THE CLASSROOM CURRICULUM DEVELOPMENT FOR NATIONAL AVIATION SECURITY INSTRUCTOR

BY
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Abstract

The study aimed to identify the objectives related to the National Aviation Security Instructor Curriculum (NASIC), employing Outcome-Based Education (OBE) principles and the ADDIE (Analysis, Design, Development, Implementation, and Evaluation) Model, and to evaluate the effectiveness of the NASIC implementation. The methodology included mixed research methods, both quantitative and qualitative methodologies, utilizing three rounds of Delphi surveys to determine the competencies of National Aviation Security Instructors (NASI). The development of NASIC was based on the analysis of expert opinions, utilizing various criteria such as positive coefficient, concentration of opinions, expert authority coefficient, and expert coordination coefficient. This process resulted in the identification of 33 competencies for NASIs. To evaluate the effectiveness of the curriculum, an experiment was conducted, involving both an experimental group and a control group. The study ensured there were no significant baseline differences between the two groups in terms of demographics and background variables. The evaluation of the curriculum's effectiveness was carried out across three dimensions: knowledge, skills, and attitudes. Statistical analysis, including Chi-square tests and Mann-Whitney U tests, was performed on the data collected from both groups. The results indicated statistically significant differences between the experimental and control groups across all three areas of knowledge, skills, and attitudes, indicating a positive impact from the NASIC implementation. These findings provide a framework for future research into applying OBE concepts and the ADDIE model to other aviation curricula.

(Total 317 pages)

Keywords: National Aviation Security Instructor, Outcomes-Based Education, Curriculum, ADDIE Model, Delphi Technique

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CHAPTER 1

INTRODUCTION

1.1 THE RATIONALE AND BACKGROUND OF THE STUDY

Terrorism threatens the security of all humanity and is a great threat to global peace. The terrorist turned civil aviation airliners into "killer bombs" in the events of 911. Because of the enormous impact of attacks on civil aviation, it has become a target for terrorist attacks, as a result of recent international media coverage of terrorist attacks at airports, there is greater awareness of the risks posed by terrorism to flight and the need for security measures in the aviation industry (Shahrabani & Regev, 2019). Civil aviation security is an extremely essential of the safety aspect of civil aviation; Aviation security failures cause far more damage than the first-line victims (Kloppers, 2020).

The history of aviation terrorism dates back to the 1930s, the first strictly and politically motivated incident occurred in 1930 when 22 Peruvian revolutionaries hijacked an airplane, an incident in which Peruvian revolutionaries seized a plane with 24 people intending to illegally cross the country's border (Rajchel, 2010). According to International Civil Aviation Organization (ICAO) records, the airplane hijacking from Macau in 1948 was the first postwar hijacking (Wolniak, 2019). Although the concept of terrorism has been upgraded in the second half of the 20th century, there is no definition that has been made public by the international legal community to date (Laskowski, 2013), but that does not affect the level of threat terrorism poses to civil aviation. In 2021, the number of attacks worldwide increased by 17 percent to 5,226.

However, the number of deaths from terrorism declined by 1.2 percent to 7,142 and is now one-third of its peak level in 2015. The slight decline in the number of deaths is also reflected in a decrease in the impact of terrorism, with 86 countries recording an improvement and 19 countries recording deterioration. Over the 12-month period, the death rate from attacks fell from 1.6 to 1.4 deaths per attack. The largest regional improvements were in Russia and Eurasia (IEP, 2022). The ninth edition of the Global Terrorism Index (GTI) notes that the threat of terrorism has escalated in recent years, and that security concerns in Asia stem from both traditional and new areas of security. The escalation of attacks and the various methods used have posed new challenges to civil aviation security, which faces new and greater threats, including the idea of "jihad" and the fearlessness of terrorists who are not afraid to die, making civil aviation security a new challenge.

The report provides a general overview of the major global tendencies and modes of terrorism in the past decade and also provides a record of terrorist attacks since January 1, 2007, encompassing more than 60,500 terrorist events that happened between 2007 and 2021. The report also notes the major terrorist forces in China are more likely to follow the actions of Al Qaeda, and that the terrorist activities of these organizations pose a greater threat to civil aviation (IEP, 2022).

In China, the terrorist threat situation in civil aviation remains critical. On 29 June 2012, six terrorists violently hijacked a flight GS7554 from Hotan, Xinjiang, to Urumqi, China, injuring some passengers and crew members. In addition to the damage caused by terrorist attacks, there are other causes of security incidents that have caused serious damage to civil aviation. Recently, the Security Committee Office of the China State Council conducted an in-depth analysis of the causes of 140 particularly serious accidents in the past 20 years and found that 120 accidents involving "human insecurity" accounted for 85.7% of the total number of accidents; 68

of them, accounting for the number of accidents involving "human unsafe behaviors" was 56.67%accounted for 56.67% of the total number of accidents." During the 13th Five-Year Plan period (2016 - 2020), 11 serious high-risk incidents occurred in China's civil aviation industry, of which 82% were human factors and 78% were crew accidents.

Therefore, safety is the core value of providing fast and reliable aviation services. ICAO advocates that governments should strengthen international cooperation in aviation safety to make commercial aircraft the safest way to travel, and advocates that the 193 contracting States around the world should cooperate to strengthen regulation and develop Global Aviation Safety Plan (GASP) to achieve the global aviation safety goal of zero fatalities by 2030 (ICAO, 2022). The GASP sets forth strategies to support aviation safety priority and sustained improvement. Together with the Global Air Navigation Plan (GANP, 9750), the GASP provides the framework for developing and implementing regional and national aviation security plans, thereby ensuring the integration and coordination of efforts to improve the safety, competency, and efficacy of international civil aviation (ICAO, 2022).

Aviation security personnel are an important part and parcel in the implementation of GASP, and in such a way as to have a large enough number of suitably competent aviation security personnel to ensure this. In the period following the horrific 9/11 terror in New York, countries have invested heavily economically, both in infrastructure and in aircraft, to improve and adapt aviation security (Tamasi & Demichela, 2011). The training of aviation security personnel is equally an important component of civil aviation personnel training. Such as The Integrated Airport Security System pillar includes operational, physical and technical pillars. The airport safety and security training is also part of the technical pillar (Burger, 2020).

ICAO launched the Next Generation of Aviation Professionals (NGAP) program to enable the development of more qualified civil aviation professionals in 2009. The NGAP initiative was launched to promote civil aviation security by ensuring that there are sufficient competent and capable aviation professionals to perform the operation, regulation and maintenance of the future international air transportation system (ICAO, 2022). The NGAP program is integrated into the global program of ICAO, including safety and air traffic navigation, as with other ICAO business plans and work programs. The ICAO Global Aviation Training (GAT) Section was established to better help global training in January 2014, and was the focal point for all training-related activities. The ICAO GAT Section is part of the ICAO Technical Cooperation Bureau. The Member States and the aviation community have developed a human resource development strategy to ensure that they have access to a sufficient number of qualified and competent personnel to operate, manage and maintain current and future air transport systems in accordance with prescribed international standards (ICAO, 2022).

In November 2017, ICAO adopted the Global Aviation Security Plan (GASeP); The GASeP outlined five priority areas for priority action, the second of which was to develop a culture of security and human capacity, including establishing and promoting a culture of security, developing/reviewing national training programs, and taking risk into account. The GASeP professionalized the workforce and ensures performance continuity and develops the basic requirement/minimal standards of competence for security personnel participating in the security operation (ICAO, 2022). Recently, \ICAO has made a lot of efforts in training, such as on November 24, 2021, a new agreement on training was recently signed, the agreement was the Airports Council International Agreement, which aimed to meet the needs of the effective performing airport criteria and proposed practices and Airports Council International best practices by providing enhanced airport training activities with airport operations and management. The agreement established an ICAO-Airports Council International accreditation process for trainers providing training in airport operations and management for the airport training sector (ICAO, 2022).

The new aviation environment has changed, which also presents new challenges to aviation safety and related training, such as the new corona virus epidemic that has occurred in recent years, which has also brought great challenges to aviation and brought corresponding changes to aviation safety challenges. The webinar hosted in June 2021 in the official languages of ICAO. Webinar themes concentrated on the fast emerging area of training since the launch of the current pandemic and emphasized the electronic learning tools and strategies being implemented by ICAO and area speakers to train ambitious and existing aviation specialists. The webinar also was intended to improve visibility into the training gains and risks brought about by the threat of a big pandemic, and to provide a forum for participants to share best practices and had constructive discussions about the new paradigm in training (ICAO, 2022).

ICAO Standards and Recommended Practices were published in nineteen annexes to the ICAO Convention (Fowler, Mathews, Lynch & Roberts, 2021). Annex 17 of ICAO Convention is an international level law and regulation that specifically addresses aviation security. The aviation security measures of each Contracting State shall be governed by the requirements of Annex 17. Aviation Security Manual (Doc8973) is a companion guidance document to Annex 17. It provides guidelines on how countries can achieve compliance with the standards and suggested approaches of Annex 17. In Annex 17 and Doc8973, each Contracting State is required to prepare a National Aviation Security Training Program (NASTP) that identifies National Aviation Security Instructors (NASI) should be trained (ICAO, 2022). ICAO developed a classroom curriculum package for aviation security instructors in 2010. In 2019 ICAO held the 6th ICAO Global Aviation Training and TRAINAIR PLUS

Symposium, which focused on examining how civil aviation training can innovate to address the opportunities and challenges facing the aviation training community. The demographic shift in the aviation industry requires transforming organizations by introducing innovation into all aspects of training. Through innovation, safer and more cost effective training methods will continually be developed. New, useful and unforeseen ideas influence the way training was delivered in aviation (ICAO, 2019).

In China, in the face of this new aviation safety environment, a number of important aviation personnel training programs have been proposed. The Ministry of Education of China has put forward a number of requirements, such as reforming and innovating the talent training model and improving the quality of talent training. With "complex knowledge, diversified ability, civil aviation literacy and international vision" as the overall goal of talent cultivation, the comprehensive quality cultivation of "professional knowledge, IT knowledge, management knowledge", "professional skills, engineering ability, innovative thinking" and "safety consciousness, service consciousness and civil aviation spirit" is strengthened. It is required to promote the construction of "new engineering" and "new liberal arts" in general higher education, promoting large class enrollment and cultivation mode, and strengthening the cultivation of multi-disciplinary, cross-professional and cross-institutional complex talents, taking advantage of international exchange and cooperation to cultivate high-quality and innovative international talents (CAAC, 2022).

With the goal of building a lifelong learning system for civil aviation talents and improving job competency, At the beginning of 2022, the Civil Aviation Administration of China (CAAC) issued a document, which requires promoting industry training, enhancing the strength of talents, strengthening the political quality education of the whole industry, serving the general situation of building a strong civil aviation country, strengthening civil aviation safety culture education, and building a "five-in-one" safety culture education and training system of safety concept, safety awareness, safety system, professional ethics and professional spirit. Every civil aviation college and universities were required to focus on central work, grasp accurate training, promote key projects by classification, strengthen the training of new technologies and knowledge, enhance the ability of intelligent development, strengthen the accurate training of various types of cadres to enhance their ability to perform their duties scientifically, build a combination of full-time and part-time teachers, hybrid boutique training courses and training platforms shared by government, schools and enterprises, and improve training supply capacity (CAAC, 2022). As one of the famous civil aviation colleges in China, the Civil Aviation Management Institute of China (CAMIC) is responsible for the in-service training of civil aviation personnel nationwide, including the task of training national aviation security instructors, so it has to follow the requirements of the CAAC, and the training of national aviation security instructors must meet the new requirements of the CAAC.

In view of the international and domestic requirements for aviation personnel training, China has recently started to revise the NASTP, which was introduced in 2013, and the National Aviation Security Instructors classroom curriculum (NASIC) is one of the important elements to be revised. China established the NASTP in 2013, which also specified the courses that China's NASI should be trained in. However, nine years have passed since then, and the classroom curriculum for NASI in the program can't meet the current terrorist threat situation any more and aviation security work requirements. Therefore, there is an urgent need to revise the National Aviation Security Instructor (NASI) classroom curriculum to meet international and national requirements for NASI training.

The previous national aviation security instructor course was designed based on the traditional classroom curriculum design method, and the course design was based on the training objectives set by the experts, and the emphasis was on the training process and the implementation according to the training plan, but not on the results of the students' learning, which caused a big difference between the training and the students' abilities needed in civil aviation security positions, and the training effect was not recognized by the airports and airlines. Therefore, this research plans to adopt the OBE concept to design a national aviation security instructor classroom curriculum. Outcomes-Based Education (OBE) is important and is used in higher education classroom curriculum development. This is because OBE concept emphasizes the outcomes of student learning. By designing programs that begins with the final learning outcomes of the students and setting course objectives, course specifics, lesson plans, teaching methods, and assessments based on outcome needs, OBE is an important concept for changing educational outcomes and producing an advanced workforce with specialized knowledge (Yanawongsa, Intasingh, Nguenyuang, & Intanet, 2020). Due to the OBE concept, the classroom curriculum is designed with emphasis on the learning outcomes of the trainees and their competency in the job after training. The classroom curriculum is designed based on the competency as well as the knowledge, skills and attitudes of the aviation security instructors required, which can ensure the job competency of the trainees in the job after training to a large extent, which is also consistent with the requirements of ICAO and China for in-service personnel training.

Many countries have introduced the OBE concept into their education and training systems in recent years. For example, in the Philippines, the Commission on Higher Education (CHED) of the Philippines a series of CHED Memorandum No. 46 was adopted in 2012, establishing standards for policies to enhance the quality assurance (QA) system of higher education in the Philippines through capacity-based standards and learning outcomes. CHED argues strenuously for a change from a teaching or guidance-centered model to a more student or learner-centered approach in higher education within a pedagogical framework of lifelong education. The student or learner-centered approach in higher education demanded a change from a more participatory to a classroom curriculum design-oriented focus content to “OBE” which classroom curriculum content is designed based on study outcomes. Learners know what they should understand and know what they should be able to master after completing modules of study. Then, teaching and evaluation are aimed at acquiring appropriate knowledge and skills (Castillo, 2014). In 2012, U.S. scholars applied the OBE concept to undergraduate homeland security classroom curriculum design, the academic programs leading to a degree that prepare the next generator of homeland security entrepreneurs based on the OBE concept focused on student learning results for undergraduates degrees in the area of homeland security, and student learning outcomes were a reliable indicator of the knowledge, skills, and abilities students had learned (Cutrer, 2012, 2017). The ICAO approved training course developed strictly following the competency-based training approach can ensure that the trained personnel will eventually acquire through the training. Competency-based is also an important part of the OBE concept, which also takes the competencies acquired by the final trainees as the starting point to reverse the design of the course objectives and the related teaching activities designed to enable the acquisition of these competencies (Huang, 2017). In China, adult vocational training has also been proposed in recent years to be based on student learning, OBE concept is widely used in engineering and other fields, but it has not been widely applied in civil aviation course design. In April 2022, the CAMIC implemented the requirements of the CAAC for civil aviation vocational institutions and proposed to start building an outcomes-oriented civil aviation cadre training classroom curriculum system (CAMIC, 2022). The NASIC to be developed in this research meets this requirement and is a meaningful exploration of applying OBE concepts to aviation security personnel courses.

The national aviation security instructor course design concept determined to be based on the OBE concept, so what classroom curriculum design model should be chosen to implement the OBE course design concept? After studying among many classroom curriculum design models, the researcher selected ADDIE classroom curriculum design model because it is a classroom curriculum design model that is very much in accordance with the characteristics of civil aviation courses. In addition, there were few studies on OBE that were integrated with the ADDIE classroom curriculum development model.

ADDIE model originated in the 1970s (Cheng, 2020). The model designed for Florida State University for in-service training of military personnel; it was slowly being used in other areas of education or training (Bamrara & Chauhan, 2018). The model is a model for educational design (Nevzorov, 2021). The model is a commonly used model for classroom curriculum design and is divided into five main phases, mainly including analysis (abbreviated as A), design (abbreviated as D), development (abbreviated as D), implementation (abbreviated as I) and evaluation (abbreviated as E) (Budoya, Kissaka & Mtebe, 2019). ICAO developed courses based on a development method that is based on the theory that trained personnel acquire competencies through training, using the ADDIE course development model, which is commonly applied by ICAO in the development of training courses and is also generally accepted by civil aviation countries (Huang, 2017). The NASIC design in this research followed the ADDIE classroom curriculum design model was also in line with the ICAO classroom curriculum design requirements, and was a bold attempt and application of the ADDIE concept to the Chinese civil aviation classroom curriculum.

1.2 SIGNIFICANCE OF THE PROBLEM

The current capabilities and levels of NASI vary and needed to be regulated through rigorous and formal training. Teachers play a very important role in maintaining and improving the quality of teaching and learning (Rahman, Kadir, Mohammad, & Moin, 2017). In the field of aviation security, NASI are very important role, their quality and training ability directly determines whether the front-line security personnel of airports and airlines can complete the security work with quality and quantity, if the front-line security personnel would not implement and enforce the security measures 100% then it will cause security risks and that's why the training of NASI is so important.

The current NASI training classroom curriculum was designed mainly from theoretical aspects, lacking integration with practice, and couldn't meet the needs of NASI in the three aspects of knowledge, skills and attitudes in their daily security training work. Traditional education and training involved the teacher as a towering scholar who dictated the content of the course and the pace of the lesson, but the times called for a more flexible learning style where the learning can involve participation in the lecture process (Rahman et al., 2017). Many measures of aviation safety and aviation security need to be implemented in practice, and aviation security training is necessary and essential in the implementation of these measures. In the field of civil aviation personnel training, pilot training was the first to receive attention, and as early as 1986, NASA organized a seminar for the civil aviation sector to talk about issues related to pilot training (İnan, 2018). However, not many studies had been conducted on the training of aviation security personnel, which is also very important as part of the flight crew. There is a need to switch the training methods that the training of NASI can be being effective in training, so that the NASI can be satisfied and improved in all three aspects of knowledge, skills and attitude.

The current NASIC, developed in 2013, was nearly nine years old, and its content did not meet the current terrorist threat landscape, for example, cyber threats have become one of the greater threats to civil aviation security in the future. Current aviation security systems all incorporate protection against cyber threats (Kloppers, 2020). The threat was shifting from the airside to the landside, to the public domain. The boundaries of safety and security should be extended (Willemsen & Cadee, 2018).

ICAO has an NASIC, but it was developed in 2010, 12 years ago, and no longer met the needs and requirements for NASI in all aspects of the current aviation security situation and work. Such as over the past two decades, the U.S. Department of Homeland Security (DHS), through the Customs and Border Protection (CBP) and the Transportation Security Administration (TSA), has implemented a variety of new screening and identification methods at U.S. airports to ensure aviation security, particularly the using of biometric to enhance civil aviation security (Acquista, 2020).

In order to solve the above problems, the national aviation security instructor classroom curriculum was designed based on the OBE concept, the classroom curriculum is designed in the reverse direction according to the final results to be achieved, that is, based on the final job competencies to be achieved by the national aviation security instructor as the starting point of the classroom curriculum design, reverse design classroom curriculum objectives, classroom curriculum structure and classroom curriculum content and other specific elements. The classroom curriculum designed with the OBE design concept ensured that the trainees can meet the needs of the job after training and improved the effectiveness of the training.

The classroom curriculum adopts ADDIE classroom curriculum design model, in this stage of analysis is divided into preliminary analysis, job analysis and training object analysis, preliminary analysis referred to the analysis of the problems in the field of aviation security operations whether the problems can be solved by training; The job analysis referred to the analysis of the national aviation security instructor position, referred to this position needs to master what kind of knowledge, skills and attitudes; Training object analysis referred to the current participation in the national aviation security instructor population in general has what kind of characteristics, according to their characteristics targeted design course teaching methods and other contents. The classroom curriculum evaluation was also based on the OBE concept, which assessed the classroom curriculum against the objectives defined prior to design, which ensures that the implementation process was structured around the job competencies originally defined in the classroom curriculum for national aviation security instructors. All of these analyses would make the NASI classroom curriculum more focused and more in accord with the requirements of the current international and domestic counter-terrorism situation and the implementation of current security measures for the position of NASI.

1.3 SIGNIFICANCE OF THE STUDY

This research deepened the understanding of the NASI position and the responsibilities of the NASI, and this research provided new insights into designing a security classroom curriculum that met the needs of the position.

In addition, this research specifically combined the OBE concept and the ADDIE model to design a classroom curriculum. It was common to design a classroom curriculum based on the OBE concept or using the ADDIE model to design a classroom curriculum, but not many combined them in classroom curriculum design, especially in the field of civil aviation security. This research provided new perspectives and insights for both international and domestic aviation security training fields.

This research had important implications for stakeholders such as NASI, NASI' units, NASI' supervisory authorities (the regulators), and ICAO security course design authorities.

National Aviation Security Instructors (NASI)

The results of this research had important implications for national NASI. The results of the research on the competencies required for the national aviation security position reminded NASI to be more clear about the duties of their position and what knowledge, skills, and attitudes they should have around the duties of their position and be able to guide NASI on what their daily training and efforts should be based on the competencies of the position, and as a result of the research, the competencies that NASI can be better able to perform their duties and responsibilities in their positions and meet the training requirements of the security measures.

National Aviation Security Instructors' Units

This study provided a solution for NASI' assignment units to enhance the effectiveness of training to ensure the effective implementation of security measures in civil aviation and the continued safe operation of civil aviation. As there was now a consensus in the aviation industry, the effective implementation of aviation security measures by security officers can only be ensured if aviation security training can be done properly and provided an effective training purpose. This study provided airports and airlines with a favorable grip to ensure the quality of training, and airports and airlines can refer to the concepts and models in this study when doing aviation security internal training to promote the quality of aviation security training in their organizations.

The Regulators

This study also provided a possible solution for regulators to improve the quality of aviation security training. The classroom curriculum design concepts and models in this study can also be replicated for other aviation security training, as aviation security training courses have relevant features. This study provided a reliable model for regulators on effective design of aviation security courses. Regulators could consider extending the classroom curriculum from this study to all security courses in domestic security and could draw on the evaluation of the classroom curriculum in this study to assess the effectiveness of all aviation security courses. This will improve the overall level and quality of aviation security training and ensure the effective implementation of aviation security measures.

ICAO security course design authorities

This study provided a model for ICAO to revise the aviation security instructor classroom curriculum. Although there was a slight difference between the duties of international and internal aviation security instructors, the duties of NASI are more than those of international aviation security instructors, the duties of NASI cover those of international aviation security instructors, and this study provided both theoretical and practical reference value for ICAO to revise the aviation security instructor classroom curriculum in the future.

1.4. RESEARCH OBJECTIVES

This research has three objectives.

To identify the objectives of the National Aviation Security Instructors Classroom Curriculum.

To develop the National Aviation Security Instructor Classroom Curriculum.

To evaluate the effectiveness of the National Aviation Security Instructors Classroom Curriculum implementation based on OBE concepts.

1.5 RESEARCH QUESTIONS/HYPOTHESIS

The questions and hypothesis in this study are mainly in the following three aspects:

RQ1: What are the objectives of the National Aviation Security Instructors Classroom Curriculum?

RQ2: What are the contents included in the National Aviation Security Instructors classroom curriculum?

RQ3: What are the effects of the National Aviation Security Instructors Classroom Curriculum on knowledge, skills and attitudes?

H3: There are differences in the effect of knowledge, skills, and attitudes between the National Aviation Security Instructors classroom curriculum designed with the OBE concept and designed with the traditional method.

1.6 RESEARCH FRAMEWORK

This study mainly used the OBE concept and the ADDIE classroom curriculum design model, and the relationship between these two theories was a complementary one, independent of and connected to each other.

The relationship between the two can be represented by the following Figure 1.1.

As shown in Figure 1.1, this study mainly adopted the ADDIE model of curriculum development, which was divided into five main stages, curriculum analysis, curriculum design, curriculum development, curriculum implementation and curriculum evaluation. Each of the five phases was based on the OBE philosophy, which has three main core principles, 'Outcome-Based', 'Learner-Centred' and 'Continuous Improvement'. In the analysis phase reflect the OBE philosophy of results-oriented principles, that was, first of all, an analysis that what results NASI should achieve after attending the classroom curriculum, which was the basis of classroom curriculum development (Light pink in Figure 1.1). The Delphi expert method was used to analyse the competencies that NASI should have, the details of which are described in Chapter 3.

The second stage of curriculum development was the classroom curriculum design stage, which includes the design of curriculum objectives, curriculum structure, curriculum content, etc. The objectives of the curriculum were based on the outcomes of the curriculum as well as the competencies that NASI needs to achieve. The competencies were divided into knowledge, skills and attitudes, and in order to be able to achieve the outcomes in all three areas, the objectives were also divided into three categories, knowledge, skills and attitudes. The curriculum content was designed around the objectives of the curriculum, and then a pyramid structure model was used to build the curriculum structure according to the curriculum content (Light Yellow in Figure 1.1).

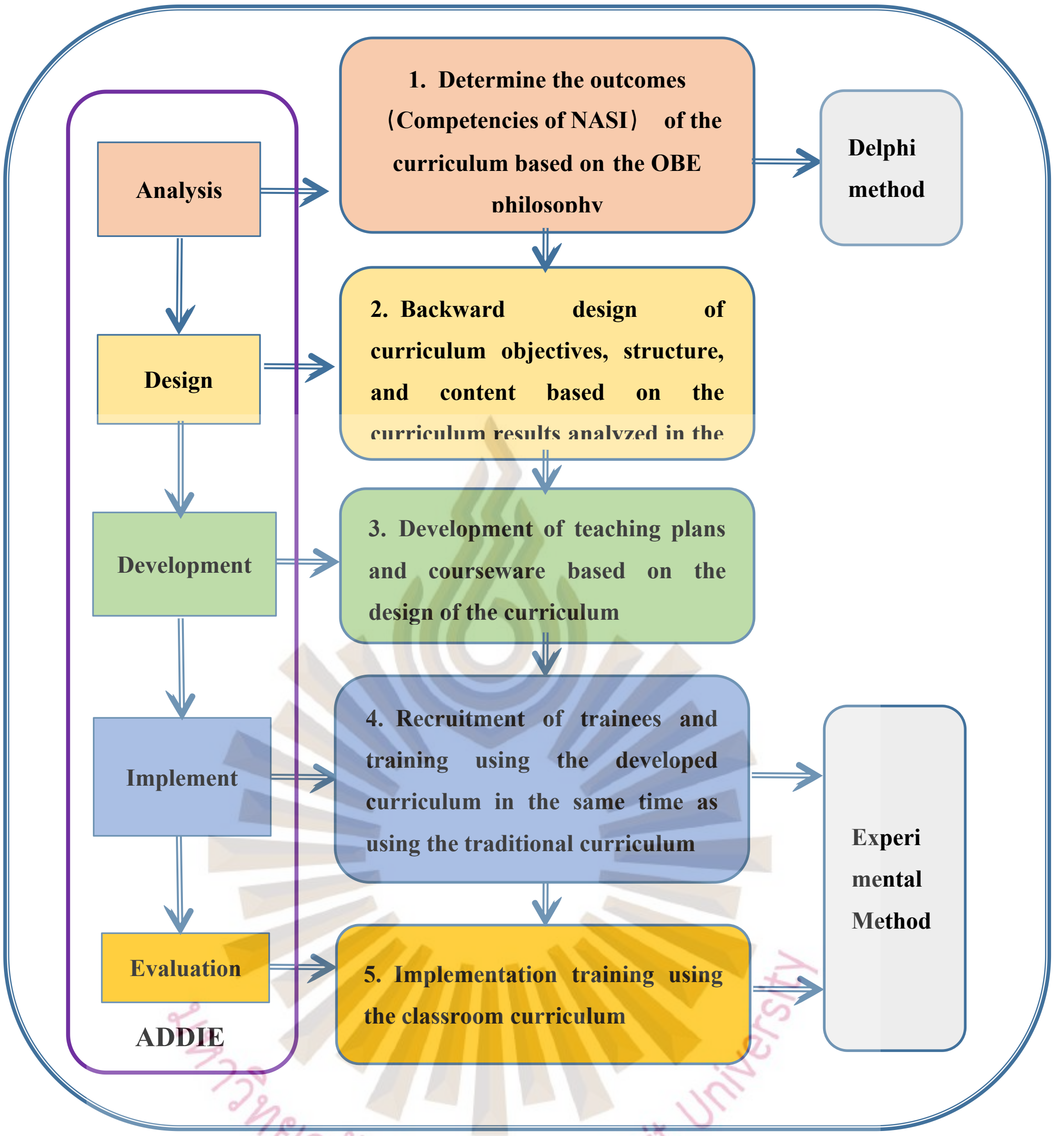

Figure 1.1 Theoretical Frameworks

In the curriculum development phase, teaching plans and courseware were developed around the objectives, content and structure of the curriculum, resulting in teaching materials for classes (Green in Figure 1.1). In the implementation phase of the curriculum, an experimental research method was used, with the experimental group attending classes using the curriculum developed in this study and the control group attending classes using the traditional curriculum, both groups were trained and assessed over five days (Blue in Figure 1.1). The fifth stage was the evaluation of the curriculum, which evaluated the effectiveness of the curriculum developed in this study by comparing the results of the two group examinations.

1.7 SCOPE OF THE STUDY

1.7.1 Research Methodology/Type of Research

A mixed qualitative and quantitative research approach were used in this research. The research focused on developing a NASIC and evaluating the effectiveness of the classroom curriculum through its implementation. The main implementation methods and processes are shown in the Figure 1.2.

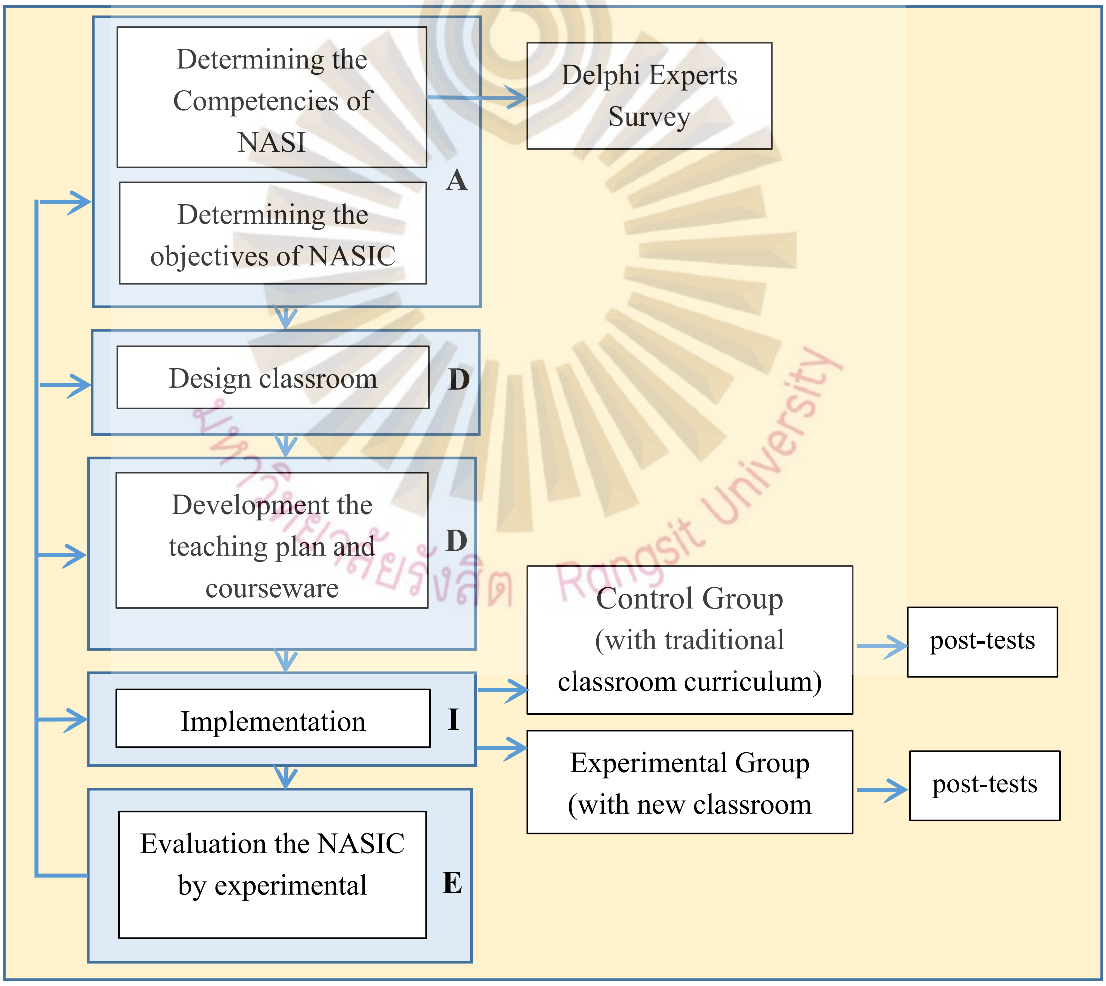

Figure 1.2 Flow diagram of the Research Procedure

As shown in Figure 1.2, indicator pool of national aviation security instructor competencies developed through a review of the literature and national legal and regulatory requirements for national aviation security instructors, and then a Delphi expert Survey was used to determine the job competencies of NASI, the three aspects covered are knowledge, skills and attitudes. At the stage of classroom curriculum design, the objectives of the classroom curriculum were first determined on the basis of the competencies that NASI should possess, and then the content of the classroom curriculum were determined on the basis of the objectives of the classroom curriculum, including the main contents and units in the classroom curriculum, etc. In the classroom curriculum development phase, the teaching plan and courseware were developed.

The implementation phase of the classroom curriculum was with a 5-day training classroom curriculum. In this phase, the main method of quantitative analysis were used, and the participants were divided into two groups, an experimental group and a control group. The experimental group was trained with the classroom curriculum developed in this study, and the control group was trained with the traditional version of the National Aviation Security Instructor's classroom curriculum.

The participants in the experimental and control group both completed post-tests on knowledge, skills and attitudes after they were trained. The researcher used SPSS software to conduct statistical analysis on post-test scores to explore the differences between the experimental and control group in order to evaluate the effectiveness of the new NASIC based on OBE concepts. At the same time, the training results of the experimental group were compared with the previously set classroom curriculum objectives to evaluate whether they has achieved the expected training objectives set by the OBE concept.

The classroom curriculum design and development were revised based on the results of the evaluation. This is in accordance with the core elements of the OBE concept of continuous improvement.

1.7.2 Location of the Research

The research location was in Civil Aviation Management Institute of China (CAMIC). Specifically, the research conducted in multimedia classrooms at the Kunming campus where prospective National Aviation Security Instructors were trained to evaluate the implementation process of the National Aviation Security Instructor classroom curriculum.

1.7.3 Research Population

The population of this study are the National Aviation Security Instructors (NASI) of around 2,000 instructors in China. They are all in-service staff in the field of civil aviation security in China.

1.7.4 Research Sample

For ensuring the statistical power considerations are indispensable for the evaluation of statistical decisions as well as for designing research, the researcher used the G*Power software tool that facilitates the implementation of various kinds of power analyses to calculate the sample size in this study. In the experimental, the expected number of the research participants was calculated by the researcher using the statistical free software G*Power 3.1.9.7 (Faul et al., 2009) (Version 3.1.9.7 developed in 2020) by setting the input and output parameters. The number of expected participants in this research was 128 through G*Power priori analysis. The 128 participants were randomly assigned to the experimental and control group. The 128 participants divided into two groups using random numbers on a computer; the odd numbers assigned to the experimental group and the even numbers to the control group, it made each group consist of 64 participants. The details of calculation were demonstrated in Chapter 3 underneath the topic of Sample Size calculation.

During the evaluation phase of the classroom curriculum, the researcher issued a training bulletin to 360 airports and airlines in China through CAMIC. In the bulletin, the researcher detailed information such as the date, location and objectives of the training classroom curriculum. In the meantime, the researcher recruited 128 participants as sample through the bulletin. This also ensured the randomness of the sample.

Delphi Method

Because this study was based on the OBE concept to design NASIC, then the first step was to determine what outcome that students achieved after training. For NASI, the competencies needed include three aspects, the knowledge that NASI needs to acquire, the training skills that NASI needs to acquire, and the attitude that NASI needs to have. Therefore, the specific content of the post-training learning outcomes for trainees needed to be determined using the Delphi survey. Since Delphi survey are often used as a unique research tool for iterative online surveys, the Delphi survey may be most effective in educational research when the questions themselves are not amenable to precise analytical techniques but could benefit from subjective judgment on a collective basis (Cutrer, 2017).

This study reviewed a large amount of literature showing that the choice of the number of Delphi experts has been variously stated, and the number of experts chosen varies depending on the content of the study. For example, Adler and Ziglio (1996) and Linstone and Turnoff (2002) proposed that an acceptable number of participants for a Delphi study range from 10-30, with an optimum number of 10-20. Okoli and Pawlowski (2004), comparing traditional surveys with the Delphi method, suggest that the size of the Delphi group does not depend on statistical power, but rather on the group dynamics for arriving at consensus among experts, and therefore the literature recommends a Delphi panel of 10-18 experts (Paliwoda, 1983). With reference to the views of the above scholars and the actual situation of this study, this study finally decided that the number of Delphi experts is 18.

There is limited consensus among researchers on 'what an expert is' (Baker, Lovell, & Harris, 2006). Some researchers have argued that too narrow definitions of experts reduce the potential sample size available (Duncan, Nicol, & Ager, 2004). However, the definition of expert should be precise and rigorous to ensure that the findings are reliable. Therefore, in accordance with the research objectives of this study, the criteria chosen by the Delphi experts in this study will be the following three qualifications:

1) The experts are certified as a NASI qualification over 5 years.

2) The experts have experienced at least 500 hours of lectures.

3) The experts are at least a training supervisor level in an airport or airline.

Based on the above criteria, the researcher selected 18 qualified experts and conducted three round Delphi survey through the Questionnaire Star.

1.8 TIME FRAME

Table 1.1 Time Frame

Plans	2022 year May -July	2022 year July - September	2022 year October-December	2023 year January - June	2023 year June -December	2024 year January
Determine the thesis topic	√					
Literature Review, search, and study-related materials	√					
Research design and methodology	√					
Complete three chapters		√				
Proposal defense of three chapters		√				
Data Collection			√	√		
Data Analysis				√		
Results and discussion					√	
Conclusion and recommendations					√	
Submission for final defense						√

1.9 DEFINITION OF TERMS USED IN THE STUDY

The operational terms used in this study are defined as follows:

Outcomes-Based Education (OBE) refers to the educational concept of continuous improvement of the training classroom curriculum, which is oriented towards the job competencies that the National Aviation Security Instructors will have after training and is centred on the training needs of the National Aviation Security Instructors.

National Aviation Safety Instructors (NASI) refers to the trainers who are responsible for, or participate in specialized aviation safety training. They have significant responsibilities for aviation safety training. National Aviation Safety Instructors who use the post-training system should obtain a license through Civil Aviation Safety Training Institute on training and qualification assessment, which are approved by the Civil Aviation Administration.

Classroom Curriculum refers to a set of electronic and paper-based materials used by National Aviation Security Instructors (NASI) for training the aviation security trainees, including learning objectives, learning content and classroom curriculum modules, teaching methods and evaluation methods, etc.

National Aviation Security Instructors Classroom Curriculum (NASIC) refers to the classroom curriculum based on the OBE concept designed and developed specifically for certification National Aviation Security Instructors.

Delphi Experts refers to the security experts with extensive aviation security training experience and will be invited to participate in this study to determine what competencies National Aviation Security Instructors should have.

Classroom Curriculum Development refers to the process of setting classroom curriculum objectives and classroom curriculum contents around the final job competencies to be achieved by the National Aviation Security Instructors based on the OBE concept, and forming the final courseware.

Classroom Curriculum Evaluation refers to the classroom curriculum evaluation will be done by the researcher collecting and analyzing the assessment data in the three areas of knowledge, skills and attitudes after the implementation of the classroom curriculum.

Knowledge refers to the aviation security expertise and teaching pedagogy-related professional knowledge that the National Aviation Security Instructors should have in the position of an instructor.

Skills refers to the competency that the National Aviation Security Instructors should have in the position of instructor, such as creating courseware and power point, writing lesson plans, and delivering lessons.

Attitude refers to the mindset that the National Aviation Security Instructors should have to perform their duties and responsibilities in the instructor position.

1.10 LIMITATION OF THE STUDY

There are some limitations in the following aspects:

1) Due to the situation of the epidemic, only one control group and one experimental group were selected for this study, with a total sample size of 128 participants, which is not a large enough sample for a population of 2,000 NASI to account for the full characteristics of the overall population and to make very comprehensive conclusions.

2) Since the aviation security profession is a measure against illegal outside interference and terrorists, much of the information is classified as confidential. Therefore, relatively little relevant information and literature could be collected from public sources during the study, which limited the width of vision of this study which made the study limited in width and depth.

CHAPTER 2

LITERATURE REVIEW

The main components of this literature review include: the OBE theory, the ADDIE theory, the Delphi method, and the National Aviation Security Instructors Curriculum. This chapter has summarized, synthesized and critiqued the relevant research literature. The following topics will state the details.

2.1 THE OUTCOME-BASED EDUCATION (OBE)

2.1.1 The Outcome-based Education (OBE)

OBE has been advocated for over 60 years. The early theoretical orientation of the Outcome-based education (OBE) was behaviorist, Tyler introduced the idea of educational goals in 1949 (Tyler, 1949). OBE theory was proposed by Spady in 1981 on the basis of Taylor's principle, competency-based education and other theories (Bin & Ming, 2021). This approach is the prototype of result-based OBE. According to the OBE concept, learning objectives dictate curriculum design, and curriculum objectives are reflected in changes in student behavior that reflect the achievement of objectives through changes in student behavior. The concept of educational goals caused a lot of impact at that time. Learning objectives are an important part of educational objectives. Bloom and colleagues divided cognitive learning objectives into three areas: knowledge, skills, and attitudes (Bloom, 1956). This wave of advocacy for curriculum goals reached its peak in 1970 (Bloom, 1968; Briggs & Gagné, 1974; Mager, 1962). In the late 1960s and early 1970s, as a result of the writings of Bloom and Block, an outcomes-based approach to education first emerged (Malan, 2014).

By the mid-1970s, OBE was opposed by some critics, with dissenting voices suggesting that predetermined outcomes were not the only way to organize curriculum (Stenhouse, 1975), but in the 1980s, OBE was revived by adhering to the behaviorist principles of the earlier competency movement. Since then OBE has been introduced into the domestic education system by many countries, and the first area of application was in the field of engineering education. This has laid a solid foundation for the rapid development of OBE later.

2.1.2 The Outcome-based Education (OBE) Theory

2.1.2.1 The Definition of OBE

OBE has been defined and understood differently at different stages of time from the time it was proposed until today. It has been argued that OBE is an effective approach to curriculum design for quality instruction based on the Bloom-Anderson Taxonomy of Learning (Anderson & Krathwohl, 2001; Bloom, Engelhart, Furst, Hill, & Krathwohl, 1956). Killen looked at OBE in three different ways-as a theory of education, as a systemic structure of education, or as classroom practice. As the proposer of OBE, Spady, had his own understanding of OBE, Spady states that what and how students learn is more important than when and how they learn. It is also noted that the concept of outcome-based models and systems is not new, as the craft guilds of 500 years ago were examples of outcome-based systems. Spady also noted outcomes-based education means a clear focus and organization in the education system around what is necessary for students to be able to succeed at the end of their learning experience. Spady (1994) defined OBE as an integrated educational philosophy in which outcomes are explicit, that is, students are presented with clear results at the end of their learning.

In the 19th century, some scholars proposed a more comprehensive and novel understanding and definition of OBE based on the previous understanding of OBE. OBE was a theory or philosophy of education because it embodies and expresses a certain set of beliefs and assumptions about learning, teaching, and the systemic structure in which these activities occur. Ultimately, the systemic structures and classroom practices need to be aligned with the theory in order to obtain a true outcomes-based education (Malan, 2000). Some scholars and practitioners of OBE used various terms and concepts to define the OBE paradigm, such as Outcomes-Based Teaching and Learning (OBTL) (Biggs & Tang, 2007), Learner-Centered Teaching or Student-Centered Learning (Weimer, 2013; Driscoll & Swarup, 2007). Student-Centered Learning (SCL) includes artificial OBE as outcomes and competency-based education (Morcke et al., 2012). The core concept of OBE was to shift the focus of research from teaching to the learning process (Barr & Tagg, 1995).

The understanding and definition of OBE in this study is more in agreement with the following two views presented in 2019 and 2021. The OBE is a holistic approach to education that is very clear about the learning outcomes and goals that students should achieve. Organizing curriculum, instructional activities, assessments all should base on the outcome and goals to ensure student learning outcomes (Li, Wang, & Tang, 2019). The OBE philosophy emphasizes the importance of first having a clear idea of what learning-to-outcomes students should have or expect to achieve as a result of their learning, what outcomes are important to students, and designing curriculum, organizing instruction and assessment should base on these outcomes to ensure that students ultimately learn them (Tenedero & Pacadaljen, 2021).

These two understandings of OBE are more conducive to the identification in NASIC of learning outcomes to be achieved by NASI as a result of their training and it is also more conducive to curriculum design that ultimately meets the requirements of the NASI position for instructor competency.

2.1.2.2 Core Elements of OBE

According to the different understanding and definition of OBE concept in different periods, the core elements of OBE had been presented differently with the development of the times. Spady, the originator of the OBE concept, and related researchers argued that the OBE is built on three basic premises: (1) all students can learn and succeed (but not on the same day and in the same way); (2) success breeds success; and (3) schools control the conditions for success (Spady & Marshall, 1991). Based on the prerequisites of their proposed OBE, in 1996 Towers listed the necessary conditions for OBE to work: the first, it must be clear what students are to learn. The OBE concept was to first determine the desired outcome before developing a course, and to design the course based on the outcome (Chase Furman, 1994; Fitzpatrick, 1995). The second, student achievement must be used to demonstrate student progress, moreover, student learning outcomes under the OBE concept must be observable and measurable performance of students (Abd Majid, 2016). The third, instructional and assessment strategies needed to meet the needs of each student; The fourth, each student must be allowed to reach his or her maximum potential by providing the necessary assistance to do so.

On the basis of the prerequisites and requisites of OBE, Vanderhorst and McDonald argued that competency-based education is based on six key components: (1) clear learning outcomes and the skills and competencies required; (2) a flexible time frame for mastering those competencies; (3) a variety of instructional activities to promote learning; (4) outcomes required to provide criterion-referenced tests; (5) certification based on evidence of learning outcomes; and (6) the best possible instruction for learners. All six of these components are prominent in the OBE approach and are key OBE principles. Competency-based education also supported the view that learners are responsible for their own achievement (Malan, 2000).

On the basis of these theories, Spady and Marshall proposed four additional key principles of OBE. The first was to ensure an explicit focus on important outcomes. Outcomes became the starting point, the starting point, the focus, and the ultimate goal of curriculum design and instruction. Schools that offer an OBE philosophy align curriculum, instruction, assessment, and credentialing with the intended goals and processes. The second was to design the curriculum retrospectively based on the final learning outcomes, identifying the outcomes before designing the curriculum and instruction based on the outcomes; The third was to work backwards from the final outcomes to the process of teaching and learning to ensure that all parts of the process had been prepared to achieve the outcomes; The fourth was to maintain high expectations for the success of all. Because the completion of outcomes was challenging for students, high levels of performance should be expected from all and rewarded for completion (Castillo, 2014). The fourth of these views was consistent with those of some scholars who believed that OBE is based on the principle of success orientation, meaning that the idea is that all learners are expected to succeed. Much of the philosophy of OBE was based on the model of mastery learning, which was about expanding opportunities. This approach to learning assumed that all learners can succeed if they were given the time and support they need (Gouws, 2007). In the same period, some scholars also proposed another great feature of OBE was the success-oriented principle, which referred to the expectation that all learners would succeed. Much of the philosophy of OBE was based on the mastery learning model of expanded opportunity. This approach to learning assumes that all learners can succeed if they were given the time and support they needed (Gouws, 2007). Another great advantage of OBE was that there were clear course objectives before the entire course was implemented, and these objectives and the associated major steps can determine the ultimate value and effectiveness of the course (Green et al., 2009; Hager, 2006). In turn, a precise definition of educational outcomes provided clear goals for the curriculum (Bond et al., 2017).

Based on the comprehensive OBE conditions, principles and six components, this study agrees more with the three core elements that are simpler and better reflect the core concept of OBE as proposed by some scholars. Scholar Gouws (2007) argued that OBE can be described as an approach that requires educators and learners to focus their attention on the desired end results (outcomes) of each learning process and the instruction and processes that should be given in order for scholars to achieve those learning outcomes. Therefore, OBE was considered to be a learner-centered and outcome-oriented approach to learning. The three core elements of the OBE concept was widely recognized as "learner-centered, outcome-oriented, and continuous improvement" (Weiss & Aldridge, 2002). Because these three core elements reflect the core concept of OBE, they are also easier to understand and implement in the real curriculum design, and have a very great significance in guiding the determination of curriculum objectives in curriculum design, so this study adopts these three core elements of the OBE concept as the core principles for designing the NASIC and "the ultimate training learning outcomes for NASI as the guiding principle, NASI centered, continuous improvement of the NASIC".

2.1.2.3 Function of OBE

The origins and core elements of the OBE were described earlier, and these showed that OBE is a system of education that prioritizes goals, objectives, achievements, and outcomes. It was a realistic approach used worldwide today as part of a quality assurance strategy in which the learning outcomes that students can achieve at the end of a course determine the content of instruction and curriculum (Rao, 2020).

The OBE concept plays an extremely important role in the field of education because of its inherent qualities, and can be applied in many professional fields. Learning outcomes are also referred to as intended learning outcomes, instructional goals, educational goals, behavioral goal-specific learning outcomes, and competencies. The main strengths of OBE are its relevance, potential for discourse, inherent clarity, accountability, autonomy, flexibility, and an integrated framework for teaching, learning, and assessment. OBE can be adapted to different learning styles and can enable innovation in teaching and learning (Davis & Winch, 2015).

The shortcomings of traditional education are becoming increasingly evident and challenged, and education must be reformed in which a clear focus, expanded opportunities, and high expectations are the cornerstones of reform. These three characteristics are the important principles in OBE philosophy education (Davis, 2003). The OBE concept is a reformation of the traditional learning philosophy, because OBE is "the product defines the process". The traditional curriculum design is input-based, and input education emphasizes the educational process, that is, the design of the curriculum process from the starting point of the curriculum objectives, so as to arrive at the educational results. However, OBE is to determine the final outcome that students get through learning first, and then design the curriculum based on the outcome in reverse. This curriculum design process ensures that the final learning outcomes of students, students can have clear learning outcomes after education, which makes learning more effective, especially for the training based on job requirements, the curriculum designed through the OBE concept to train students can meet the needs of the job more (Davis, 2003). Scholar Jessup argued that education or training is defined by outcomes and that the OBE concept opens up access to learning and assessment in ways that are not possible in traditional education. Many of the problems faced in traditional education and training can be solved by OBE if learning is targeted by outcomes (Harden, 2007). In fact, this is consistent with the view of many researchers of OBE concept, that OBE concept education makes up for many drawbacks in traditional education, can make education more focused, can achieve the purpose of education, through the OBE concept education out of students more adaptable to society, their learning outcomes can be more quickly matched with the needs of society. The OBE philosophy of education makes students more useful to society and helps them to be successfully employed and create value for society. The OBE philosophy education is the future direction of education.

2.1.3 OBE Research

2.1.3.1 Status of OBE Research

In 1992, Spady, the originator of OBE, said that OBE had been implemented in many schools over the past 20 years, and that tracking data showed that OBE implementation still had a positive effect on education, and that many schools would choose OBE education in the future when they faced major changes (Brandt, 1992). OBE is currently one of the trends promoting educational reforms and policies in the international arena. In the following decades OBE had been developed extensively in various countries and in various disciplines. It has been implemented in many countries such as the United States, Canada, Australia, New Zealand, South Africa, Malaysia, and the Philippines (Akir, Eng, & Malie, 2012). In 1994 Spady proposed a results-oriented pyramid model, which included an execution paradigm (Spady, 1994). In recent years, the United States, the British, the Philippines, Pakistan, China and many other countries have implemented different paradigms of education systems in different fields based on the OBE concept.

In the United States, the best-known educational system based on the OBE concept is Accreditation Board for Engineering and Technology (ABET). The origins of ABET date back to 1932 when the Engineers Council for Professional Development (ECPD) was formed by seven engineering societies. The ECPD was conceived as a professional body dedicated to the education, certification, regulation, and professional development of engineering professionals and students in the United States. In 1980, it was renamed ABET to accurately describe its emphasis on accreditation (Cabezas, 2015). ABET contains a set of procedural standards for accreditation purposes in which the essential elements include student achievement outcomes and continuous improvement. The student outcomes describe what the student should know and be able to do upon graduation. This is the standard set based on the OBE philosophy (ABET, 2022).

The most famous area of application of the OBE concept in Europe is European Higher Education Area (ESG). The ESG was published in 2005 by the European Association for Quality Assurance in Higher Education (ENQA) and the European Students' Union (ESU), the European Association of Higher Education Institutions (EURASHE) and the European University Association (EUA). The Standards and guidelines for quality assurance were originated in the European. Since 2005, considerable progress has been made in quality assurance and other Bologna initiatives. The 2012 Ministerial Communiqué invited the E4 Group (ENQA, ESU, EUA, and Eurasia) with International Education Cooperation (EI), Business and the European Quality Assurance Register for Higher Education (EQAR) to revise the ESG.

This revised version was published in 2015. The core concept of ESG is based on the OBE concept, such as the Qualifications Framework, recognition and promotion of the use of learning outcomes, all of which have led to a paradigm shift towards student-centered learning and teaching (ENQA, 2015).

In 2012, China also began experimenting with the OBE concept as an educational paradigm, as described in the next section.

2.1.3.2 Application of OBE in NASIC

The introduction of OBE concept in China is a little later than in the United States and Europe, but in recent years the development in China is also very rapid. In 2012, the Chinese government and the European Commission launched the Sino-European Tuning Joint Project under the Sino-European Higher Education System. The EU team consisted of 10 members, 6 academic experts, and 4 Tuning experts including the coordinator and project manager. The Chinese team included Dr. Dou Advanced, Dr. Lu Haihong, Deputy Director of Law at the Ministry of Education, three senior academic coordinators of the disciplinary team, the and a full support team of subject matter experts and researchers from Chinese universities (Wagenaar, Gipin, Benetoine, & Soeiro, 2015). The first phase of the Sino-European Joint Tuning Project was launched in three disciplines: Business Administration, Civil Engineering and Comparative Education, with Xi'an Jiaotong University, Tongji University and Beijing Model University as the leading institutions respectively (Augusti & Soeiro, 2013). One of the objectives of the pilot study was to strengthen outcome-based education, also termed as OBE concept. Since then China's education paradigm based on the OBE concept had also been started. Through a year of practice, it was found that the student-centered and competency-based Tuning method is well suited to the strategy of higher education reform in China, and had obvious reference value for the cultivation of talents in higher education in China. China experimented with other paradigms that focus on the OBE concept, such as the DQP paradigm in the United States. The DQP paradigm is based on the goal that by 2025, at least 60% of students in the United States will receive a high-quality college or university degree. In order to address this goal of high quality, the American Lumina Association convened experts to discuss and finally combined the European Tuning model based on the integration of the special DQP paradigm suitable for the American context, the core of the DQP paradigm is still oriented to the final learning outcomes of students, which is also based on the OBE concept (Matthews, 2012). Guangdong Lingnan Vocational and Technical College took the lead in adopting the DQP paradigm in 2014, followed by Guangdong Institute of Science and Technology Vocational College, Guangdong College of Foreign Languages and Arts Vocational College and Guangdong Lingshan Vocational and Technical College in 2017, which joined in applying the DQP results-oriented concept to carry out high-level professional cluster construction. Since then the educational paradigm of OBE concept has been carried out in Chinese vocational institutions one after another. From the results of a search for DQP on the Wanfang website, the number of papers with DQP as a keyword reached 456, peaking in 2017. As shown in Figure 2.1.

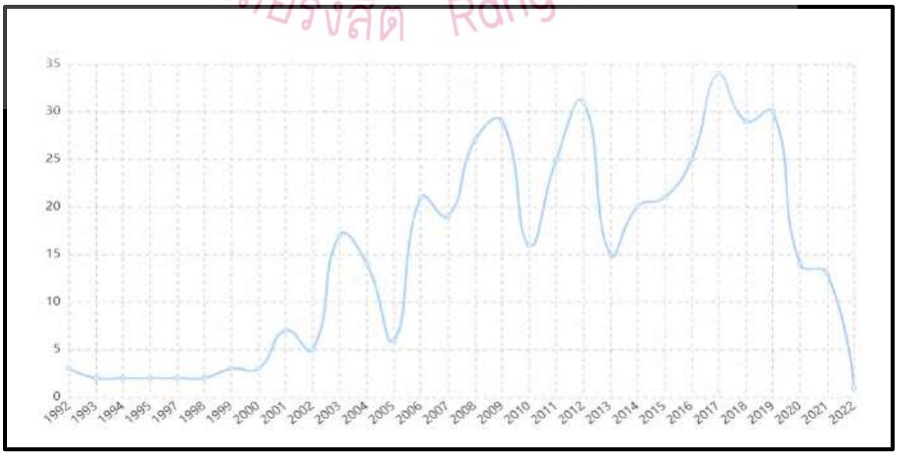

Figure 2.1 The analysis of keyword search results of DQP
Source: Wanfang Data, 2022

The OBE concept has not found corresponding research results in the field of civil aviation. In 2021, the Civil Aviation Administration of China (CAAC) issued a document entitled "Opinions on Promoting the High-Quality Development of Civil Aviation Directly Administered Colleges and Universities", which required practicing the concept of student-centered development. The document demanded strict student graduation standards and degree awarding standards to improve the quality of talent training and the degree of talent industry adaptability (CAMIC, 2021). This requirement is also very much in line with the OBE philosophy in essence. According to the requirements of CAAC, the Civil Aviation Management Institute of China (CAMIC) formulated the main points of work in 2022 at the beginning of 2022, which required to actively carry out research on teaching quality improvement under the OBE model, so the research on in-service training based on the OBE concept has been started in civil aviation institutions (CAMIC, 2022). As an important part of civil aviation in-service training, the active development of curriculum design with the OBE concept by the NASI is in line with the overall requirements of the CAAC and is essential. Because the NASIC which is designed based on OBE concept can fundamentally solve the match between trainees and job requirements after training, making the training more effective and more meaningful in practice. This study will also actively promote the application of OBE concept in the field of civil aviation training in China, and will provide a curriculum design model with great reference value for more civil aviation training courses that practice OBE concept in the future.

2.2 ADDIE MODEL

2.2.1 Definition of ADDIE

The ADDIE model is one of the most popular methods for building an effective curriculum. Some scholars (Arshavskiy, 2013) have commented that the ADDIE model is the forerunner of all other models of Instructional System Design (ISD). Although more than one hundred ISD models exist, most current ISD models are adapted from the ADDIE model process. According to Dzikowski (2022), it was developed in the 1970s by the Centre for Educational Technology at Florida State University for the U.S. Army based off the Army's original 1950s ISD. It was then quickly adopted by all Armed Forces of the United States (Branson, Rayner, Cox, Furman, & King, 1975). Although the majority of the literature indicates that ADDIE was developed in the 1970s (Cheng, 2020), it has also been suggested that the ADDIE instructional design process has existed in one form or another since the Second World War (Allen, 2006). This is probably because instructional design was promoted and created by the military during the Second World War, and many ISD models were born during that period. Regardless of when ADDIE originated, however, it is almost unanimously acclaimed by scholars at present.

Some scholars have argued that the ADDIE model is simply a colloquial term used to describe a systematic approach to instructional development and is in fact synonymous with instructional systems development (ISD). ADDIE has no identified author and has evolved informally through oral tradition. ADDIE is a general term for a series of models with a common underlying structure (Molenda, 2003).

There is some validity to the various claims about the origin of ADDIE, and all have their own validity, but no matter what the origin of ADDIE is, it cannot be otherwise than that ADDIE is a more complete and very useful course design model. The ADDIE model is also used in this study to design the NASIC, which ensures the rationality of the course design in the design session.

The ADDIE Instructional Systems Design (ISD) framework is a conceptual model that many instructional designers and training developers use to develop curriculums (Morrison, G., Ross, Morrison, J., & Kalman, 2019). The name ADDIE is an acronym for the following five phases (Hodell, 2016; Branson et al., 1977; Branson et al., 1975):

Analysis

Design

Development

Implementation

Evaluation

2.2.2 The Main Process of ADDIE

In this model each phase must be completed before the next phase can be progressed. This enables developers to incorporate ongoing feedback into every phase of development of their curriculum.

Analysis

The analysis phase is the beginning of the entire ADDIE process. The analysis phase involves gathering information to inform decisions about design, and evaluation of the success of the design. The analysis phase allows the developer to develop a broader understanding of the training curriculum requirements through the study of the experts and target participants. The conclusions of the analysis phase will provide direction for the design phase.

For example, Instructional Goals - What are the participants' general goals?

Learning Outcomes - How will the developer know whether the participants have already met these goals? What are the changes in knowledge, attitudes, and skills that can be observable and measurable?

Participants Characteristics - What is content that participants need to learn currently?

Design

The design phase is an important phase in the ADDIE process. Based on the information from the analysis phase, the developer will be created a preliminary design for the new instructional material.

For example, Content design - How much content will be presented in the curriculum?

Feature design - How will the design attract the attention of participants to important information?

Assignment design - What kind of assignments are good for participants to master the important information of the curriculum?

PowerPoint design - What will the PowerPoint slide look like?

Handout design - What will the handout look like?

Development

The development phase is the connecting link phase in the ADDIE process. The development phase is where the design is put into action, the phase that will result in the curriculum. The ideas of the design phase are turned into 'deliverables' at this phase, for example handouts and PowerPoint of the curriculum.

Implementation

The implementation phase is a significant phase in the ADDIE process. The implementation phase is where the developer implements the curriculum, invites the target participants, and tracks the target participants' progress and results. This phase describes the first use of the curriculum with participants.

Evaluation

The final phase of the ADDIE model is evaluation; the purpose of which is to assess the effectiveness of the curriculum. Participants are assessed on the basis of whether their knowledge, skills and attitudes are in line with the curriculum objectives. These information will be used to measure the effectiveness of the curriculum. If the curriculum receives a low effectiveness score, the developer must evaluate the curriculum. The curriculum should be evaluated to find out the reasons for insignificant effectiveness, and the effectiveness of the assessment should also be evaluated.

The ADDIE to support continuous evaluation and revision is a cyclical model. As shown in Figure 2.2.

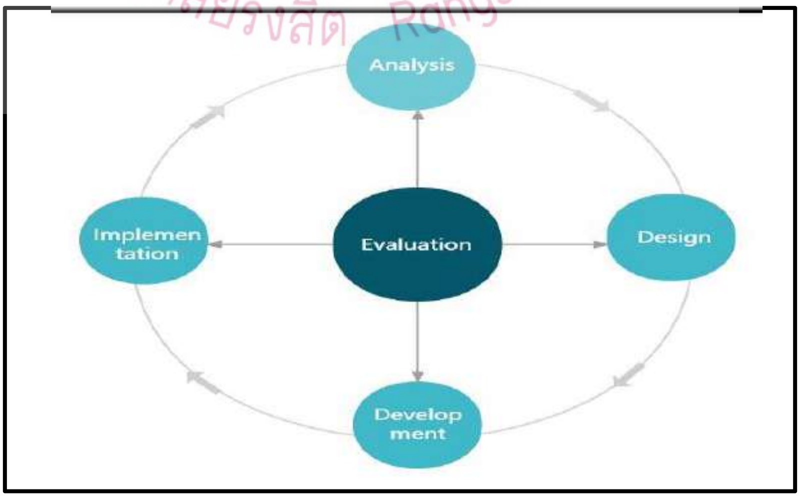

Figure 2.2 ADDIE model
Source: Wanfang Data, 2022

The evaluation phase in the ADDIE model is likely to be the beginning of the next round of the ADDIE process. This is perhaps one of the reasons for the wide acclaim of the ADDIE model.

2.2.3 ADDIE Research

The ADDIE model has been widely used since it was developed because it can be continuously improved and is easy to use.

2.2.3.1 Status of ADDIE Research

There are various ways in which the ADDIE model can be used. Some researchers have used the ADDIE model individually to develop the curriculum, while others have combined the ADDIE model with other models to develop the curriculum. For example, Ross (2022) used both ADDIE model and Kirkpatrick model when designing. Gonzalez (2022) used both ADDIE model, the PDSA Cycle model and the Phillips model in the design and development. Regardless of whether the ADDIE model is used individually or together with other models, the results are remarkable. In addition, other researchers have combined the ADDIE model with advanced educational concepts, such as the OBE concept (Hamamah, Hapsari, Emaliana, & Degeng, 2020). Such combined models seem to be worth advocating, as this combination allows both the ADDIE model and the OBE concept to play to their respective strengths. However, Hamamah et al.'s (2020) study was designed to develop a writing assessment model rather than a curriculum. Therefore, researchers should try to develop a curriculum that combines the ADDIE model and the OBE concept to explore its effectiveness.

The group of people for whom the ADDIE model can be applied is very broad. Some researchers have used the ADDIE model to develop curriculum for university students, while others have used the ADDIE model to develop curriculum for staff. For example, Alnajdi (2018) designed a practical interactive lesson based on the ADDIE model at Tabuk University to improve student learning outcomes. Gonzalez (2022) designed the two-day training session based on the ADDIE model for first-year college students. Abbas et al. (2022) used the ADDIE model to design a training course for nurses in hospital. Barstow (2022) used the ADDIE model to design a pediatric staff education curriculum. Pears and Konstantinidis (2021) developed a cyber-security workshop following the ADDIE model, allowed frontline healthcare workforce and nursing students to increase their knowledge and confidence abilities against windows of opportunity for cybercrime. This verifies the wide range of populations to which the ADDIE model can be applied. Therefore, researchers should apply the ADDIE model to the curriculum development of civil aviation professionals in order to explore its effectiveness.

2.2.3.2 Application of ADDIE in NASIC

In fact, although ICAO curriculum development model does not explicitly use the ADDIE model in its curriculum development, the steps and process of its curriculum development are very much in line with the concept and main aspects of the ADDIE model. ICAO course development is divided into three phases and seven steps. The first stage is the analysis stage, which includes a preliminary analysis, a job analysis and an object analysis. The second phase includes course design, module design and curriculum development. The third phase includes the implementation and evaluation to revise the curriculum. Then, through the curriculum evaluation, the implementation of the evaluation is also the evaluation and feedback of the first two stages, and then the curriculum is revised according to the feedback results. The whole process is very similar to the ADDIE model, as shown in Figure 2.3. Therefore, it is also necessary to carry out research on the application of the ADDIE model in the field of civil aviation education. It is logical to apply the steps and models of ICAO curriculum development to the development of the national aviation security curriculum, so it is perfectly reasonable to apply the ADDIE model to the development of the national aviation security instructor's curriculum.

This study will refer to the ADDIE model of ICAO curriculum design, will also start with the analysis phase, analyze the responsibilities of NASI security positions and the competencies required for the positions, then through research, find out the deficiencies of trainees in the three aspects of knowledge, skills and attitudes of competencies, and develop the results that should be achieved after training, determine the training objectives based on the training results, then design the course content based on the objectives, course units, course structure, teaching methods and other links, then implement and evaluate the course, and then revise the previous links in response to the evaluation results.

In conclusion, the concept of ADDIE model in this study refers to a model of curriculum development that consists of five phases (Analysis, Design, Development, Implementation, and Evaluation), therefore abbreviated as ADDIE model.

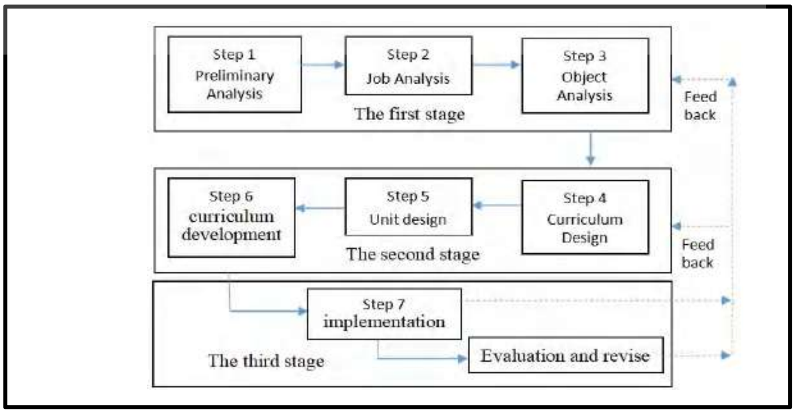

Figure 2.3 ICAO Curriculum Development Model
Source: Wanfang Data, 2022

2.3 DELPHI METHOD

2.3.1 The Definition of Delphi Method

The Delphi method is a group exchange between groups of experts who are not geographically located together. The nature of this technique is quite simple. It consists of several rounds of questionnaires, sent by mail or electronically to a panel of pre-selected experts who are responsible for reaching consensus through several iterations using pre-defined, focused questions. This method allows experts to systematically address complex problems or tasks (Turoff & Linstone, 2002).

The origin of Delphi is said to be numerous, among which some scholars believe that in the 1950s and 1960s the Delphi method was originally developed by Dalkey and Helmer (1963) at the RAND Corporation. This method takes its name from the Ancient Greek oracle that was able to predict the future. Meanwhile, in ancient Greece, the word Delphi refers to a town where the God Apollo's prophecies were passed on to the Earth's futurologists. Therefore, the word Delphi has always been related to forecasting (Landeta, 2006; Wakefield & Watson, 2014).

Although the original research of Delphi method was associated with the defense industry (Thangaratinam & Redman, 2005). In the 1950s, the United States Air Force (USAF) sponsored 'Project Delphi'. The USAF uses it to estimate the probable effects of Russian nuclear attack on the United States. At that time, this method was devised by Dalkey and Helmer (1963) based on the idea that it would allow participants (n=7) an opportunity to present considered and independent opinions that would lead to reliable conclusions. However this method has long history since it was spread to other areas of research.

2.3.2 Delphi Applications

The use of the Delphi method increased dramatically in the 1970s as it became widely known in many industries. Some researchers have started to apply it in the field of education. For example, Spivey (1971) use it in curriculum development in the field of education. The Delphi method has flourished to the present day. Today, the Delphi method is considered to be a well-established and adaptable research method (McPherson, Reese, & Wendler, 2018). Researchers use it to query experts and ultimately transform opinions of experts into group consensus.

The Delphi method is a qualitative research method that is used to gain consensus on issues through expert opinion. The aim of this process is to structure information on a topic. The research questions can be answered by a panel of experts from different geographical areas. In addition, the Delphi method is flexible in its operation. Communication between the researcher and the expert can be done electronically. This makes it an ideal method for consensus building (McPherson et al, 2018).

The survey design study with structured questions is used in the Delphi method (Asselin & Harper, 2014). Using this method, researchers can through multiple rounds of queries obtain accurate and reliable data (Keeney et al., 2011). At the end of the first round, descriptive statistical analysis was carried out on the data obtained. In particular, measures of central tendency were to be used. The results of the data analysis would be provided as feedback to the participants in each round. When the researcher needs to gather subjective information about the research questions from experts, the Delphi method is a good option (Stitt-Gohdes & Crews, 2004).

Similarly, research using the Delphi method needs to comply with the relevant requirements of ethical principles, including the need for appropriate Institutional

Review Board review. The core ethical principles of the Delphi study include 1) anonymity, 2) keeping the participants' identifying data safe from being tracked by other participants, and 3) protecting the dataset not to be linked to the names of the participants. This also meets the ethics oversight committee's relevant requirements (Melnyk & Fineout-Overholt, 2014).

The aim of the Delphi method was to obtain reliable expert consensus (Barrett & Heale, 2020). One concept that is crucial when conducting research using the Delphi method is that of the 'expert'. There has been much discussion among scholars about how to define an expert in a particular field (Keeney, Hasson, & McKenna, 2006). The discussion among scholars is normal and useful because in the Delphi method the subjective opinions of experts are collected. The experts give a source of information that is accessible and advice can be obtained quickly. They will provide knowledge usually when more traditional research is not being conducted (Baker et al., 2006). Therefore, the level of the experts will influence the reliable of the Delphi method. The initial study, however, also did not define experts, did not explain how or why they were selected, and did not describe specific criteria for experts (Dalkey & Helmer 1963).

In the Delphi method, the definitions of 'expert' and 'consensus' differ between scholars, but are similar at their core. Fink, Kosecoff, Chassin, and Brook (1984) stated that an expert who was a representative of their professional community should have sufficient knowledge without causing controversy. Keeney et al. (2001) stated that an expert was defined as a 'knowledgeable person', and someone who had knowledge of a particular subject. Mead and Moseley (2001) stated that there were multiple ways in which experts were defined, such as through their position in the hierarchy, their public acknowledgement or other participant's recommendation. Skulmoski, Hartman, and Krahn (2007) stated that an expert was someone who had the experience and knowledge of the issue under investigation, the willingness and ability to participate, the time to participate and adequate communication skills. McPherson et al. (2018) had defined "expert" was having, involving, or displaying special skill or knowledge derived from training or experience. It is easy to see that the core elements that define an expert include knowledge and experience. Therefore, knowledge and experience should be important defining criteria when selecting experts using the Delphi method. For example, when using the Delphi method to design and develop a civil aviation NASIC curriculum, the experts are selected with at least three criteria: 1) Certified as a NASI qualification over 6 years; 2) At least 1500 hours of lectures ; 3) At least a training supervisor in an airport or airline. Such criteria can prove that the expert is reliable.

There is no perfect research method in the world, and any research method has strengths and weaknesses, as does the Delphi method. Therefore, the Delphi method should be judged holistically and it is best to compare it with traditional methods. According to Okoli and Pawlowski (2004), the comparison between the Delphi method and the traditional method is shown in Table 2.1.

Table 2.1 Comparisons between Delphi and Traditional Methods

Evaluation Criteria	Delphi method	Traditional method
Summary of procedure	All the questionnaire design issues of a survey also apply to a Delphi study. After the researchers have designed the questionnaire, they select a suitable panel of experts that are qualified to answer the questions. The researcher then conducted a survey and analyzed the answers. Next, they designed another survey based on the responses to the first one and re-hosted it, asking the experts to answer again. The researchers repeated the process until a satisfactory consensus was reached. Throughout the process, the participants were anonymous to each other.	The researchers design a questionnaire with questions relevant to the issue of study. The questionnaire may include questions on quantitative or qualitative data, or both. The researcher decides on the population to which the hypothesis applies and a random sample from this population is selected for the survey. The respondents fill out the survey and return it. The researchers then analyze the usable responses to investigate the research questions.

Table 2.1 Comparisons between Delphi and Traditional Methods (Cont.)

Representative of sample	The questions investigated by the Delphi study are questions of high uncertainty and speculation. Thus, a general population, might not be sufficiently knowledgeable to answer the questions accurately. A Delphi study is a panel of experts to work together to arrive at an answer to a difficult question. Thus, a Delphi study could be considered a group decision technique.	The researchers used statistical sampling techniques to randomly select a sample that was representative of the population of interest.
Sample size for statistical power and significant findings	The Delphi group size does not depend on statistical power. It depend on group dynamics for arriving at consensus among experts. Thus, the literature recommends 10–18 experts on a Delphi panel.	The researchers needed to select a sample size large enough to detect statistically significant effects in the population because the goal was to generalise the results to a larger population. Power analysis is required to determine an appropriate sample size.

Table 2.1 Comparisons between Delphi and Traditional methods (Cont.)

Group response vs. Individual	Research has consistently shown that the average of individual responses to questions requiring expert judgement is not as good as the average produced by group decision-making processes; research has clearly shown that the Delphi method proves this.	The researchers averaged the responses of individuals to determine the average response of the sample and generalized it to the population of concern.
Reliability and response revision	Pretesting is also an important reliability assurance for the Delphi method. However, test-retest reliability is not relevant, since researchers expect respondents to revise their responses.	Researchers typically assure this by pretesting and by retesting to assure test-retest reliability.
Construct validity	In addition to what is required of a survey, the Delphi method can employ further construct validation by asking experts to validate the researcher's interpretation and categorization of the variables.	Construct validity is assured by pretesting and by careful survey design .

Table 2.1 Comparisons between Delphi and Traditional Methods (Cont.)

Anonymity	Respondents are always anonymous to each other. However, never anonymous to the researcher. This because the researchers need to follow up for clarifications and further qualitative data.	Respondents were almost always anonymous to each other and often to the researcher.
Non-response issues	Non-response is typically very low in Delphi surveys. This because most researchers have personally obtained assurances of participation.	Researchers need to investigate the possibility of non-response bias to ensure that the sample remains representative of the population.
Attrition effects	The attrition tends to be low in Delphi studies. The researchers usually can easily ascertain the cause by talking with the dropouts.	For single surveys, attrition is a non-issue. For multi-step repeated survey studies, researchers should investigate attrition to assure that it is random and non-systematic.
Richness of data	In addition to the richness issues of traditional surveys, Delphi studies inherently provide richer data due to their multiple iterations and response corrections due to feedback. Moreover, Delphi participants tend to be open to follow-up interviews.	Data richness depends on the form and depth of the questions and follow-up possibilities, such as interviews. There are often limitations to follow-up when researchers are unable to track respondents.

Source: Okoli & Pawlowski, 2004

2.3.3 Delphi's Method Advantages

An important advantage of this method is that it avoids direct confrontation between experts, thus ensuring the objective neutrality of the results. This method is more conducive to independent thinking by experts, who only need to contribute their own opinions and are not influenced by the opinions of other experts. It avoids conflicts with other experts to prove the correctness of their personal opinions, or rejects other ideas because of defending personal ideas, which can lead to a lack of objectivity in the results (Okoli & Pawlowski, 2004).

In terms of research methodology, Delphi methods have been shown to be commonly used to identify and prioritize high-level decision problems and are a popular tool in research, (Okoli & Poloski, 2004; Linston & Turoff, 2002), This research method can help researchers identify variables of interest and allow researchers to extend their observations to enhance the generation of consensus-level results across iterations.

The reasons for choosing the Delphi method in this study are as follows:

1) One of the components of this study is an investigation of the job competencies that NASIs should have. This complex question needs to be answered by those who have specialized aviation security knowledge and have extensive aviation security training experience. Therefore, the Delphi study can answer the research question very appropriately.

2) The design of the questionnaire in the Delphi study is very flexible, this makes it easy for experts to choose and to write down their unique suggestions, and it is easy to conduct in-depth interviews with individual expert, which ensures that the data collected is richer, more conducive to consensus and more valuable for research.

3) The questions in this study are suitable for a group representative to answer, rather than any one expert's response. Delphi is a suitable group method. Among other high-performance methods for group decision analysis , Delphi is preferable because it does not require experts to meet in the field, which is more in line with the reality of research via the Internet in the current epidemic situation.

4) Although the number of experts in the Delphi method may be relatively limited, the Delphi panel in this study is larger than the generally required 10-18 members, and the panel in this study is 40 members, which ensures the objectivity and representativity of the experts' opinions.

The concept of Delphi method in this study refers to inviting experts in the field of civil aviation NASIC curriculum for multiple rounds of enquiry and obtaining a reliable expert consensus, the Delphi method will be used to determine the competencies that NASI should have, including knowledge, skills, and attitudes. This study is based on the OBE concept of curriculum envelopment. Curriculum design based on the OBE concept is to first identify the competencies that NASI should have and reverse design the curriculum objectives and curriculum contents, etc. based on the competencies. Therefore, it is important to first identify the competencies, and it is one of the key points of this study to use the Delphi method in this link, and to use the advantages and principles of the Delphi method to be able to accurately determine the competencies that NASI should have. The accuracy of the competency determination is also the first link of the curriculum design, and this link is crucial because the success of this link can ensure the smooth implementation and conduct of the later study.

2.4 NATIONAL AVIATION SECURITY INSTRUCTORS CURRICULUM (NASIC)

2.4.1 National Aviation Security Instructors (NASI)

The dramatic increased in violent crime in the late 1960s seriously affected the security of civil aviation. In 1963, ICAO first addressed the hijacking issue by establishing a general framework for hijacking that described the steps and requirements for dealing with aircraft coming out of hijacking, which were formally ratified as part of the 1963 Tokyo Convention and are considered to be the first step in dealing with international cooperation to prevent and suppress hijackings. The work of ICAO, which formally began in December 1968, dealt with the jurisdiction and treatment of individuals who committed hijacking operations. This work culminated in the Hague Convention of December 16, 1970, on the prohibition of unlawful seizure of aircraft (Elias, 2009). This is also the first international law on aviation security. But just as the conference to develop the Hague Convention was being held another arcade incident occurred, which led to the convening of a special session of the ICAO Assembly in June 1970.

One of the resolutions of that Assembly called for provisions in the existing or new annexes to the Chicago Convention to deal specifically with the problem of unlawful interference, particularly with respect to the unlawful seizure of aircraft. Following the work of the Committee on Navigation, the Committee on Air Transport, and the Committee on Unlawful Interference, the Council adopted standards and recommended measures on security on 22 March 1974, which were designated as Annex 17 - Security. This Annex provides the basis for the ICAO Civil Aviation Security Program and for seeking to prevent acts of unlawful interference with civil aviation and its facilities. The measures taken by ICAO worldwide to prevent and combat acts of unlawful interference with civil aviation are critical to the future of civil aviation and the broader international community (ICAO, 2020). By 2020 Annex 17 has been revised 17 times to form the 11th version.

Aviation security is defined in Annex 17 as the maintenance of civil aviation from acts of unlawful interference. This objective is achieved through a combination of measures and human and material resources (ICAO, 2020). So aviation security is mainly for illegal interference.

After the 9/11 attacks in the United States, the importance of aviation security was raised to an unprecedented level. On September 11, 2001, terrorists used hijacked airplanes as weapons to cause mass civilian casualties. Thousands of people were killed in these attacks. After this incident, the United States established Homeland Security, and a series of related aviation security measures. China also set up an air police force in 2001 to act as a dedicated team to prevent illegal interference. Since then the aviation security profession has developed rapidly in the field of civil aviation security in China. A number of aviation security regulations have been introduced and various aviation security teams have been established. Annex 17 stipulates the measures to be adopted to ensure aviation security, including the various types of security personnel to undergo appropriate security training, including aviation security instructors to undergo training and to pass the examination before taking up their duties (ICAO, 2020).

NASI is an aviation security instructor as required in Annex 17. However, there are some differences between NASI and ICAO security instructors in terms of their duties. NASI are professional aviation security personnel in China's civil aviation, and undertake the task of training aviation security regulations and security measures for various security positions and personnel at airports or airlines (CAAC, 2013). NASI has two main responsibilities in China, one is the responsibility for the design and development of aviation security related courses, and the other is the responsibility for lecturing aviation security courses. The main responsibility of the ICAO instructors is to teach the ICAO Aviation Security courses. So in terms of competency requirements, NASI in China requires the ability to design and develop courses, as well as the ability to teach, while ICAO instructors only require the ability to teach. These competencies are clearly identified in the National Aviation Security Training Program, Revision 2021, and in the ICAO Aviation Security Instructor Package (CAAC, 2021). The responsibility for ICAO aviation security course design is the responsibility of a separate department dedicated to course development, not that of the aviation security instructors. Therefore, ICAO has a course for specialized curriculum developers to train dedicated individuals to conduct curriculum development. The curriculum is accompanied by an instructional textbook called "Training Development Guide". This guide is a comprehensive and thorough analysis of aviation jobs to establish the critical learning path for aviation professionals. Based primarily on the trainee's ability to build competencies with solutions, it is an effective tool for developing human resource professionals and ensures consistency between job descriptions and training requirements (ICAO, 2011). From the core concept of this guide, we can see that it is also based on the final training results of the trainees as the starting point of the course design, and pay attention to the match between the trainee's ability and job responsibilities after training, so it is also based on the OBE concept and the design of the course.

With the NASI in China basing the responsibility of curriculum design development and delivery all under one roof, it is most appropriate to develop a curriculum based on the OBE concept by actively drawing on the responsibilities and curriculum of ICAO Curriculum Developers and Aviation Security Instructors. So in China, based on the above two competency requirements of NASI, especially the first one, it is very suitable to use the OBE concept to design NASIC.

Therefore, this study is based on the OBE concept to develop NASIC is in line with both theoretical and practical needs. With the ICAO curriculum development model as a reference, combined with the practical competency requirements of Chinese aviation security instructor positions, the curriculum developed based on the OBE concept is the most consistent with the actual work requirements of Chinese aviation security instructor positions, and is the greatest extent to meet the NASI competency and practice requirements of the participating units.

2.4.2 National Aviation Security Instructors Curriculum (NASIC)

Annex 17 requires that aviation security instructors must be trained by training institutions authorized by the State Civil Aviation Administration with standard teaching materials, and must pass the corresponding examination before they can be on duty. The NASIC to be designed in this study is the material used for NASI training that meets the requirements of Annex 17. In 2013 China released the first edition of the National Aviation Security Training Program, which defines the main responsibilities of NASI and the related curriculum content (CAAC, 2013). However, the main features and tasks of current aviation security efforts, as well as the corresponding types and characteristics of external threats to civil aviation security, have changed significantly. The main responsibilities and training content of NASI as specified in the first version of the National Aviation Security Training Program do not meet the requirements of the above changes, and there is an urgent need to revise the National Aviation Security Training Program and revise the corresponding responsibilities and training content of NASI. The CAAC is revising the National Aviation Security Training Program starting in 2021, and aviation security instructors and their courses are an important part of the program that will also be actively revised.

CAMIC is the main unit responsible for NASI training and has the responsibility to actively revise the content of NASIC to make NASIC more time-efficient and effective, and more able to meet the current counter-terrorism situation and the competency needs of NASI positions.

NASIC in this study is a curriculum developed through extensive research and scientific research methods based on the OBE concept and the ADDIE model.

Therefore, the curriculum in this study is in line with the current trends in education and training, both in terms of the theoretical framework and the development process. The curriculum developed in this study ensures that it will meet the requirements of the current aviation security training mission and is one of the most urgent contents in the current CAAC revised national aviation security training program.

2.5 PREVIOUS RELATED RESEARCH

This study focuses on designing NASIC using the OBE concept and the ADDIE model, both of which have been clearly elucidated in previous studies in the previous sections. Through the previous content, it can be seen that both the OBE concept and the ADDIE model are reflected in ICAO's curriculum design. The curriculum design is centered on the final competency of the participants as the goal of the curriculum, which is similar to the OBE concept, but not as clear and comprehensive as the OBE, and the ICAO curriculum design process is very similar to the ADDIE model, but also not as rigorous and comprehensive as the ADDIE model (ICAO, 2011). This study is an explicit application of OBE concept and additional model to NASIC, built on the basis of ICAO curriculum design, more systematic and comprehensive application of OBE concept and ADDIE model, so that the designed curriculum is more reasonable and meets the needs of aviation safety curriculum.

The most famous application of the OBE concept is in the field of engineering. The ABET Board of Directors approved the famous Engineering Criteria 2000 (EC, 2000) in 1996 (Soundarajan, 1999). EC 2000 became mandatory in 2001 (Volkwein, Lattuca, Harper, & Domingo, 2007). The core concept of EC 2000 is the OBE philosophy of "student-centered, outcome-oriented and continuous improvement". There is a very important protocol in the field of engineering certification, which is Washington Agreement. Six countries signed the Washington Agreement at the beginning of the 20th century by endorsing ABET, and 20 countries have signed it by 2022 (IEA, 2022). These are the development and result of the OBE concept in the field of engineering certification. The OBE concept has played a big role in the field of engineering certification, and the results of the development have been recognized by the wider community. In September 2021, the system produces graduates whose competencies are recognized and supported by WFEO and UNESCO (IEA, 2022). In 2012, the U.S. applied the OBE concept to Homeland Security (HS) curriculum development to design a four-year undergraduate homeland security program. This is a bold attempt to apply the OBE concept to the security curriculum (Cutrer, 2017).

The OBE concept has been implemented globally at different levels of education. The adoption of the OBE philosophy in Australia dates back to the early 1990s (Donnelly, 2007). The OBE concept has been in place in the United States since 1994 and has been continuously improved since then (Glatthorn, 1993). The OBE concept was piloted in universities in Hong Kong in 2005 and was integrated into the Malaysian public school system in 2009 (Kwok, 2000; Mohayidin et al., 2008).

Outcomes-based education (OBE) has become a major direction of educational reform in the United States. This is in line with the important national goal set forth by the previously mentioned Lumina Foundation that by 2025, 60% of the U.S. population will have earned high-quality college and higher degrees and certificates. Contemporary American students do not want to learn only theoretical foundations, but are searching for educational methods that are more helpful for future employment, so they choose OBE education (Asim, Vaz, Ahmed, & Sadiq, 2021). One of the most famous applications of the OBE concept is the accreditation system for engineering education in the United States. The OBE concept applied in the field of security is a previous experience, that is, the OBE concept was applied in the undergraduate program for homeland security officers in the United States, and the four-year program was designed through the outcomes that undergraduates should achieve after graduation. The results of the implementation proved that this exploration was very fruitful and produced usable talent for the U.S. Homeland Security (Cutrer, 2012). So this is the OBE concept applied in the security curriculum is very reasonable and effective. Because NASIC is also in the field of security, the application of OBE concept in NASIC is also reasonable.

The OBE concept has also been practiced in Europe for many years and has achieved certain implementation results. The Bologna Declaration, signed on June 19, 1999 by the Ministers of Education of 29 countries, including Spain, seeks the cooperation of universities and higher education institutions, as well as accreditation agencies and quality assurance organizations, in order to explore the European concept of higher education. In 2000 the Tuning Educational Structures in Europe project started to pilot (González & Wagenaar, 2003). This is one of the better known educational paradigms in Europe based on the OBE concept. The core results of Tuning are " The Standards and guidelines for quality assurance in the European Higher Education Area (ESG)", which was adopted in 2005.

The OBE concept has not found clear research results in the field of civil aviation security, although there is mention in ICAO curriculum development to design curriculum based on students' competencies, there is still a big difference with the real application of the OBE concept, because the OBE concept involves three core elements, and these are not all reflected in ICAO curriculum development. As mentioned earlier the OBE concept is starting to be implemented in many Chinese universities. In 2021, the CAAC issued a document asking all civil aviation institutions to propose high quality schooling, and in the document it is clearly required to practice a student-centered schooling concept (CAMIC, 2021). This requirement fits well with the OBE concept, so at the end of 2021 CAMIC requires aviation in-service training to incorporate the OBE concept, requiring the design of courses that meet the three core elements of the OBE concept. NASIC, as an important part of the aviation security curriculum, is facing an iterative upgrade of the curriculum, so under the dual requirements of CAAC and CAMIC, it is necessary to develop NASIC revisions based on the OBE concept at this time to meet the requirements and is very appropriate. The NASIC curriculum development is based on the OBE concept, which provides a model for the development of other aviation security curricula, the other curricula developed later can be based on the NASIC in this study and learn the advanced parts of it, which will help the success of other curriculum development.

This study will use the ADDIE curriculum development model, which is also a common model used in curriculum development. ADDIE model classes are widely used in various professional fields. Civil aviation is an industry that places great importance on the effectiveness of training and civil aviation personnel are required to undergo annual training to ensure the validity of their qualifications. The ADDIE model has a very wide area of application. For example, Craig et al. (2022) have designed a management course in the field of management education called Applied

Organizational Sustainability using the ADDIE model. Ji, Lee, and Baek (2019) have designed the Dental Curriculum in the field of medical education using the ADDIE model. The vast majority of studies on the application of the ADDIE model have shown its effectiveness.

In addition, this study also applied the Delphi method, and the previous studies of the Delphi method are described in the previous chapters. This study applied the Delphi method to the stage of designing course objectives for the OBE concept, which is also an innovation.

The Delphi method has had applications in various areas. For example, the Delphi method has been applied in library and information science research (Lund, 2020), public transport research (Hirschhorn, 2019), and medical education research (Varndell, Fry, Lutze, & Elliott, 2021). Gossler, Sigala, Wakolbinger, and Buber (2019) applied the Delphi method in humanitarian logistics research. Bauer, Fusté, Andrés, and Saldaña (2019) developed The Barcelona Orthorexia Scale using the Delphi method. The Delphi method is widely used in various fields of research, proving its acceptance by researchers.

In the many different areas of research into the application of the Delphi method, perhaps the field of education is the most recognized for it. According to Cutrer (2012), the Delphi method is probably the most effective method in educational research. A problem does not lend itself to precise analytical techniques but can benefit from collective subjective judgment. Katz (2004) states that the Delphi method is recommended for use in curriculum development, particularly in emerging areas where there are no recognized curriculum standards. Hatcher and Colton (2007) stated that the Delphi technique was an excellent tool for establishing the content validity of adult learning principles. Therefore, the use of the Delphi method in the development of the civil aviation NASIC curriculum is considered suitable.

In a study of industrial engineering (IE) curricula similar to this study, a three-round Delphi technique was used to identify new content that should be included in the curriculum that would adequately prepare engineering graduates for future job competencies (Eskandarietal, 2007). This study also will use the Delphi method to determine the competencies that trainees should have based on their post-training requirements.

Combining advanced research methods or models to conduct research has always been preferred by researchers. For example, researchers have combined the ADDIE model with the Delphi method to carry out research. Strickland et al. (2013) developed the online course using the ADDIE model with the Delphi method. Chowdhury et al. (2022) used the ADDIE model with the Delphi method modeling training frameworks. Md Isa and Razalli (2021) used the ADDIE model and the Delphi method to create new learning aids to help students improve their performance. Noh et al. (2020) developed a training program using the ADDIE model with Delphi methods to enhance the competency of hospital nurses. The results showed all participants improved their response competencies significantly.

In addition to the above-mentioned studies combining the OBE concept and the ADDIE model, some researchers have combined the OBE concept with the Delphi method to carry out research. Zhu and Zha (2021) constructed of Career Core Competence Evaluation System for vocational students based on OBE concept and combined with Delphi method.

It can be seen from the various studies that there are scholars who have previously done research combining OBE concept and ADDIE model, and there are also those who have done research combining ADDIE model and Delphi method, but there is no research combining OBE concept, ADDIE model and Delphi method together. This study is a combination of OBE concept, ADDIE model and Delphi method to develop NASIC. This study is an innovative application of the OBE concept and the ADDIE model in NASIC development.

Based on the OBE concept, the Delphi method will be used to determine the competencies that NASI should have, and based on these competencies, the curriculum will be developed in reverse, and the ADDIE model will be used in this study, which is NASIC development to form a systematic closed loop, and the evaluation of the curriculum implementation will be used to judge whether the curriculum has achieved the expected curriculum objectives and is in line with the OBE concept. This study integrates multiple research methods, advanced curriculum design concepts and curriculum design models for NASI is the integration and upgrading of previous research results, when a certain degree of conceptual innovation and curriculum design innovation, the close integration of multiple methods and concepts ensures the rationality and practicality of NASIC development, and will provide good application results and research models for future aviation safety curriculum design.

This study is an innovation in the field of curriculum development, especially in the field of civil aviation curriculum development. Because OBE concept, ADDIE model and Delphi are all very suitable for on-the-job training curriculum development, these three can play an advantage in the development of on-the-job training curriculum, which can help to improve the effect of on-the-job training, the trainees after training will be more in line with the needs of job competency, more able to play the inherent ability of trainees, and achieve the presidential goal of on-the-job training.

2.6 CONCLUSION

In summary, this chapter focuses on explaining the theoretical framework associated with the key concept to explain further the importance of these concepts to the research objectives and questions. The literature provides empirical evidence of concepts related to the OBE theory, the ADDIE theory, the Delphi method, and the NASIC to identify gaps in the literature. From this literature review, it is evident that back in 2013 when researchers were working on the NASIC study in civil aviation in China, they did not apply the OBE concept and ADDIE model in an integrated manner, nor did they apply the Delphi approach. This is also not in line with the mainstream trend of today's curriculum development. This study applied OBE concept, ADDIE model, and Delphi method altogether to design NASIC, so NASIC in this study is a comprehensive innovation of concept and application, it is in line with the contemporary concept and system requirements for curriculum design and development.

CHAPTER 3

RESEARCH METHODOLOGY

The researcher used a mixed-method of quantitative and qualitative research methods to answer the research questions in this study. The Delphi method was used in the analysis phase of curriculum. The experimental method was used in the evaluation phase of curriculum.

3.1 POPULATION AND SAMPLES

3.1.1 Research population

The population of this study are the National Aviation Security Instructors (NASI) of around 2,000 instructors in China. They are all in-service staff in the field of civil aviation security in China.

3.1.2 Research Sample

3.1.2.1 Sample Size

To ensure the statistical power considerations are indispensable for the evaluation of statistical decisions as well as for designing research, the researcher used the G*Power software tool that facilitates the implementation of various kinds of power analyses to calculate the sample size in this study.

In the experimental group, the expected number of the research participants had calculated by the researcher using the statistical free software G*Power 3.1.9.7 (Faul et al., 2009) (Version 3.1.9.7 developed in 2020) by setting the input and output parameters. The number of expected participants in this research was 128 through G*Power priori analysis as calculated and shown in Figure 3.1.

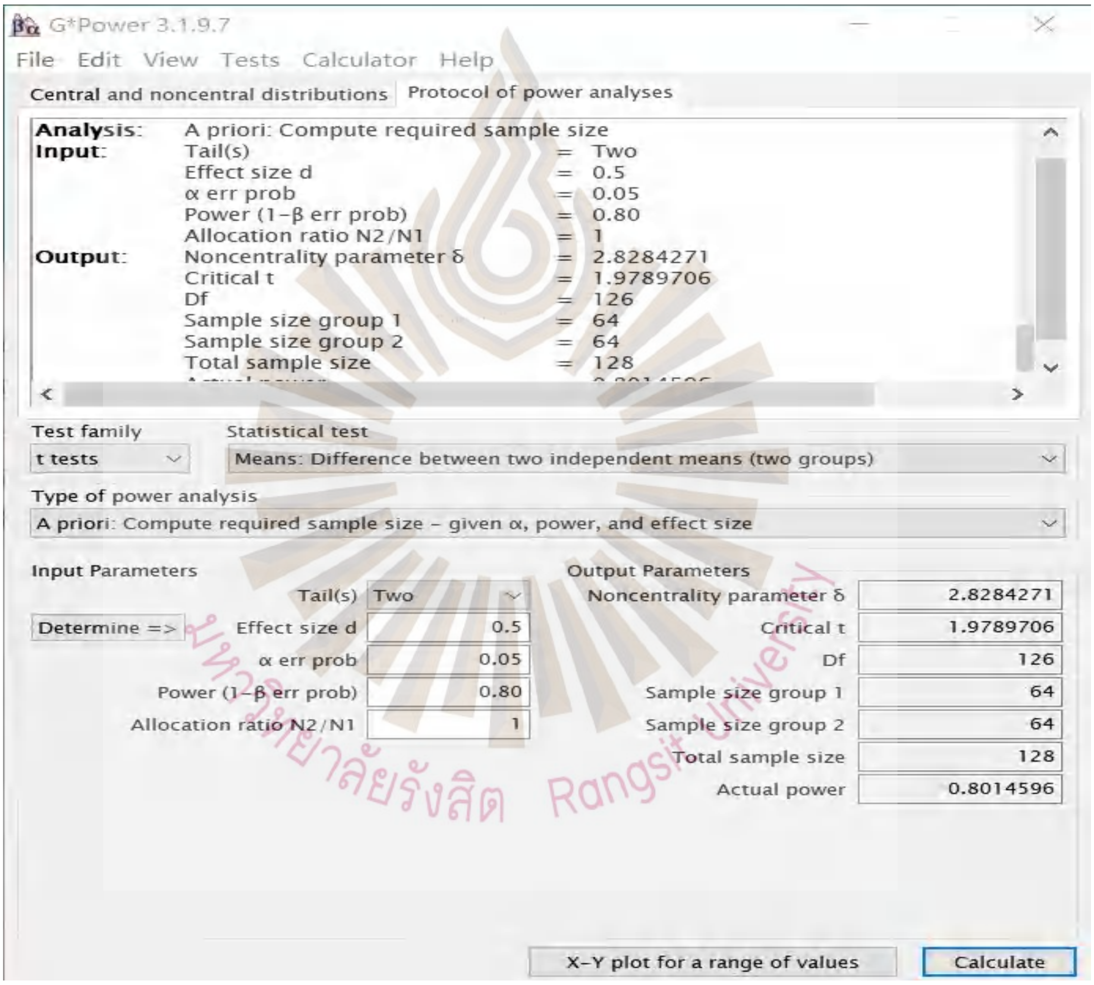

Figure 3.1 G*Power Sample Size Calculation

The details of the calculation shown in Figure 3.1 are as follows:

Test family: t tests

Statistical test: Means: Difference between two independent means (two groups)

Analysis: A priori: Compute required sample size

Input: Tail(s) = Two

Effect size d = 0.5

α err prob = 0.05

Power (1- β err prob) = 0.80

Allocation ratio N2/N1 = 1

Output: Noncentrality parameter δ = 2.8284271

Critical t = 1.9789706

Df = 126

Sample size group 1 = 64

Sample size group 2 = 64

Total sample size = 128

Actual power = 0.8014596

3.1.2.2 Sampling Method

During the evaluation phase of the curriculum, that is, before the start of the experiment. The researcher issued a training bulletin to 360 airports and airlines in China through CAMIC. In the bulletin, the researcher detailed information such as the date, location and objectives of the training curriculum. In the meantime, the researcher recruited 128 participants as sample students through the bulletin.

The 128 participants were randomly assigned to the experimental and control groups. The 128 participants were divided into two groups by using random numbers on a computer; the odd numbers assigned to the experimental group and the even numbers to the control group, it made each group consist of 64 students.

3.2 RESEARCH INSTRUMENTS

In this research, four research instruments were used.

1) Delphi Survey Questionnaire;

2) National Aviation Security Instructors Curriculum (NASIC) Theory Examination;

3) National Aviation Security Instructors Curriculum (NASIC) Practical Examination;

4) National Aviation Security Instructors (NASI) Attitude Questionnaire.

The use of these four instruments is shown in Figure 3.2.

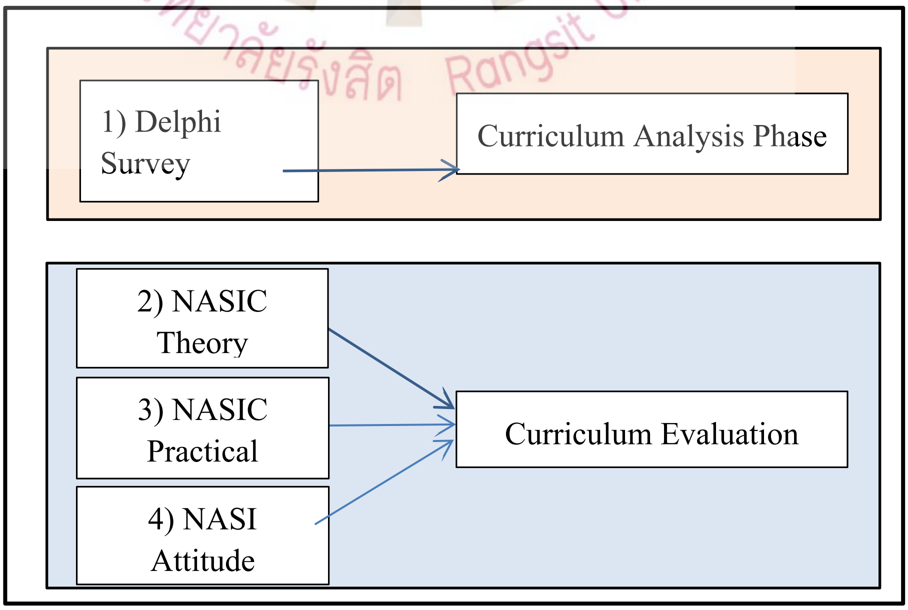

Figure 3.2 Research Instruments

From Figure 3.2, the four instruments were used in the analysis phase and in the evaluation phase. Delphi Survey instrument was used in the development phase and the other three instruments were used in the evaluation phase.

They are shown in Figure 3.3.

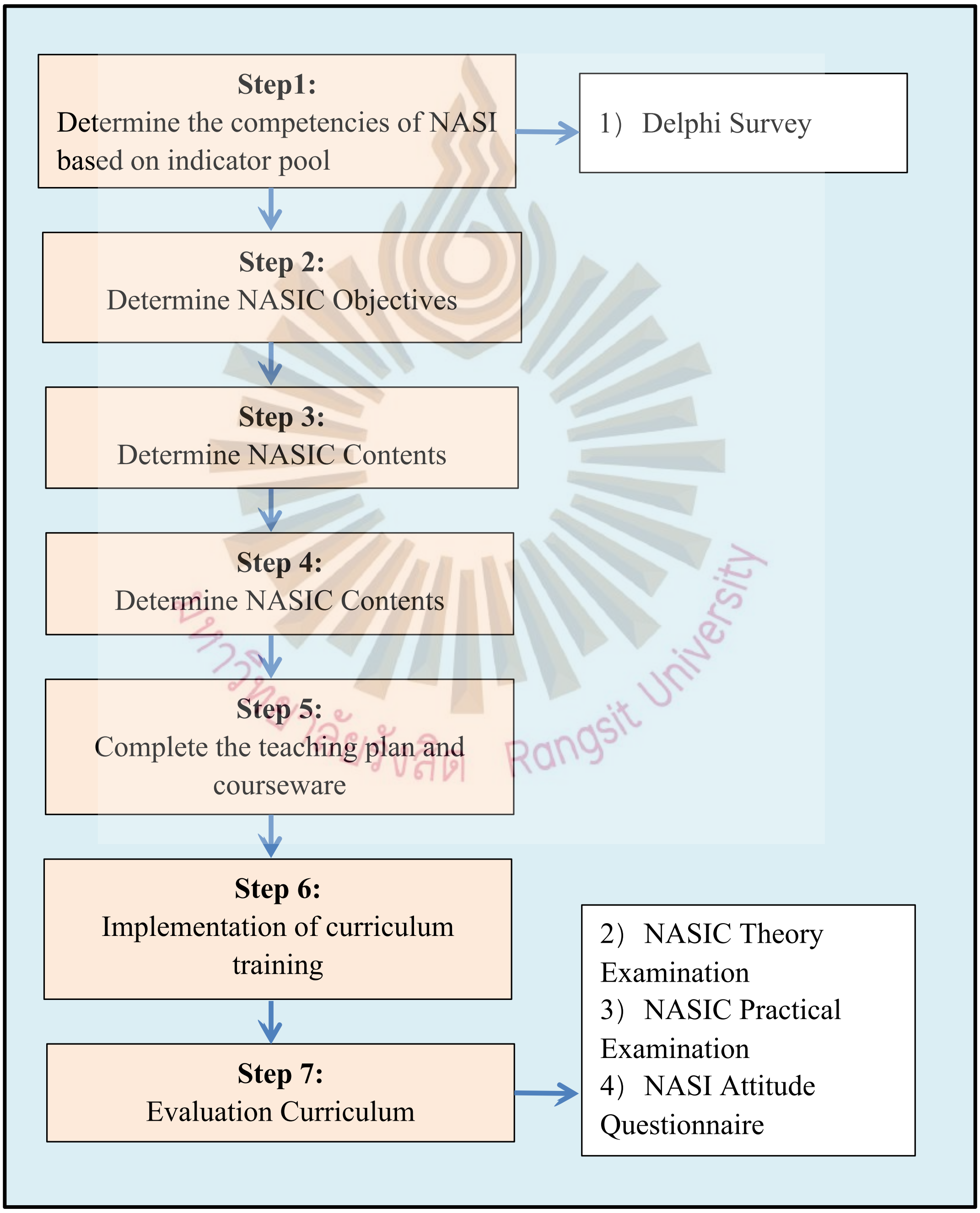

Figure 3.3 The Main Methods and Steps in the NASIC Development Phase

As shown in Figure 3.3, first instrument the study used a Delphi survey to determine what competencies NASI needs to have, Delphi Survey invited 18 aviation security experts to make a final determination of the competencies that should be possessed by NASI; The second step was to determine the curriculum objectives for NASIC based on the competencies determined by the Delphi survey; The third step was to define the curriculum objectives based on the competencies that NASI needs to have; The fourth step was to determine the curriculum content based on the curriculum objectives; The fifth step is to complete the teaching plan and courseware of the curriculum; The sixth step was the implementation of curriculum; The seventh step was to do a curriculum evaluation using three examination or questionnaires.

3.2.1 In the Curriculum Analysis Phase

In the analysis phase, the use of one research instruments was described as follows.

Delphi Survey

The Delphi survey may be most effective in educational research when the questions themselves are not amenable to precise analytical techniques but could benefit from subjective judgment on a collective basis (Cutrer, 2017). Delphi techniques are often used as a unique research tool for iterative online surveys. The competences of the NASI in this study cannot be analyzed precisely, so it is particularly suitable for the Delphi survey. The competencies of the NASI include three aspects, the knowledge that NASI needs to acquire, the training skills that NASI needs to acquire, and the attitude that NASI needs to have as NASI. The using the Delphi survey was described as follows.

Criteria for Selecting Delphi Experts

There is limited consensus among researchers on "'what an expert is" (Baker et al., 2006). Some researchers have argued that too narrow definitions of experts reduce the potential sample size available (Duncan et al., 2004). However, the definition of expert should be precise and rigorous to ensure that the findings are reliable. Therefore, referring to the criteria in the literature above, the criteria chosen by the Delphi experts in this study was the following three qualifications:

1) The experts are certified as a NASI qualification over 5 years.
2) The experts have experienced at least 300 hours of lectures.
3) The experts are at least a training supervisor level in an airport or airline.

The researcher selected experts who meet the criteria among the eligible NASI based on the above three criteria, and after the consent of the selected experts, the researcher sent the questionnaire to the experts Via Questionnaire Star.

Numbers of Delphi experts

This study reviewed a large amount of literature showing that the choice of the number of Delphi experts has been variously stated, and the number of experts chosen varies depending on the content of the study. For example, Adler and Ziglio (1996) and Linstone and Turnoff (2002) proposed that an acceptable number of participants for a Delphi study range from 10-30, with an optimum number of 10-20. Okoli and Pawlowski (2004), comparing traditional surveys with the Delphi method, suggested that the size of the Delphi group does not depend on statistical power, but rather on the group dynamics for arriving at consensus among experts, and therefore a literature recommended a Delphi panel of 10-18 experts (Paliwoda, 1983). Combining the views of the above experts, the study decided that the number of Delphi experts should be 18.

3.2.2 In the Curriculum Evaluation Phase

The three of the instruments were used in the NASIC evaluation phase. They were as follows:

1) National Aviation Security Instructors Curriculum (NASIC) Theory Examination.

2) National Aviation Security Instructors Curriculum (NASIC) Practical Examination.

3) National Aviation Security Instructors (NASI) Attitude Questionnaire.

They are shown in Figure 3.4.

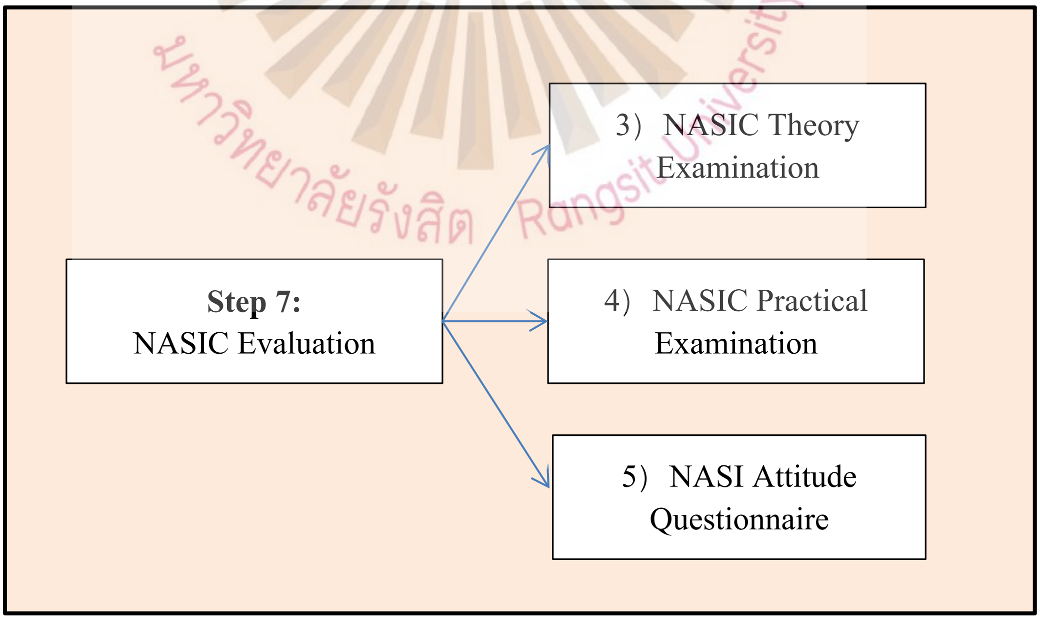

Figure 3.4 The Main Methods in the Curriculum Evaluation Phase

The specific applications of the three instruments are described as follows:

1) National Aviation Security Instructors Curriculum (NASIC) Theory Examination

The NASIC Theory Examination WERE developed to evaluate NASI knowledge acquisition. The NASIC Theory Examination consists of 20 questions, each question is scored for 5 scores and the total score is 100 scores. Participants were awarded 5 scores for a correct answer and no marks were awarded for an incorrect answer. Finally, the scores for each question were summed. Participants were considered to pass the examination when their total score was above or equal to 70 scores. Participants were not considered to pass the examination when their total score was below 70 scores.

2) National Aviation Security Instructors Curriculum (NASIC) Practical Examination

The NASIC Practical Examination was developed by the Safety and Security Faculty of CAMIC to evaluate NASI lecturing skills. The NASIC Practical Examination consists of 10 questions, each question was using a five-point Likert scale (1= 'very poor', …, 5 = 'very good'). Finally, the scores for each question were summed. Participants' scores must meet two requirements at the same time and are deemed to have passed the examination. 1) Participants were considered to pass the examination when their total score was above or equal to 30 scores. Participants were not considered to pass the examination when each total score was below 30 scores. 2) Participants were considered to pass the examination when each score was above or equal to 3 scores. Participants were not considered to pass the examination when each score was below 3 scores.

3) National Aviation Security Instructors (NASI) Attitude Questionnaire

The researcher developed a questionnaire to collect data from NASI. The questions were rated quantitatively using a five-point Likert's scale: 5 = strongly agree, 4 = agree, 3 = neutral, 2 = disagree, 1 = strongly disagree.

3.2.3 Validity of the Research Instruments

In order to verify validity of instruments in this research, the researcher invited five experts, namely IOC Experts, to evaluate instruments by using the Index of Item-Objective Congruence (IOC) method (Turner & Carlson, 2003).

The five IOC Experts have adequate experience related to this study; in addition, all of them are fluent bilingual scholars. With this special qualification, all research instruments of English and Chinese translation vice versa version in this study were evaluated and commented by these five experts at the same time.

The IOC scores evaluation was provided into three scales of rating for consistency and congruence of the items. All IOC Experts had to choose only one answer as the given mark from these three alternatives of choices.

Where IOC score ranges from -1 to +1.

If the rating is 1, it means that the item matches the stated objectives.

If the rating is 0, it means that the item is unclear or not sure whether the measures meet the objectives or not.

If the rating is -1, it means that the item does not meet the objectives.

The average scores for each item must have the consistency and acceptable value equal to or above 0.67 to +1 (Turner & Carlson, 2003).

According to Turner and Carlson (2003), the average scores for each item must have the consistency and acceptable value equal to or above 0.67 to +1. Therefore, the items with average scores greater than or equal to 0.67 were reserved, items with average scores less than 0.67 were removed (See Appendix D).

In general, all instruments passed the IOC check and these instruments reflect reasonable content validity.

3.2.4 Reliability of the Research Instruments

In this study, the reliability of the research instruments were tested using Cronbach's Alpha analysis (Cronbach, 1951).

After all instrument items had been identified, the researcher invited a trial group to use the instrument. The collected data were analyzed using SPSS software for Cronbach's Alpha analysis. According to Table 3.1, the Cronbach's Alpha values were shown for the questionnaire items of the NASI Attitude Questionnaire.

Table 3.1 The Cronbach's Alpha Values of the NASI Attitude Questionnaire

Reliability Statistics		
Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.832	.833	5

According to Achour (2017), an implied reliability and generally accepted for Cronbach's Alpha value is that α of 0.65 - 0.70 indicates an acceptable level of reliability, and 0.80 or greater a very good level. The details of the Cronbach's Alpha value and interpretation (Achour, 2017) are shown in Table 3.2.

According to Table 3.2 indicates that the Cronbach's Alpha Coefficient of the NASI Attitude Questionnaire is very good. In conclusion, the research instruments of this study possess good reliability.

Table 3.2 The Cronbach's Alpha Value

Cronbach's Alpha Value	Interpretation
Below .60	Unacceptable
Between .60 and .65	Undesirable
Between .65 and .70	Acceptable
Between .70 and .80	Respectable
Between .80 and .90	Very Good

Source: MSB Yusoff, 2010

3.3 DATA COLLECTION

The data collected in this study consisted of Data Collection at the analysis phase and the evaluation phase of the curriculum.

3.3.1 Data Collection at the Analysis phase of the Curriculum

The data collected in the analysis phase of the curriculum consists of Delphi Experts data collection.

Figure 3.5 introduces the Delphi Experts data collection processes of this study. The details of each process are as follows.

Delphi Experts data collection includes:

1) Round one

Delphi experts were asked to complete the Delphi Survey Questionnaire (For Round one), which were used to collect data of the experts. After the experts return the Delphi Survey Questionnaire (For Round one) with comments, the researcher analyzed the data and formed the Delphi Survey Questionnaire (For Round two) for the Round two data collection.

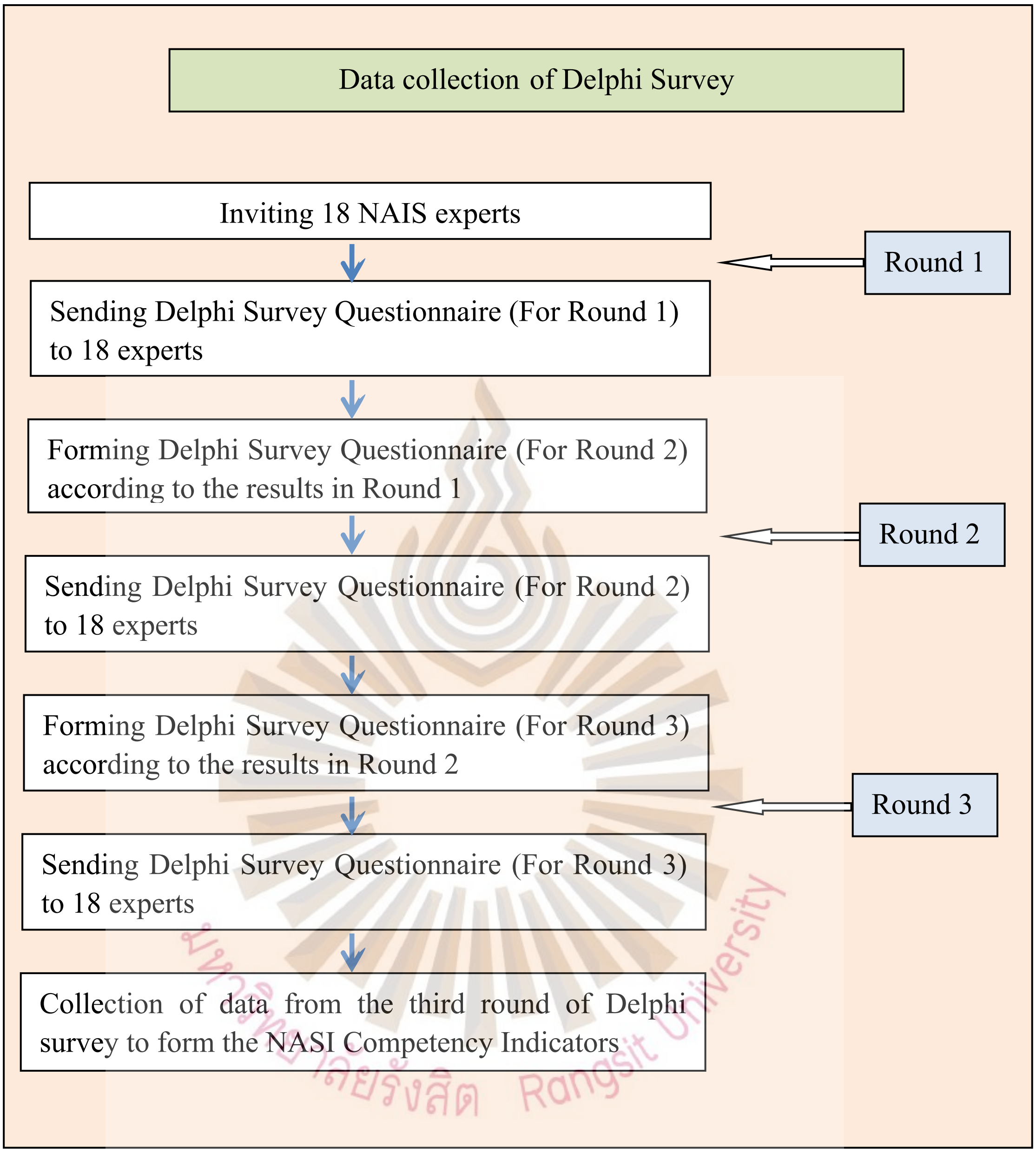

Figure 3.5 Illustration of the Delphi Survey Procedures

2) Round two

Delphi experts were asked to complete the Delphi Survey Questionnaire (For Round two), which were used to collect data of the experts. After the experts returned the Delphi Survey Questionnaire (For Round two) with comments, the researcher analyzed the data and formed the Delphi Survey Questionnaire (For Round three) for the Round three data collection.

3) Round three

Delphi experts were asked to complete the Delphi Survey Questionnaire (For Round three), which were used to collect data of the experts. After the experts returned the Delphi Survey Questionnaire (For Round three) with comments, the researcher analyzed the data and based on the results from the data analysis, the capability indicators that NASI should script were derived.

3.3.2 Data Collection in the Evaluation Phase of the Curriculum

The data collection at the evaluation phase of the curriculum drew from three research instruments.

1) NASIC Theory Examination

All NASIC participants were asked to complete the NASIC Theory Examination after the curriculum. Exam scores were collected and analyzed.

2) NASIC Skill Examination

All NASIC participants were asked to deliver a 10-minute course, which was scored by the teacher against a skill examination scoring sheet based on their performance. Exam scores were collected and analyzed as data.

3) NASI Attitude Questionnaire

All NASIC participants were asked to complete the NASI Attitude Questionnaire after the curriculum. The scores of NASI Attitude Questionnaire were collected and analyzed.

3.4 DATA ANALYSIS

Data analysis for this research included both quantitative data analysis and qualitative data analysis. The IBM's Statistical Package for the Social Sciences (SPSS) V.23 software (IBM, 2015) supported and licensed by Rangsit University's library will be used in this study to analyze the quantitative data collected. MAXQDA (Free version) software were used in this study to analyze the qualitative data collected. The free version of MAXQDA 2022 is obtained by downloading from the official website of VERBI Software GmbH (VERBI, 2022). The followings are analysis methods used for each set of data collection from each instrument.

3.4.1 Data Analysis of Delphi Survey

The data were collected from the Delphi Expert Survey consisted of quantitative and qualitative data. For quantitative data, a descriptive statistical analysis was used to describe the statistic values such as Mean, and Standard Deviation (SD). To justify the reliability and scientific validity of the Delphi survey, Positive Rate, Expert Authority Coefficient (Cr), Coefficient of Variation (CV) and Kendall's concordance coefficient (w) were reported. For qualitative data, MAXQDA software were used to analyze comments. Qualitative data analysis contained three basic steps: uploading the raw data into MAXQDA and managing it, coding the data into themes, and data analysis and concluding.

3.4.2 Data Analysis of NASIC Theory Examination

The data collected from the NASIC Theory Examination are quantitative data. The independent-samples t-test were used to analyzed the data from the experimental and control groups. The p value, 95% CI and Effect Size (Cohen's d) were reported.

3.4.3 Data Analysis of NASIC Skill Examination

The data were collected from the NASIC Skill Examination consists of quantitative and qualitative data. For quantitative data, the independent-samples t-test was used to analyze the data from the experimental and control groups. The p value, 95% CI and Effect Size (Cohen's d) were reported. For qualitative data, MAXQDA software were used to analyze comments. Qualitative data analysis contains three basic steps: uploading the raw data into MAXQDA and managing it, coding the data into themes, and data analysis and concluding.

3.4.4 Data Analysis of NASI Attitude Questionnaire

The data collected from the NASI Attitude Questionnaire were quantitative data. The independent-samples t-test were used to analyze the data from the experimental and control groups. The p value, 95% CI and Effect Size (Cohen's d) were reported.

3.5 ETHICAL CONSIDERATIONS

Two components of ethics needed to be considered in this study are as follows.

The first component included seeking approval from Rangsit University to undertake the study. The details of the study submitted to the RSU Ethics Review Board (ERB) for human research ethics review. The certificate of approval number COA RSUER 2022-131 dated 15 December 2022 was granted by Rangsit University Ethic Review Board. After that, the approval certificate granted by ERB and the study details were submitted to the Safety and Security Department of CAMIC for another review. The certificate of approval was granted by the Director of the Safety and Security Faculty to ensure the confirmation on research data collection.

The second component was to respect and protect the research experts and participants in the study. It included:

1) Voluntary participation. The researcher provided experts and participants with information about the study, obtain their consent, and sign the inform consent forms.

2) Confidentiality. All data were kept strictly confidential and will be destroyed after the article of this dissertation is published in a journal for one year.

3) Avoidance of harm and avoidance of deception to the participants, during the curriculum, the researcher invited two instructors to supervise in the field to avoid all participants being harmed or deceived.

In summary, this chapter explicates the research methodology in the topics of research population and sample, research instruments, data collection and analysis, and ethical considerations of the study. The data collected in this chapter were analyzed and displayed further in detail in Chapter 4.

CHAPTER 4

DATA ANALYSIS

This chapter presents the results of the data analysis from the Delphi Technique utilized in this study to address the research questions, test the hypotheses, and meet the research objectives. These objectives are restated as follows: 1) to identify the objectives of the National Aviation Security Instructors Curriculum (NASIC) based on the OBE concept; 2) to develop the NASIC; and 3) to evaluate the effectiveness of implementing the NASIC based on OBE concepts. The subsequent section presents the analyzed data results.

4.1 DATA ANALYSIS RESULTS OF THE DELPHI METHOD

This study applied the Delphi method with a total of three rounds of consultation.

4.1.1 Round One: Delphi Consultation Data Analysis Results

The data collection process for Round One involved administering the Delphi Expert Consultation Questionnaire. This questionnaire consisted of a letter for experts, instructions, demographic information of the Delphi experts, and the questions themselves (refer to Appendix F). Upon receiving completed questionnaires from the experts, the researcher proceeded to analyze the data for the first round. The results of this analysis encompassed several aspects:

1) Delphi Experts Demographic Statistics:

In this study, 18 experts specializing in National Aviation Security Training were selected for Delphi consultation, and their demographic information is presented in Table 4.1.

According to Table 4.1, the expert panel comprised 10 male experts (55.6%) and 8 female experts (44.4%). In terms of years of National Aviation Security Instructors (NASI) qualification, the majority of experts, 14 in total (77.8%), possessed more than 10 years of NASI qualification experience, while 4 experts (22.2%) had 5-10 years of NASI qualification experience. Furthermore, 12 experts (66.7%) had accumulated more than 1,000 hours of teaching experience, whereas 6 experts (33.3%) had 500-1,000 hours of teaching experience.

This demographic breakdown provides insight into the composition and experience level of the expert panel, offering a foundation for understanding the perspectives and contributions of the Delphi experts in subsequent rounds of consultation.

Table 4.1 Delphi Experts Demographic Statistics

Gender	n	Years of NASI Qualification	n	Hours of Teaching Experience	n
Male	10	Over 10 years	14	Over 1000 hours	12
Female	8	5-10 years	4	500-1000 hours	6

2) Expert Positive Coefficient

The expert positive coefficient is determined by the recovery rate of the questionnaire, calculated as the number of questionnaires recovered divided by the number of questionnaires distributed. A higher value suggests greater engagement of the experts in the research, with a recovery rate exceeding 70% considered favorable (Babbie, 2020).

In Round One of the Delphi consultation, a total of 18 copies were distributed, and all 18 were recovered, resulting in an effective recovery rate of 100% (refer to Table 4.2). This 100% effective recovery rate indicates that the positive coefficient of Round One experts was excellent. Furthermore, it suggests that the experts in Round One were highly motivated for the consultation and demonstrated a strong willingness to participate.

Table 4.2 Recovery Rate of Round One Questionnaire

Round	Number of questionnaires distributed	Number of questionnaires recovered	Effective Recovery Rate
1	18	18	100%

3) Expert Authority Coefficient

The expert authority coefficient quantifies the strength of an expert's authority on a specific issue or direction, significantly influencing the reliability of the evaluation. Thus, it's crucial to quantify and calculate the degree of expert authority. The expert's authority coefficient (Cr) is derived from the expert's self-assessment and is influenced by two factors: the basis of the expert's judgment on the issue (Ca) and the expert's familiarity with the issue (Cs). Generally, a study's results are considered reliable if Cr ⩾ 0.7.

The formula for calculating the expert authority coefficient is as follows:

$$Cr = (Ca + Cs)/ 2 \qquad (4\text{-}1)$$

Where:

Cr = Expert authority coefficient

Ca = Basis of the expert's judgment on the issue

Cs = Degree of familiarity of the expert with the issue

The basis of experts' judgment on the problem is primarily categorized into four dimensions: practical experience, theoretical analysis, reference to domestic and foreign literature, and intuitive feeling. Each dimension is divided into different levels: large, medium, and small. The evaluation criteria for each level are outlined in Table 4.3.

Table 4.3 Judgement Basis and the Degree of Influence

Judgment Criterion	Score for degree of influence on expert judgment		
	Large	Medium	Small
Theoretical analyze	0.3	0.2	0.1
Practical experience	0.5	0.4	0.3
Domestic and International Literature	0.1	0.1	0.1
Intuitive feeling	0.1	0.1	0.1

The Degree of Familiarity (Cs) encompasses five levels indicating familiarity with the content of the survey: Very unfamiliar, Less unfamiliar, Familiar, More familiar, and Very familiar. Corresponding values assigned to each level are: 0, 0.2, 0.5, 0.8, and 1, respectively. These values are illustrated in Table 4.4.

Table 4.4 Expert Familiarity and the Degree of Influence

Degree of familiarity	Familiarity coefficient
Very unfamiliar	0
Less familiar	0.2
Familiar	0.5
More familiar	0.8
Very familiar	1

The results of Round One indicate that experts' familiarity with the content was Cs = 15.8/18 = 0.878 (see Table 4.5). Similarly, the results for the basis of judgment in Round One were Ca = 16.8/18 = 0.933 (see Table 4.5). The expert authority coefficient of this study is calculated as Cr = (0.933 + 0.878) / 2 = 0.906 (see Table 4.5), which exceeds 0.7. An expert authority coefficient (Cr) of Cr ⩾ 0.7 indicates that the results of the study are considered reliable. Therefore, the results of Round One can be deemed reliable.

Table 4.5 Ca, Cs, and Cr Value of Round One

Round	Ca	Cs	Cr
1	0.933	0.878	0.906

4) Concentration of expert opinions

The degree of concentration of expert opinion is represented by the mean (Mj) and the full score frequency (Kj).

(i) Mean

The formula for calculating the Mj is:

$$M_j = \frac{1}{m_j} \sum_{i=1}^{m} C_{ij} \tag{4-2}$$

In the formula, mj represents the number of experts participating in the evaluation of the j indicator. The Cij denotes the rating value of the j indicator by the i expert. A higher value of Mj indicates greater importance of the corresponding j indicator.

(ii) Full score frequency

The formula for calculating the Kj is:

$$K_j = \frac{m_j'}{m_j} \tag{4-3}$$

In the formula, mj denotes the number of experts who participated in the evaluation of the j indicator, and Kj takes values between 0 and l. The Kj can be used as a complementary indicator for Mj. The larger the Kj, the larger the percentage of experts who gave the indicator a full score and the more important the indicator is.

The mean and full score frequency for Round One are detailed in Table 4.7.

5) Experts coordination coefficient

The coordination coefficient of expert opinions assesses whether there is disagreement on the indicators among the participating experts. Typically, this is expressed through Kendall's Concordance Coefficient W and the Coefficient of Variation (CV).

Kendall's Concordance Coefficient W indicates the degree of concordance among all experts on all indicators. A higher Kendall's concordance coefficient W reflects a greater degree of concordance among experts' opinions.

The CV indicates the degree of coordination among experts on the relative importance of an indicator, the reasonableness of the calculation formula, and the operability of the collection method. A smaller CV indicates a higher degree of coordination among experts. It is generally recognized that the CV should be less than 0.25. The calculation of the CV and Kendall's Concordance Coefficient (W) can determine whether there is significant divergence in the evaluation of each indicator by the experts or identify highly coordinated experts and those with heterodox opinions.

(i) Kendall's Concordance Coefficient W

The Round One data analysis yielded Kendall's Concordance Coefficient W=0.119, p=0.000<0.05, indicating that there is a significant consistency among expert opinions (see Table 4.6).

Table 4.6 Test Statistics of Kendall's Concordance Coefficient W of Round One

N	18
Kendall's W[a]	0.119
Chi-Square	72.536
df	34
Asymp. Sig.	0.000
a. Kendall's Coefficient of Concordance	

(ii) CV

The Round One data were analyzed to derive the value of CV (see Table 4.7). The CV value is the ratio of the Standard deviation to the Mean.

Table 4.7 Descriptive Statistics of Round One

Item	N	Mean	Std. Deviation	Minimum	Maximum	Full score frequency	CV
01	18	4.56	0.616	3	5	61.11%	0.135
02	18	4.72	0.575	3	5	77.78%	0.122
03	18	4.56	0.784	3	5	72.22%	0.172
04	18	4.67	0.594	3	5	72.22%	0.127
05	18	4.5	0.618	3	5	55.56%	0.137
06	18	4.61	0.502	4	5	61.11%	0.109
07	18	4.61	0.608	3	5	66.67%	0.132
08	18	4.39	0.698	3	5	50%	0.159

Table 4.7 Descriptive Statistics of Round One (Cont.)

09	18	4.78	0.428	4	5	77.78%	0.090
10	18	4.61	0.608	3	5	66.67%	0.132
11	18	4.33	1.085	1	5	61.11%	0.251
12	18	4.17	1.15	1	5	55.56%	0.276
13	18	4.39	1.037	1	5	61.11%	0.236
14	18	4.00	0.97	1	5	27.78%	0.243
15	18	4.78	0.428	4	5	77.78%	0.090
16	18	4.61	0.502	4	5	61.11%	0.109
17	18	4.61	0.502	4	5	61.11%	0.109
18	18	4.5	0.707	3	5	61.11%	0.157
19	18	4.67	0.485	4	5	66.67%	0.104
20	18	4.89	0.323	4	5	88.89%	0.066
21	18	4.22	0.647	3	5	33.33%	0.153
22	18	4.5	0.618	3	5	55.56%	0.137
23	18	4.78	0.428	4	5	77.78%	0.090
24	18	4.78	0.428	4	5	77.78%	0.090
25	18	4.72	0.461	4	5	72.22%	0.098
26	18	4.78	0.428	4	5	77.78%	0.090
27	18	4.78	0.428	4	5	77.78%	0.090
28	18	4.56	0.616	3	5	61.11%	0.135
29	18	4.78	0.428	4	5	77.78%	0.090
30	18	4.78	0.428	4	5	77.78%	0.090
31	18	4.67	0.485	4	5	66.67%	0.104
32	18	4.39	0.608	3	5	44.44%	0.138
33	18	4.39	0.608	3	5	44.44%	0.138
34	18	4.56	0.511	4	5	55.56%	0.112
35	18	4.67	0.485	4	5	66.67%	0.104

(iii) Boundary Value

This study primarily employs the boundary value method to screen evaluation indicators and calculates the frequency of full scores, arithmetic mean, and CV based on the importance score of each indicator.

The boundary value for the full score frequency and arithmetic mean is computed using the following method: "Boundary Value = Mean - Std. Deviation." Indicators with scores higher than the boundary value are selected.

The boundary value for the CV is calculated as follows: "Boundary Value = Mean + Std. Deviation." Indicators with scores lower than the boundary value are selected. Indicators that fail to meet all three boundary values are excluded. Those meeting only one or two boundary values are selected or excluded accordingly. The boundary values for the indicators from Round One are presented in Table 4.8.

Table 4.8 Boundary Value for Indicators of Round One

	Mean	Std. Deviation	Boundary Value
Full score frequency (%)	64.29	13.2	51.09
Mean	4.581	0.197	4.384
Cv	0.132	0.05	0.182

After calculation, the criteria for retaining indicators in Round One were as follows: the full score frequency was >51.09%, the mean was >4.384, and the CV was <0.182. In Table 4.6, Indicator 14 did not meet any of the three boundary values, so it was excluded. Indicators 11, 12, and 21 only met one of the measurement conditions, and these three indicators were excluded in alignment with the requirements related to the competencies of NASI. Indicators 08, 13, 32, and 33 met two of the measurement conditions. These four indicators were retained based on the competencies of NASI. Consequently, after Round One, four indicators were excluded, reducing the total number of indicators from 35 to 31.

Simultaneously, the experts proposed additional competencies for NASI. According to the MAXQDA word frequency analysis, the ratio of word frequency occurrence is depicted in Figure 4.1.

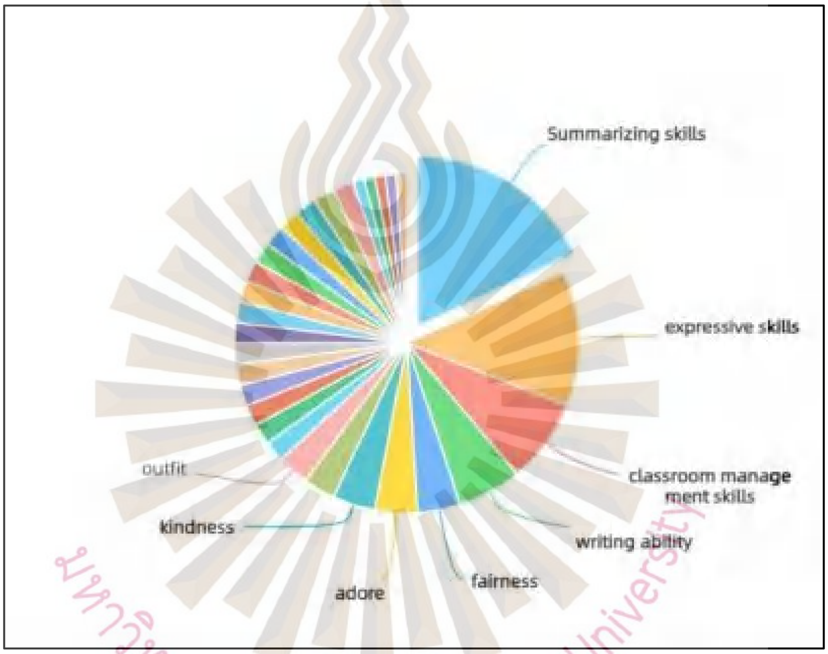

Figure 4.1 The ratio of word frequency occurrence

In response to the experts' feedback, three indicators, labeled 36, 37, and 38, were added to the questionnaire after the removal of four indicators. These additional indicators are as follows: Indicator 36 involves the ability to summarize content presented in appropriate language after each lesson, Indicator 37 focuses on possessing good verbal tabulation skills, and Indicator 38 pertains to having effective classroom control techniques. Therefore, after Round One, three indicators were included following the removal of four, resulting in a reduction of the total number of indicators from 35 to 34. Subsequently, based on the determination of these indicators, the Delphi Expert Consultation Questionnaire for Round 2 was formulated.

6) Competency indicators resulting from the first round of Delphi expert survey

No.	Competency Projects	code	Competency Elements	1	2	3	4	5
A	Requirements investigation capability	1	The basic situation of the training target, such as job position, experience, education, etc., is clarified through investigation.					
		2	The lack of knowledge, skills and attitudes of the training participants is clarified through investigation.					
		3	The investigation enables clarity on the expected security training.					
		4	The investigation can provide the clear objectives of the aviation security training curriculum.					
2	The ability to produce teaching plans	5	The ability to clarify the purpose and role of the teaching plan.					
		6	The ability to clarify the main components of a teaching plan.					
		7	The ability to write standardized curriculum objectives.					
		9	The ability to select appropriate teaching methods based on course content and clearly describe them in a teaching plan.					

		10	The ability to describe the key elements of each unit of the course in a teaching plan.
		11	The ability to create courseware using PowerPoint (PPT) templates appropriate to the training topic.
3	The ability to produce the courseware	12	The ability to create courseware according to PowerPoint (PPT) authoring principles.
		14	Produced PowerPoint (PPT) that is well laid out and has good looking pages.
		15	The ability to implement training and prepare for teaching according to the teaching plan.
		16	The ability to select the appropriate instructor and classroom based on the training topic.
4	The ability to organize and manage	17	The ability to do a good job of supporting the training, including teaching software equipment and hardware equipment.
		18	The ability to create and properly maintain training files and assessment records.
		19	The ability to rationalize the pace of instruction based on teaching plans.
5	The ability to teaching	20	The ability to focus on key points during teaching.
		21	The ability to stand reasonably and walk appropriately during teaching.

22	The ability to make good eye contact with trainee during teaching.
23	The ability to stimulate and sustain trainee interest during teaching.
24	The ability to pay attention to the state and reaction of the trainee to the lesson during teaching.
25	The ability to communicate effectively both verbally and non-verbally during teaching.
26	The ability to adjust the pace of teaching according to the response of the students in the class at the right time.
27	Utilization of pedagogical methods and tools.
28	The ability to use gestures, silence and body language effectively.
29	The ability to use effective questioning techniques.
30	The ability to use appropriate communication skills.
31	The ability to keep participants on course topics by starting, ending, monitoring and controlling them.
33	Be the ability to assess the learner's learning outcomes in an appropriate way at the end of the course.

	34	The ability to self-evaluate the effectiveness of the delivery in an appropriate way at the end of the course.
	35	The ability to improve and apply the course based on the findings of this training evaluation.
Additional capacity items	36	The ability to summarize the content presented in appropriate language after each lesson content.
	37	The ability to have good verbal tabulation skills
	38	The ability to have good classroom control techniques

4.1.2 Round Two Delphi Consultation Data Analysis Results

The Delphi Expert Consultation Questionnaire for Round 2 consists of instructions and questions designed to further refine the indicators identified in Round One.

After the experts returned the questionnaires with comments, the researcher analyzed the data for the second round. The results of the data analysis include the following: 1) The demographic statistics of the experts; 2) Expert positive coefficients; 3) Expert authority coefficients; 4) Concentration of expert opinions; and 5) Expert coordination coefficients.

1) Expert Positive Coefficient

In Round Two, a total of 18 copies were distributed, and all 18 copies were recovered, resulting in an effective recovery rate of 100% (see Table 4.9). This 100% effective recovery rate indicates a positive coefficient among the experts in Round Two. Additionally, it suggests that the experts in Round Two were highly motivated for the survey and demonstrated a strong willingness to participate.

Table 4.9 Recovery Rate of Round Two

Round	Number of questionnaires distributed	Number of questionnaires recovered	Effective Recovery Rate
2	18	18	100%

2) Expert authority coefficient

The results of the experts' familiarity with the content in Round Two were Cs = 16.3/18 = 0.906 (see Table 4.10). The results of the basis of judgment in Round Two were Ca = 17/18 = 0.944 (see Table 4.10). The expert authority coefficient of this study was Cr = (0.944 + 0.906) / 2 = 0.925 (see Table 4.10), which was greater than 0.7. An expert authority coefficient Cr ≥ 0.7 indicates that the results of the study are considered reliable. Therefore, the results of Round Two are reliable.

Table 4.10 Ca, Cs, and Cr Value of Round Two

Round	Ca	Cs	Cr
2	0.944	0.906	0.925

3) Concentration of expert opinions

The degree of concentration of experts in Round Two is expressed in terms of the mean (Mj) and full score frequency, as shown in Table 4.12.

4) Experts coordination coefficient

The coordination coefficient is expressed by Kendall's concordance coefficient W and the CV.

(i) Kendall's concordance coefficient W

The Round Two data analysis yielded Kendall's concordance coefficient W=0.32, p=0.000<0.05, indicating significant consistency of expert opinions (see Table 4.11).

Table 4.11 Test Statistics of Kendall's Concordance Coefficient W of Round Two

N	18
Kendall's W[a]	0.32
Chi-Square	190.033
df	33
Asymp. Sig.	0.000
a. Kendall's Coefficient of Concordance	

(ii) CV

The Round Two data was analyzed to derive the value of CV (see Table 4.12). The CV value is the ratio of the Standard deviation to the Mean.

Table 4.12 Descriptive Statistics of Round Two

	N	Mean	Std. Deviation	Minimum	Maximum	Full Score Frequency (%)	Cv
1	18	4.28	0.461	4	5	27.8	0.108
2	18	4.83	0.383	4	5	83.3	0.079
3	18	4.06	0.873	3	5	38.9	0.215
4	18	4.28	0.461	4	5	27.8	0.108
5	18	4.78	0.548	3	5	83.3	0.115
6	18	4.89	0.323	4	5	88.9	0.066
7	18	4.06	0.236	4	5	5.6	0.058
8	18	4.67	0.485	4	5	66.7	0.104
9	18	4.72	0.461	4	5	72.2	0.098
10	18	4.33	0.485	4	5	33.3	0.112
13	18	4.72	0.575	3	5	77.8	0.122
15	18	4.28	0.895	3	5	55.6	0.209
16	18	4.33	0.485	4	5	33.3	0.112
17	18	4.94	0.236	4	5	94.4	0.048
18	18	4.78	0.428	4	5	77.8	0.090
19	18	4.28	0.461	4	5	27.8	0.108
20	18	4.72	0.575	3	5	77.8	0.122
22	18	4.89	0.323	4	5	88.9	0.066
23	18	4.22	0.428	4	5	72.2	0.101
24	18	4.89	0.323	4	5	88.9	0.066
25	18	4.39	0.778	3	5	55.6	0.177
26	18	4.22	0.428	4	5	22.2	0.101
27	18	4.72	0.575	3	5	77.8	0.122
28	18	4.94	0.236	4	5	94.4	0.048
29	18	4.22	0.428	4	5	22.2	0.101
30	18	4.72	0.575	3	5	77.8	0.122
31	18	4.89	0.323	4	5	88.9	0.066

Table 4.12 Descriptive Statistics of Round Two (Cont.)

32	18	4.33	0.485	4	5	33.3	0.112
33	18	4.78	0.548	3	5	83.3	0.115
34	18	3.83	0.707	3	5	16.7	0.185
35	18	4.22	0.548	3	5	27.8	0.130
36	18	4.78	0.428	4	5	77.8	0.090
37	18	4.78	0.548	3	5	83.3	0.115
38	18	4.17	0.383	4	5	16.7	0.092

(iii) Boundary Value

The formula for calculating boundary value in Round Two is the same as in the Round One. The boundary value for the indicators for the Round Two are shown in Table 4.13.

Table 4.13 Boundary Value for Indicators of Round Two

	Mean	Std. Deviation	Boundary Value
Full score frequency (%)	58.826	27.872	30.955
Mean	4.528	0.311	4.216
Cv	0.108	0.039	0.148

After Round Two, based on the calculated boundary values mentioned above, the conditions for retaining indicators are as follows: they must meet all three measures—full score frequency >30.955%, mean >4.216, and CV <0.148. If an indicator fails to meet all three measures, it is directly excluded. Indicators that meet one or two of the measures are selected based on an analysis of the actual situation. In Table 4.12, indicator 34 does not meet any of the three measures, so it is excluded.

However, other indicators met at least one of the three conditions above. To avoid excluding important indicators, the rest were retained.

Meanwhile, the experts pointed out that the description of the course objectives in indicator 4 should incorporate the OBE concept, and that the designation of the instructor indicators should be based on the results of the trainees' training. Indicator 15, "Ability to implement training and prepare for teaching according to the teaching plan," was considered too general and not specific enough. It should be replaced with a more specific description outlining the requirements for the development of lesson plans. Indicator 27, "Utilization of pedagogical methods and tools," was deemed not specific enough. It needs to be described more specifically.

Indicator 34 was deleted from the questionnaire based on the experts' comments, and the specific descriptions of indicators 4, 15, and 27 were modified. This resulted in the Delphi Expert Consultation Questionnaire (For Round 3), with a total of 33 indicators.

5) Competency indicators resulting from the second round of Delphi expert survey

No.	Competency Projects	code	Competency Elements	1	2	3	4	5
A	Requirements investigation capability	1	The basic situation of the training target, such as job position, experience, education, etc., is clarified through investigation.					
		2	The lack of knowledge, skills and attitudes of the training participants is					

			clarified through investigation.
		3	The investigation enables clarity on the expected security training.
		4	The survey can provide post-course training results for the determination of course objectives.
		5	The ability to clarify the purpose and role of the teaching plan.
		6	The ability to clarify the main components of a teaching plan.
		7	The ability to write standardized curriculum objectives.
2	The ability to produce teaching plans	9	The ability to select appropriate teaching methods based on course content and clearly describe them in a teaching plan.
		10	The ability to describe the key elements of each unit of the course in a teaching plan.
		11	The ability to create courseware using PowerPoint (PPT) templates appropriate to the training topic.
3	The ability to produce the courseware	12	The ability to create courseware according to PowerPoint (PPT) authoring principles.
		14	Produced PowerPoint (PPT) that is well laid out and has good looking pages.
4	The ability to organize and manage	15	The ability to clarify what preparations are needed for the implementation of training courses.

		16	The ability to select the appropriate instructor and classroom based on the training topic.
		17	The ability to do a good job of supporting the training, including teaching software equipment and hardware equipment.
		18	The ability to create and properly maintain training files and assessment records.
		19	The ability to rationalize the pace of instruction based on teaching plans.
		20	The ability to focus on key points during teaching.
		21	The ability to stand reasonably and walk appropriately during teaching.
		22	The ability to make good eye contact with trainee during teaching.
		23	The ability to stimulate and sustain trainee interest during teaching.
5	The ability to teaching	24	The ability to pay attention to the state and reaction of the trainee to the lesson during teaching.
		25	The ability to communicate effectively both verbally and non-verbally during teaching.
		26	The ability to adjust the pace of teaching according to the response of the students in the class at the right time.
		27	The ability to apply teaching methods and tools.

	28	The ability to use gestures, silence and body language effectively.
	29	The ability to use effective questioning techniques.
	30	The ability to use appropriate communication skills.
	31	The ability to keep participants on course topics by starting, ending, monitoring and controlling them.
	33	Be the ability to assess the learner's learning outcomes in an appropriate way at the end of the course.
	35	The ability to improve and apply the course based on the findings of this training evaluation.
	36	The ability to summarize the content presented in appropriate language after each lesson content.
Additional capacity items	37	The ability to have good verbal tabulation skills
	38	The ability to have good classroom control techniques

4.1.3 Round Three Delphi Consultation Data Analysis Results

Delphi Expert Consultation Questionnaire (For Round 3) consists of instructions and questions.

After the experts have returned the questionnaire with comments, the researcher analyzed the data for the third round. The results of the data analysis include the following: 1) the demographic statistics of the experts; 2) Expert positive coefficients;

3) Expert authority coefficients; 4) Concentration of expert opinions; and 5) Expert coordination coefficients.

1) Expert Positive Coefficient

In Round Three, a total of 18 copies were distributed, and all 18 copies were recovered, resulting in an effective recovery rate of 100% (see Table 4.14). The 100% effective recovery rate indicates a positive response from the experts in Round Three. Additionally, it suggests that the experts in Round Three were highly motivated for the survey and demonstrated a strong willingness to participate.

Table 4.14 Recovery Rate of Round Three

Round	Number of questionnaires distributed	Number of questionnaires recovered	Effective Recovery Rate
3	18	18	100%

2) Expert authority coefficient

The results of the experts' familiarity with the content in Round Three were Cs = 16.5/18 = 0.917 (see Table 4.15). The results of the basis of judgment in Round Three were Ca = 17.1/18 = 0.95 (see Table 4.15). The expert authority coefficient of this study is Cr = (0.95 + 0.917) / 2 = 0.934 (see Table 4.15), which is greater than 0.7. An expert authority coefficient Cr $\geq$ 0.7 indicates that the results of the study are considered reliable. Therefore, the results of Round Three are reliable.

Table 4.15 Ca, Cs, and Cr Value of Round Three

Round	Ca	Cs	Cr
3	0.95	0.917	0.934

3) Concentration of expert opinions

The degree of concentration of experts in the Round Three is expressed in terms of the mean (Mj) and full score frequency, as shown in Table 4.17.

4) Experts coordination coefficient

The coordination coefficient is expressed by the Kendall's concordance coefficient W and the CV.

(i) Kendall's concordance coefficient W

The Round Three data analysis yielded Kendall's concordance coefficient W=0.505, p=0.000<0.05, indicating significant consistency of expert opinions (see Table 4.16).

Table 4.16 Test Statistics of Kendall's Concordance Coefficient W of Round Three

N	18
Kendall's W[a]	0.505
Chi-Square	290.977
df	32
Asymp. Sig.	0.000
a. Kendall's Coefficient of Concordance	

(ii) CV

The Round Three data was analyzed to derive the value of CV (see Table 4.17). The CV value is the ratio of the Standard deviation to the Mean.

Table 4.17 Descriptive Statistics of Round Three

	N	Mean	Std. Deviation	Minimum	Maximum	Full Score Frequency (%)	CV
1	18	4.11	0.323	4	5	11.1	0.079
2	18	4.94	0.236	4	5	94.4	0.048
3	18	4.00	0.907	3	5	38.9	0.227
4	18	4.17	0.383	4	5	16.7	0.092
5	18	4.78	0.548	3	5	83.8	0.115
6	18	4.94	0.236	4	5	94.4	0.048
7	18	4.17	0.383	4	5	16.7	0.092
8	18	4.94	0.236	4	5	94.4	0.048
9	18	4.94	0.236	4	5	94.4	0.048
10	18	4.22	0.428	4	5	22.2	0.101
13	18	4.83	0.514	3	5	88.9	0.106
15	18	4.28	0.895	3	5	55.6	0.209
16	18	4.17	0.383	4	5	16.7	0.092
17	18	4.94	0.236	4	5	94.4	0.048
18	18	4.83	0.383	4	5	83.3	0.079
19	18	4.11	0.323	4	5	11.1	0.079
20	18	4.89	0.323	4	5	88.9	0.066
22	18	4.89	0.323	4	5	88.9	0.066
23	18	4.17	0.383	4	5	16.7	0.092
24	18	5.00	0	5	5	100	0.000
25	18	4.67	0.594	3	5	72.2	0.127
26	18	4.11	0.323	4	5	11.1	0.079
27	18	4.72	0.575	3	5	77.8	0.122
28	18	4.94	0.236	4	5	94.4	0.048
29	18	4.17	0.383	4	5	16.7	0.092
30	18	4.83	0.514	3	5	88.9	0.106

Table 4.17 Descriptive Statistics of Round Three (Cont.)

31	18	4.94	0.236	4	5	94.4	0.048
32	18	4.17	0.383	4	5	16.7	0.092
33	18	4.78	0.548	3	5	83.3	0.115
35	18	4.06	0.416	3	5	11.1	0.102
36	18	4.83	0.383	4	5	83.3	0.079
37	18	4.94	0.236	4	5	94.4	0.048
38	18	4.17	0.383	4	5	16.7	0.092

(iii) Boundary Value

The formula used to calculate the boundary value in Round Three remains consistent with that of Rounds One and Two. The boundary values for the indicators in Round Three are presented in Table 4.18.

Table 4.18 Boundary Value for Indicators of Round Three

	Mean	Std. Deviation	Boundary Value
Full score frequency (%)	59.773	35.526	24.247
Mean	4.565	0.366	4.199
Cv	0.087	0.043	0.14

After Round Three, the conditions for retaining indicators were determined based on the calculated values as follows: indicators needed to meet all three measures, namely full score frequency > 24.247%, mean > 4.199, and coefficient of variation < 0.14. If an indicator failed to meet all three conditions, it was excluded from further consideration. However, if an indicator met at least one or two of the measures, it was selected for retention based on an analysis of the actual situation.

In Table 4.17, all indicators satisfied at least one of the three conditions mentioned. To prevent the exclusion of important indicators, it was decided to retain all the indicators.

Since the Kendall's concordance coefficient W reached 0.505 after Round Three, When Kendall's W is greater than 0.4, the study is well co-ordinated; when Kendall's W is greater than 0.5, the Delphi survey can be completed (Chen, Zeng, & Tian, 2022). W values after the third round of Delphi surveys satisfied the condition for ending the consultation as per the established criterion. While it is acknowledged that the Delphi process can theoretically continue until 100% consensus is reached (Custer, Scarcella, & Stewart, 1999; Ludwig, 1997), in practice, three iterations of Delphi consultation are typically adequate to achieve consensus for 99% of cases. Therefore, considering both the achieved Kendall's concordance coefficient and the standard practice in Delphi studies, the decision was made to conclude the consultation. Consequently, 33 indicators pertaining to NASI competencies were ultimately obtained, and the Delphi consultation was concluded.

After the Delphi consultation, a pool of indicators for the competencies of NASI was formed, providing an answer to the first question of this study and addressing the question of what competencies NASI should have.

5) Competency indicators resulting from the third round of Delphi expert survey

No.	Competency Projects	code	Competency Elements	1	2	3	4	5
A	Requirements investigation capability	1	The basic situation of the training target, such as job position, experience, education, etc., is clarified through investigation.					
		2	The lack of knowledge, skills and attitudes of the training participants is clarified through investigation.					
		3	The investigation enables clarity on the expected security training.					
		4	The survey can provide post-course training results for the determination of course objectives.					
2	The ability to produce teaching plans	5	The ability to clarify the purpose and role of the teaching plan.					
		6	The ability to clarify the main components of a teaching plan.					
		7	The ability to write standardized curriculum objectives.					
		9	The ability to select appropriate teaching methods based on course content and clearly describe them in a teaching plan.					
		10	The ability to describe the key elements of each unit of the course in a teaching plan.					

3	The ability to produce the courseware	11	The ability to create courseware using PowerPoint (PPT) templates appropriate to the training topic.
		12	The ability to create courseware according to PowerPoint (PPT) authoring principles.
		14	Produced PowerPoint (PPT) that is well laid out and has good looking pages.
4	The ability to organize and manage	15	The ability to clarify what preparations are needed for the implementation of training courses.
		16	The ability to select the appropriate instructor and classroom based on the training topic.
		17	The ability to do a good job of supporting the training, including teaching software equipment and hardware equipment.
		18	The ability to create and properly maintain training files and assessment records.
		19	The ability to rationalize the pace of instruction based on teaching plans.
		20	The ability to focus on key points during teaching.
5	The ability to teaching	21	The ability to stand reasonably and walk appropriately during teaching.
		22	The ability to make good eye contact with trainee during teaching.
		23	The ability to stimulate and sustain trainee interest during teaching.

	24	The ability to pay attention to the state and reaction of the trainee to the lesson during teaching.
	25	The ability to communicate effectively both verbally and non-verbally during teaching.
	26	The ability to adjust the pace of teaching according to the response of the students in the class at the right time.
	27	The ability to apply teaching methods and tools.
	28	The ability to use gestures, silence and body language effectively.
	29	The ability to use effective questioning techniques.
	30	The ability to use appropriate communication skills.
	31	The ability to keep participants on course topics by starting, ending, monitoring and controlling them.
	33	Be the ability to assess the learner's learning outcomes in an appropriate way at the end of the course.
	35	The ability to improve and apply the course based on the findings of this training evaluation.
Additional capacity items	36	The ability to summarize the content presented in appropriate language after each lesson content.
	37	The ability to have good verbal tabulation skills

38	The ability to have good classroom control techniques

4.2 THE OBJECTIVES OF THE NASIC

After three rounds of Delphi expert surveys to determine the competencies that NASI should have, the competencies were analyzed to arrive at three categories and 10 curriculum objectives.

Knowledge Objectives

1) The trainees will be able to grasp the basic concepts of teaching and learning principles.

2) The trainees will be able to acquire the main steps in curriculum design.

Skill Objectives

1) The trainees can have the ability to determine course titles and write course objectives.

2) The trainees can have the ability to build course structures.

3) The trainees will be able to select appropriate teaching methods based on course content.

4) The trainees will be able to acquire the method of writing teaching plans.

5) The trainees will be able to acquire knowledge and skills to create courseware.

6) The trainees will be able to apply teaching skills to deliver aviation security curriculum.

These objectives encompass the core competencies that National Aviation Security Instructors (NASI) should develop through their training, ensuring they are well-equipped to design, structure, and deliver effective aviation security courses.

Attitude Objectives

1) The trainees will be able to understand the roles of NASI.

2) The trainees will be able to understand the responsibilities of NASI.

4.3 THE RESULTS OF EXPERIMENT

The two groups of trainees were trained and then evaluated separately in three areas: theory, skills and attitudes, and the instruments used for the exams were the three scales developed in this study. They are 1) NASIC Theory Examination, 2) NASIC Skill Examination, and 3) NASI Attitude Questionnaire.

4.3.1 Demographic Statistics of Participants

One hundred and twenty-eight NASI trainees as participants originally provided data.

Out of the 128 participants, the distribution among different demographic categories is as follows:

Age Groups:

Less than 30 years old: 40 participants (31.3%)

31-40 years old: 69 participants (53.9%)

Above 40 years old: 19 participants (14.8%)

Years of Work Experience:

Less than ten years: 31 participants (24.2%)

10-20 years: 82 participants (64.1%)

Over 20 years: 15 participants (11.7%)

Educational Background:

Less than a bachelor's degree: 22 participants (17.2%)

Bachelor's degree: 93 participants (72.7%)

More than a bachelor's degree: 13 participants (10.2%)

Gender:

Male: 86 participants (67.2%)

Female: 42 participants (32.8%)

The participants were randomly assigned to one of two groups: Experimental group (n=64) and Control group (n=64).

The comparisons of the demographic characteristics between the Experimental and Control groups at baseline were examined using Chi-square test for categorical variables. The Chi-square tests showed that there were no significant baseline differences between groups based on age, genders, years of work, and educational background categories. The following are the detailed results of the data analysis.

Age

The data from the Experimental and the Control group were analyzed using Chi-square, and it was observed that $\times^{2}=0.283$, $p=0.868>0.05$ indicated that there were no statistically significant differences between the two groups, as shown in Table 4.19 and Table 4.20.

Table 4.19 Age Range * Two Groups Cross-tabulation

			Groups		Total
			Experimental group	Control group	
Age Range	Less than 30 years old	Count	19	21	40
		%	29.7	32.8	31.3
	30-40 years old	Count	36	33	69
		%	56.3	51.6	53.9
	Above 40 years old	Count	9	10	19
		%	14.1	15.6	14.8
	Total	Count	64	64	128
		%	100	100	100

Table 4.20 Chi-Square Tests of Age

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	0.283	2	0.868
N of Valid Cases	128		

Gender

The data from the Experimental and the Control group were analyzed using Chi-square, and it was observed that $\times^{2}=0.567$, $p=0.451>0.05$ indicated that there were no statistically significant differences between the two groups, as shown in Table 4.21 and Table 4.22.

Table 4.21 Gender * Two Groups Cross-tabulation

			Groups		Total
			Experimental group	Control group	
Gender	Male	Count	41	45	86
		%	64.1	70.3	67.2
	Female	Count	23	19	42
		%	35.9	29.7	32.8
	Total	Count	64	64	128
		%	100	100	100

Table 4.22 Chi-Square Tests of Gender

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	0.567	1	0.451
N of Valid Cases	128		

Years of Work

The data from the Experimental and the Control group were analyzed using Chi-square, and it was observed that $\chi^2=0.148$, $p=0.929>0.05$ indicated that there were no statistically significant differences between the two groups, as shown in Table 4.23 and Table 4.24.

Table 4.23 Years of Work * Two Groups Cross-tabulation

			Groups		Total
			Experimental group	Control group	
Years of Work	Less than 10 years	Count	15	16	31
		%	23.4	25	24.2
	10-20 years old	Count	42	40	82
		%	65.6	62.5	64.1
	Above 20 years	Count	7	8	15
		%	10.9	12.5	11.7
	Total	Count	64	64	128
		%	100	100	100

Table 4.24 Chi-Square Tests of Years of Work

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	0.148	2	0.929
N of Valid Cases	128		

Educational Background

The data from the Experimental and the Control group were analyzed using Chi-square, and it was observed that $\chi^2=1.073$, $p=0.585>0.05$ indicated that there were no statistically significant differences between the two groups, as shown in Table 4.25 and Table 4.26.

Table 4.25 Educational Background * Two Groups Cross-tabulation

			Groups		Total
			Experimental group	Control group	
Educational Background	Less than Bachelor's degree	Count	9	13	22
		%	14.1	20.3	17.2
	Bachelor's degree	Count	49	44	93
		%	76.6	68.8	72.7
	Above Bachelor's degree	Count	6	7	13
		%	9.4	10.9	10.2
	Total	Count	64	64	128
		%	100	100	100

Table 4.26 Chi-Square Tests of Educational Background

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	1.073	2	0.585
N of Valid Cases	128		

4.3.2 NASIC Theory Examination Scores

According to the research plan, data from both the experimental and control groups underwent Normality Tests using SPSS software, specifically the Kolmogorov-Smirnov (KS) test and Shapiro-Wilk (SW) test. Based on the comparative research findings of Razali and Wah (2011), the Shapiro-Wilk test is considered the most powerful test for all types of distributions and sample sizes, while the Kolmogorov-Smirnov test is the least powerful. Therefore, the researchers chose to utilize the Shapiro-Wilk test results.

The Shapiro-Wilk test resulted in p-values of 0.004 for the Experimental Group and 0.005 for the Control Group scores, both falling below the significance level of 0.05 (refer to Table 4.27). Consequently, the null hypothesis, which assumes normality, is rejected for both datasets, indicating that they do not conform to a normal distribution. Therefore, the researchers proceeded to analyze the data using the non-parametric Mann-Whitney U test (Nachar, 2008; Siegel, 1957).

Table 4.27 Tests of Normality of NASIC Theory Examination Scores

	Groups	Kolmogorov-Smirnova			Shapiro-Wilk		
		Statistic	df	Sig.	Statistic	df	Sig.
Scores	Experimental Group	.152	64	.001	.942	64	.004
	Control Group	.178	64	.000	.943	64	.005
a. Lilliefors Significance Correction							

The Mann-Whitney U Test results showed that the NASIC Theory Examination scores between Experimental Group and Control Group that there were statistically significant differences (Z=-4.335, p=0.000, see Table 4.28). Figure 4.3 is box-plot of NASIC Theory Examination Scores of Experimental and Control Group. It shows the median, quartile, and extremes of NASIC Theory Examination scores for the Experimental group (80, 75~85) and Control group (75, 70~80).

Table 4.28 Mann-Whitney U Test Statistics of NASIC Theory Examination Scores

Groups	Scores	n	Mann-Whitney U	Wilcox-on W	Z	Sig.
Experimental Group	80 (75~85)	64	1155.000	3235.000	-4.335	0.000
Control Group	75 (70~80)	64				

In addition, participants are considered to pass the Theory Examination when their total score is above or equal to 70 scores. According Table 4.29, the pass rate of Experimental Group (0.938) higher than the pass rate of Control Group (0.891).

Table 4.29 The Pass Rate of NASIC Theory Examination

Groups	Number of Pass	Pass Rate
Experimental Group	60	0.938
Control Group	57	0.891

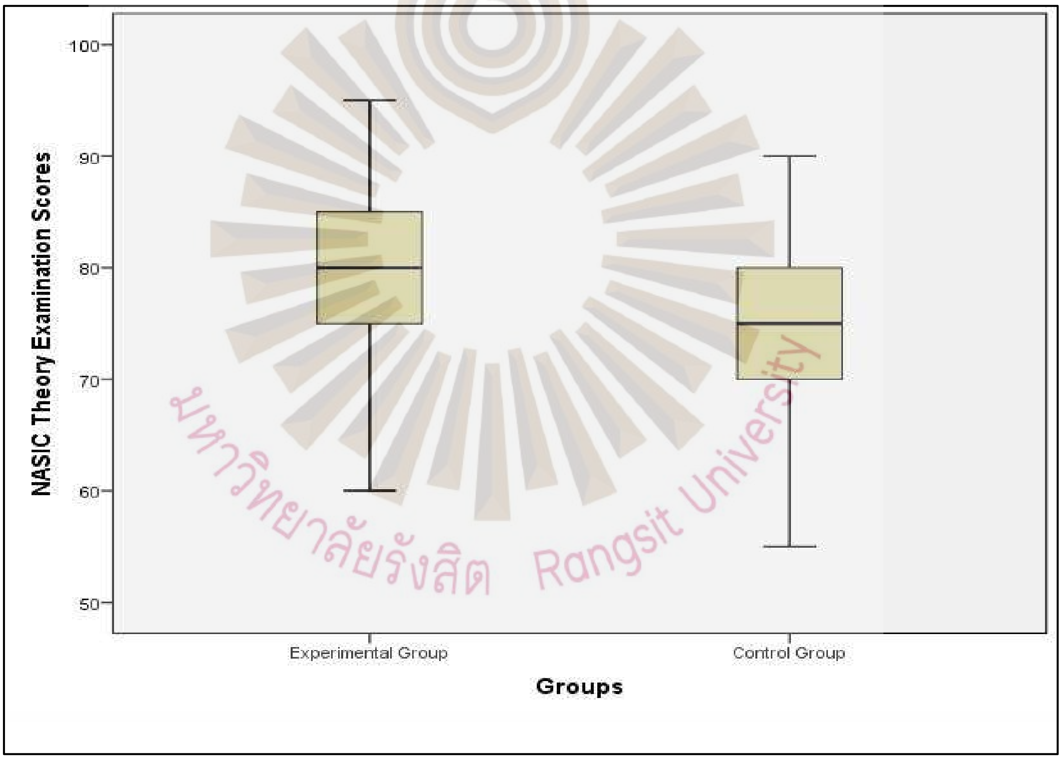

Figure 4.2 Box-plot of NASIC Theory Examination Scores of Experimental and Control Group

4.3.3 NASIC Skill Examination Scores

According to the research plan, data from both the experimental and control groups were subjected to Normality Tests using SPSS software, specifically the Shapiro-Wilk (SW) test. The Shapiro-Wilk test yielded p-values of 0.004 for the Experimental Group and 0.003 for the Control Group scores, both below the significance level of 0.05 (refer to Table 4.30). Consequently, the null hypothesis, which assumes normality, is rejected for both datasets, indicating that they do not follow a normal distribution. Therefore, the researchers proceeded to analyze the data using the non-parametric Mann-Whitney U test (Nachar, 2008; Siegel, 1957).

Table 4.30 Tests of Normality of NASIC Skill Examination Scores

		Kolmogorov-Smirnova			Shapiro-Wilk		
	Groups	Statistic	df	Sig.	Statistic	df	Sig.
Scores	Experimental Group	.128	64	.011	.941	64	.004
	Control Group	.135	64	.005	.936	64	.003
a. Lilliefors Significance Correction							

The Mann-Whitney U Test results indicated statistically significant differences in NASIC Skill Examination scores between the Experimental and Control Groups (Z = -4.091, p = 0.000, see Table 4.31).

Additionally, Figure 4.4 presents a box plot illustrating the distribution of NASIC Skill Examination scores for both groups. The box plot displays the median, quartiles, and extremes of the scores. Specifically, for the Experimental Group, the median score is 39, with quartiles ranging from 37 to 41. For the Control Group, the median score is 36.5, with quartiles ranging from 33 to 39.

Table 4.31 Mann-Whitney U Test Statistics of NASIC Skill Examination Scores

Groups	Scores	n	Mann-Whitney U	Wilcoxon W	Z	Sig.
Experimental Group	39 (37~41)	64	1193.500	3273.500	-4.091	0.000
Control Group	36.5 (33~39)	64				

According to Table 4.32, the pass rate for the Experimental Group is 0.953, indicating that 95.3% of participants in this group achieved a passing score. On the other hand, the pass rate for the Control Group is 0.891, signifying that 89.1% of participants in this group attained a passing score.

Thus, it can be observed that the pass rate for the Experimental Group is higher than that of the Control Group.

Table 4.32 The Pass Rate of NASIC Skill Examination

Groups	Number of Pass	Pass Rate
Experimental Group	61	0.953
Control Group	57	0.891

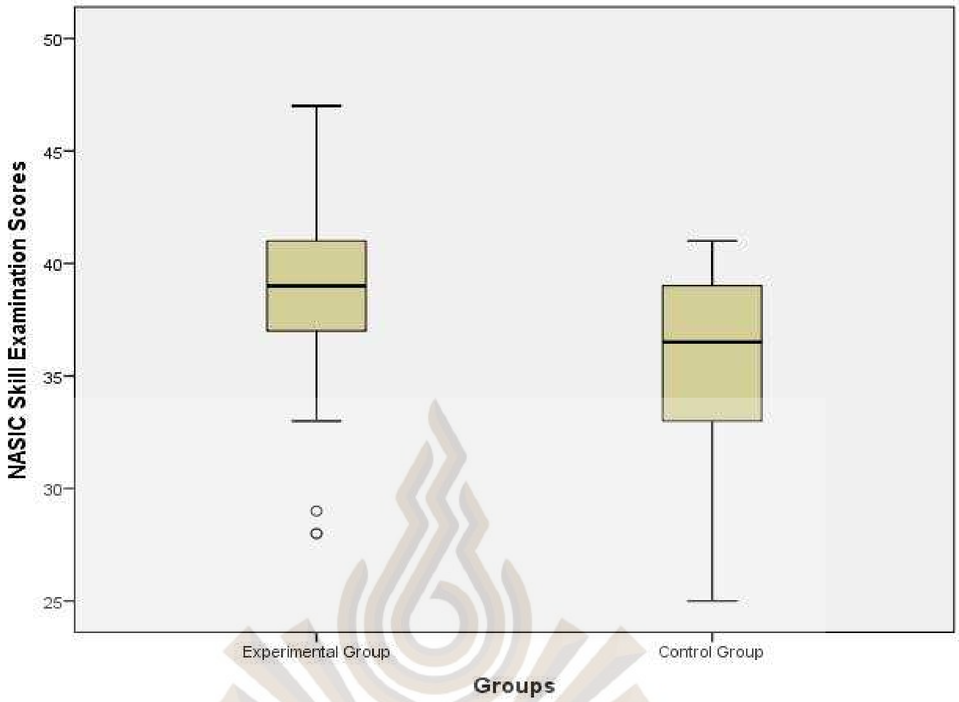

Figure 4.3 Box-plot of NASIC Skill Examination Scores of Experimental and Control Group

4.3.4 NASI Attitude Questionnaire

Based on the research plan, Normality Tests were conducted on the NASI Attitude Questionnaire scores from both the experimental and control groups using SPSS software. The Shapiro-Wilk (SW) test results indicated that the p-value for the Experimental Group was 0.000, and for the Control Group was 0.029, both below the significance level of 0.05 (refer to Table 4.33). Consequently, the null hypothesis, which assumes normality, is rejected for both datasets, indicating that they do not follow a normal distribution. Therefore, the data were analyzed using the non-parametric Mann-Whitney U test (Nachar, 2008; Siegel, 1957).

Table 4.33 Tests of Normality of NASI Attitude Questionnaire Scores

	Groups	Kolmogorov-Smirnova			Shapiro-Wilk		
		Statistic	df	Sig.	Statistic	df	Sig.
Scores	Experimental Group	.186	64	.000	.918	64	.000
	Control Group	.107	64	.065	.958	64	.029
a. Lilliefors Significance Correction							

The Mann-Whitney U Test results indicated statistically significant differences in NASI Attitude Questionnaire scores between the Experimental and Control Groups (Z = -3.977, p = 0.000, see Table 4.34).

Furthermore, Figure 4.4 presents a box plot illustrating the distribution of NASI Attitude Questionnaire scores for both groups. The box plot displays the median, quartiles, and extremes of the scores. Specifically, for the Experimental Group, the median score is 20, with quartiles ranging from 19 to 20. For the Control Group, the median score is 18.5, with quartiles ranging from 17 to 21.

Table 4.34 Mann-Whitney U Test Statistics of NASI Attitude Questionnaire

Groups	Scores	n	Mann-Whitney U	Wilcoxon W	Z	Sig.
Experimental Group	20 (19~22)	64	1219.500	3299.500	-3.977	0.000
Control Group	18.5 (17~21)	64				

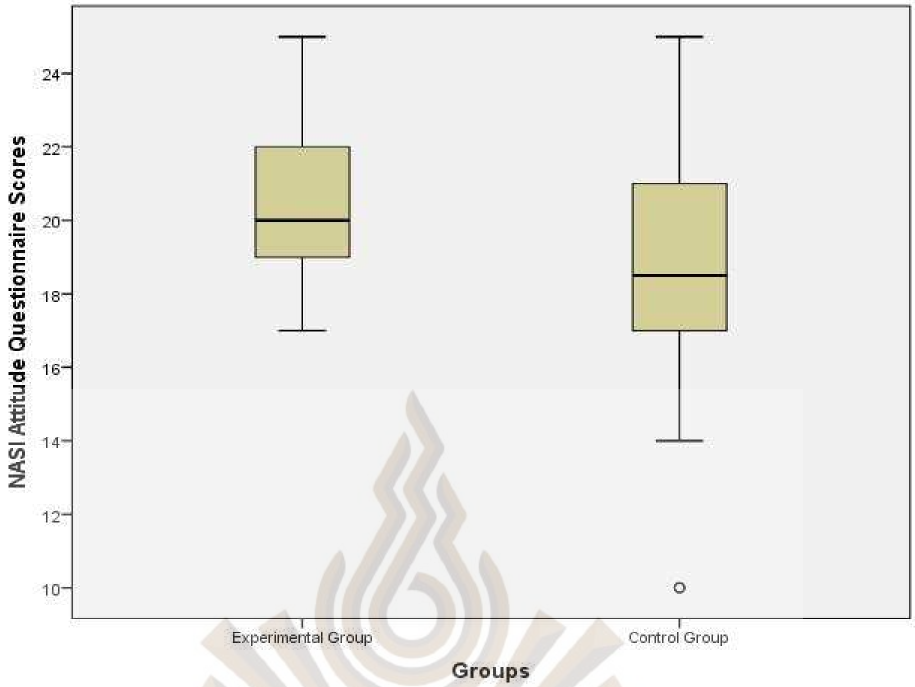

Figure 4.4 Box-plot of NASI Attitude Questionnaire Scores of Experimental and Control Group

4.4 SUMMARY

In summary, this chapter undertook comprehensive data analyses incorporating information gathered from both the Delphi consultation and the experiment. Statistical computations and descriptive interpretations were utilized to examine demographic data, examination scores, and questionnaire responses. The insights gleaned from this analysis will be further expounded upon in Chapter 5, where the conclusion, discussion, and recommendations sections will provide a more detailed exploration of the findings.

CHAPTER 5

CONCLUSION, DISCUSSION AND RECOMMENDATION

This chapter has four sections: conclusion, discussion, recommendations, and implications. It summarizes and discusses the research results and provides suggestions and insights for future research on the design and development of aviation security-related curricula based on OBE concept.

5.1 CONCLUSION

There were three objectives in this study. The first objective was to identify the objectives of the National Aviation Security Instructors Curriculum (NASIC) based on the OBE concept. The second objective was to develop the NASIC. The third objective was to evaluate the effectiveness of the NASIC implementation based on OBE concept. The researcher used mixed research methods, quantitative and qualitative. Quantitative and qualitative data were obtained through Delphi technique and questionnaires.

To achieve these three objectives, this study was divided into two main phases. The first phase aimed to determine the competencies of National Aviation Security Instructors (NASI) using the Delphi technique and to identify the objectives of the NASIC. The study results from the first phase were intended to address Objective 1. In the second phase, a variety of statistical methods were used. The study results from the second phase were intended to address Objectives 2 and 3.

5.1.1 Responses to First Research Objective

The first research objective was to identify the objectives of the NASIC based on the OBE concept.

This study was based on the OBE (Outcome-Based Education) concept of curriculum development, which focuses on the outcomes of the curriculum training. The first step, based on the OBE concept, was to determine what participants should achieve as a result of the training. Thus, identifying the outcomes of the NASI training was a key part of developing the curriculum. Training outcomes specify the competencies that should be attained by NASI.

To identify the competencies that NASI should have in the security post, this study used the Delphi technique. Three rounds of the Delphi technique were conducted to determine these competencies. Before conducting the Delphi technique, this study drew on multiple sources to form the National Aviation Security Instructor Competency Indicator Pool (NASCIP).

In the first round of the Delphi technique, 18 experts selected the indicators they considered important from the NASCIP. After the experts completed the survey forms, the study collected and analyzed the results. Statistical data analysis was performed, focusing on the following metrics: the expert positive coefficient (100%), the concentration of expert opinions (Mean and Full score frequency), the expert authority coefficient (Cr=0.906 > 0.7), and the experts' coordination coefficient (CV, Kendall's Wa =0.119). Statistical data analysis showed that the first round of the Delphi technique was effective. Indicators were screened based on the boundary values of the full score frequency, arithmetic mean, and CV. Four indicators of NASCIP were excluded, and three indicators were added to the NASCIP based on expert opinions. Since the Kendall's coefficient was <0.5, the Delphi technique needed to continue to the second round.

In the second round of the Delphi technique, the same statistical data analysis was conducted. The results were: the expert positive coefficient (100%), the concentration of expert opinions (mean and full score frequency), the expert authority coefficient (Cr=0.925 > 0.7), and the experts' coordination coefficient (CV, Kendall's Wa =0.32). Statistical data analysis showed that the second round of the Delphi technique was effective. Indicators were screened based on the boundary values of the full score frequency, arithmetic mean, and CV. One indicator of NASCIP was excluded, and the descriptions of three indicators were revised based on expert opinions. Since the Kendall's coefficient was <0.5, the Delphi technique continued to the third round.

In the third round, the same statistical data analysis was reported. The results were: the expert positive coefficient (100%), the concentration of expert opinions (mean and full score frequency), the expert authority coefficient (Cr=0.934 > 0.7), and the experts' coordination coefficient (CV, Kendall's Wa =0.505).

After the third round, the boundaries of the full score frequency, arithmetic mean, and CV were applied to the indicators, and none needed to be excluded. With the Kendall's coefficient being >0.5, the Delphi technique was concluded. The results of the Delphi technique finalized the 33 competency indicators as NASICP (attached in Appendix F).

Given that this study was grounded in the OBE concept, utilizing outcomes to inform curriculum design, the establishment of curriculum objectives should similarly reflect an outcome-oriented approach. The 33 indicators derived from the three rounds of the Delphi technique served as the outcomes of the curriculum training and guided the determination of the curriculum objectives. As the competencies NASIC should possess are classified into knowledge, skills, and attitudes, the objectives should align with this categorization. Consequently, this study yielded ten curriculum objectives (attached in Appendix G).

5.1.2 Responses to Second Research Objective

The second objective was to develop the NASIC.

The contents of the NASIC should revolve around the 10 curriculum objectives (attached in Appendix G). To fulfill these objectives, the curriculum contents have been structured into eight units along with a general curriculum framework (attached in Appendix I), and eight teaching plans (attached in Appendix J) have been devised. Additionally, 138 pages of courseware (attached in Appendix H) have been developed, serving as the teaching material utilized during classes. These curriculum units enable trainers to attain competencies in knowledge, skills, and attitudes as NASI.

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The eight units presenting the contents of the NASIC were structured to align with the curriculum objectives as follows (see Table 5.1).

Table 5.1 Curriculum Units and Main Action

Unit	Action
Unit 1	focuses on the roles and responsibilities of NASI, emphasizing the attitudinal aspects of competency as NASI.
Unit 2	covers the theoretical aspects of teaching and learning, such as the OBE teaching concept and the ADDIE model of curriculum development.
Unit 3	addresses the steps of course design and objective setting of the curriculum.
Unit 4	discusses the methodological and modeling aspects of structuring a curriculum.
Unit 5	focuses on the methodology of producing teaching plans.
Unit 6	covers the principles and methods of producing courseware for aviation security courses (PowerPoint presentations).
Unit 7	addresses competencies and skills in teaching abilities and skills.
Unit 8	focuses on the evaluation and summarization of the curriculum.

5.1.3 Responses to Third Research Objective

The third objective was to evaluate the effectiveness of the NASIC implementation based on OBE concept.

Before the experiment commenced, 128 participants were recruited from 360 airports and airlines and randomly divided into two groups. Both groups underwent a comparative analysis before training in terms of age, gender, years of security work, and educational background to verify whether there were differences in their basic competencies. Chi-square tests indicated that there were no significant baseline differences between the two groups based on age (χ^2=0.283, p=0.868), gender (χ^2=0.567, p=0.451), years of security work (χ^2=0.148, p=0.929), and educational background (χ^2=1.073, p=0.585).

After the training of the two groups, the data were analyzed using the non-parametric Mann-Whitney U test. The Mann-Whitney U test results revealed statistically significant differences between the Experimental Group and Control Group in NASIC Theory Examination scores (Z=-4.335, $p<0.001$), NASIC Skill Examination scores (Z=-4.091, $p<0.001$), and NASIC Attitude Questionnaire scores (Z=-4.091, $p<0.001$). Furthermore, by analyzing the median, quartiles, and extremes of the NASIC scores, the results indicated that the Experimental Group scored higher than the Control Group in all three areas: theory, skills, and attitudes.

5.2 DISCUSSION

This research explored the development of NASIC based on the OBE concept, combined with the ADDIE curriculum development model, and validated the effectiveness of NASIC training in China. Few researchers have applied OBE concepts to NASIC development, and even fewer have combined OBE concepts with the ADDIE curriculum development model for curriculum development. Moreover, no one has previously conducted research on applying a combination of OBE and the ADDIE curriculum development model to NASIC in China. Therefore, little is known about the training effects of combining the OBE concept and the ADDIE curriculum development model for NASIC development. This study developed NASIC by combining the OBE concept and the ADDIE curriculum development model and evaluated the training effectiveness of the developed NASIC.

This study pioneered the development of NASIC by amalgamating the OBE concept and the ADDIE curriculum development model and assessed the training effectiveness of the resulting NASIC. It stands as the inaugural research endeavor in the field of aviation security training in China. This study aimed to address the following questions: 1) What are the training objectives of NASIC based on the OBE concept? What contents are included in NASIC? 2)What are the effects of NASIC on knowledge, skills, and attitudes?

5.2.1 Responses to First Research Question

The first research question of this study is, "What are the curriculum objectives of the NASIC based on the OBE concept?"

The concept of OBE centers on students' final learning outcomes, making it a valuable tool in curriculum design. This educational concept is widely recognized for its role in facilitating the realization of training effects. Numerous scholars, such as Anderson and Krathwohl (2001) and Bloom et al. (1956), have conducted studies highlighting the significance of OBE in education. OBE is characterized by its outcome-oriented and learner-centered approach, emphasizing the importance of defining clear learning objectives and aligning instructional strategies with desired outcomes.

The OBE concept plays a crucial role in setting curriculum objectives with direction and precision. It significantly contributes to achieving training outcomes by guiding the curriculum design process. Numerous scholars have conducted studies emphasizing the importance of OBE in determining curriculum objectives, yielding consistent research findings (Bloom, 1956; Bloom, 1968; Gagné & Briggs, 1974; Mager, 1962; Malan, 2014; Zhang et al., 2021). Castillo (2014) proposed that designing curriculum based on final learning outcomes and identifying these outcomes beforehand is essential. This approach involves working backward from the desired outcomes to ensure alignment with the teaching and learning process, thus preparing all components effectively. The consensus among scholars underscores the critical role of the OBE concept in curriculum design and its contribution to achieving desired educational objectives.

Previous studies and participants have consistently highlighted the significance of the OBE-based concept in curriculum design, emphasizing the importance of identifying outcomes resulting from curriculum implementation and reverse-engineering curriculum objectives based on these outcomes (Barr & Tagg, 1995; Biggs & Tang, 2007; Driscoll & Swarup, 2007; Malan, 2000; Morcke et al., 2012; Weimer, 2013). This study followed a similar approach, focusing on determining the outcomes NASI should possess after undergoing NASIC training. These outcomes represent the competencies required for the NASI position, and serve as the foundation for designing curriculum objectives. The study's findings indicate that curriculum objectives designed in this manner align with the training curriculum's requirements and ensure the realization of training outcomes.

Thus, this study's strategy of determining NASI training outcomes before setting curriculum objectives is consistent with previous scholarly findings regarding the role of the OBE concept in curriculum design. This approach assumes that instructional delivery and design aim to achieve student outcomes. Therefore, it underscores the importance of first identifying what is essential for students and then establishing curriculum objectives based on these critical outcomes. This process guides curriculum development, instruction, and assessment.

The OBE concept is widely recognized for its three core elements: learner-centeredness, outcome-orientation, and continuous improvement (Weiss & Aldridge, 2002). These core elements are pivotal in curriculum design, making it easier to comprehend and implement, and hold significant importance in guiding curriculum objective determination. Thus, this study adopts these core elements as the guiding principles for designing the NASIC: "The ultimate training learning outcomes for NASI as the guiding principle, NASI centeredness, and continuous improvement of the NASIC." Additionally, being results-oriented is a crucial aspect of one of the three core elements of the OBE concept (Spady & Marshall, 1991). This research, based on the OBE concept, emphasizes the necessity of aligning curriculum design with participants' post-training outcomes.

As Spady and Marshall (1991) defined OBE as an integrated educational philosophy emphasizing explicit outcomes, ensuring that students are presented with clear results at the end of their learning. Thus, determining the outcome of the NASI curriculum after training becomes integral based on the OBE concept. Accurately identifying the competencies participants should possess after completing the NASIC program, i.e., the training outcomes, is essential for designing precise curriculum objectives based on these outcomes.

Considering the positive role of the OBE concept highlighted by several previous scholars in identifying objectives and defining curriculum outcomes in curriculum design, it is both reasonable and advisable for this study to develop the NASIC based on the OBE concept.

In this study, the first step based on the OBE concept was using the Delphi technique to determine the competencies of NASI after training. The Delphi technique is a well-established method for identifying the competencies of personnel. Many scholars have previously applied the Delphi technique to determine the abilities of different groups, yielding reliable conclusions (Landeta, 2006; Thangaratinam & Redman, 2005; Turoff & Linstone, 2002; Wakefield & Watson, 2014). Many later scholars have used the Delphi technique in the field of education with equally positive results, agreeing that it is a mature and adaptable research methodology (Asselin & Harper, 2014; Keeney et al., 2011; McPherson et al., 2018; Stitt-Gohdes & Crews, 2004). Given that this study aims to determine the competencies of personnel in the field of education, the application of the Delphi technique is highly appropriate.

The 33 competencies identified were aligned with the post-training job requirements of NASI and covered three main areas: knowledge, skills, and attitudes. The curriculum objectives were then determined based on how the NASIC curriculum could develop these 33 competencies. This research resulted in ten curriculum objectives based on the OBE concept, which correspond to each of the 33 training outcomes identified for NASI post-training.

Bloom and colleagues divided cognitive learning objectives into three areas: knowledge, skills, and attitudes (Bloom, 1956). Therefore, this study's categorization of competencies is consistent with Bloom's criteria for categorizing objectives.

The successful implementation of the entire curriculum is preceded by clearly defined curriculum objectives. These objectives and related major steps can determine the ultimate value and effectiveness of the curriculum. Therefore, objectives based on training outcomes are highly appropriate and play a crucial role in realizing the results of the curriculum training. This conclusion aligns with the findings of many previous studies, which have demonstrated that curriculum objectives determined based on learner outcomes positively contribute to achieving curriculum goals (Bond et al., 2017; Green et al., 2009; Hager, 2006).

The second core element based on the OBE concept is learner-centeredness. Towers listed the necessary conditions for OBE to work: first, it must be clear what students are to learn. The OBE concept emphasizes determining the desired outcomes before developing a course and designing the course based on these outcomes (Fitzpatrick, 1995). Therefore, this study followed the learner-centered approach by determining what competencies learners need to achieve after training before developing the curriculum. The objectives of the curriculum were then based on these competency needs.

5.2.2 Responses to Second Research Question

The second research question of this study is, "What are the contents included in the NASIC?"

The content of the curriculum is what NASIs are going to learn, designed with the learner as the center of the curriculum. This reflects the learner-centered approach, an important core element of the OBE concept. In this study, the learners are NASIs, so the curriculum design is centered on them, and the content NASIs need to learn is the core of the curriculum design. NASIs need to learn content that aligns with the competencies required for their position. Therefore, this study analyzed the competencies of the NASI job before beginning the curriculum design. Through the Delphi technique, 33 competencies that meet the job requirements were identified. The objectives and main elements of the curriculum are defined around these 33 competencies.

Rao (2020) also demonstrated in his study that the learning outcomes students can achieve through the curriculum determine the content of the curriculum. Davis (2003) proposed that OBE involves determining the final outcomes students will obtain through learning and then reverse-engineering the curriculum based on these outcomes. This curriculum design process ensures that students have clear learning outcomes after receiving education, making learning more effective. This is particularly beneficial for job-specific training, where the OBE concept ensures the curriculum is designed to meet job requirements (Davis, 2003). Therefore, the curriculum content developed in this study, based on the OBE concept, aligns with the training needs and meets job competency requirements.

5.2.3 Responses to Third Research Question

The third research question of this study is, "What are the effects of the NASIC on knowledge, skills and attitudes?"

The OBE concept significantly contributes to the realization of training results. After implementing the curriculum, a comparison of the performance between the experimental group and the control group showed that the training effects of the curriculum developed for the experimental group were significantly higher than those of the original traditional curriculum. The significance of these results is closely tied to the fact that the curriculum was based on the OBE concept, which aligns with the findings of many scholars. The OBE concept plays a crucial role in ensuring successful training outcomes.

Compared to traditionally designed curricula, curricula designed with the OBE concept are more relevant and focused on the outcomes after implementation. The OBE-based curriculum makes outcomes more measurable and focuses on the achievement of results. Many scholars have demonstrated through research that the OBE concept is advanced compared to traditional methods of curriculum design. Traditional curriculum design is input-based and emphasizes the educational process, starting from curriculum objectives and leading to educational results. However, the shortcomings of traditional education are becoming increasingly evident and challenged, necessitating reform. Clear focus, expanded opportunities, and high expectations are the cornerstones of this reform, which are also the important principles in OBE philosophy (Davis, 2003).

The OBE concept represents a reformation of traditional learning philosophy, where "the product defines the process." Scholar Jessup argued that education or training is defined by outcomes and that the OBE concept opens up access to learning and assessment in ways not possible in traditional education. Many problems faced in traditional education and training can be addressed by OBE if learning is targeted by outcomes (Harden, 2007).

As Spady (1994) noted that outcomes-based education (OBE) implies a clear focus and organization in the education system around the need for student success at the end of the learning experience. Also, Akramy (2021) mentioned that applying the OBE concept to engineering courses for college students has become a prominent trend in education today, aimed at helping students in their professional careers by guiding them to acquire more knowledge and be more creative. This approach can help them thrive in the work environment. It is highlighted that the goal of OBE is to ensure graduates possess all the theoretical knowledge, practical skills, and competencies needed to adapt to industry demands. Based on the common understanding among these scholars, the OBE concept ensures that students can achieve the expected outcomes and meet future job competency requirements.

Experimental results showed that the training effect of NASIC, developed based on the OBE concept, is significantly higher than that of the curriculum developed using the traditional model. This aligns with the expected results before the research was conducted. NASIC, developed based on the OBE concept, demonstrated higher performance in terms of knowledge, skills, and attitudes compared to traditional curriculum training. It also aligns more closely with the three areas of knowledge, skills, and attitudes required for NASI positions. The significance of this study lies in identifying a curriculum whose training outcomes better meet the requirements of the NASI position, thereby improving training effectiveness. Therefore, the results of the study indicate that the curriculum developed based on the OBE concept is more effective.

The success of this curriculum design also benefited significantly from the use of the ADDIE curriculum development model. The role of the ADDIE model in this study aligns with its significance in various scholarly research. As Gonzalez (2022) suggested, the ADDIE model produces significant results, whether used alone or in conjunction with other models. Hamamah et al. (2020) also studied the effects of combining the ADDIE model with the OBE concept, though their research focused on writing assessment rather than curriculum development. This study is innovative in combining the ADDIE model and the OBE concept for curriculum development. The results after implementing the program are consistent with previous studies, demonstrating that the combination of ADDIE and OBE concepts improves NASIC training outcomes in line with NASI job competencies.

Therefore, this study proves that combining the ADDIE model with the OBE concept is also positively significant in the field of curriculum development. This approach enhances the effectiveness of curriculum development and ensures that the training outcomes meet expectations.

5.3 RECOMMENDATIONS

5.3.1 Recommendations for Implementation

5.3.1.1 Recommendations for NASI Training Teachers are as follows:

Utilize the ADDIE Curriculum Development Model

The ADDIE model is highly effective for constructing curricula. Recognized as the precursor to various other instructional design models, the ADDIE model is praised for its comprehensiveness and practicality (Arshavskiy, 2013). It serves as a foundational framework embraced by many instructional designers and training developers for curriculum development (Morrison et al., 2019). In this study, the NASI curriculum was developed using the ADDIE model, following its five distinct phases. This approach ensured a logical sequence in curriculum development, enhancing overall coherence and efficiency. By adhering to the ADDIE model, future curriculum development endeavors, such as NASIC, can benefit from a structured and systematic approach that streamlines the development process and facilitates smooth execution. Therefore, it is recommended that curriculum developers consider employing the ADDIE model for the development of training programs, including NASIC.

Determine Outcomes Before Curriculum Design

It is essential to determine the outcomes to be achieved by participants before beginning curriculum design. This aligns with the OBE concept, the most central element of which is defining clear results for students at the end of their learning. As Spady (1994) defined OBE as an integrated educational philosophy where outcomes are explicit, presenting students with clear results (Davis & Winch, 2015; Brandt, 1992). Brandt noted that OBE implementation in schools over the past 20 years has had a positive effect on education, with many schools likely to choose OBE education in the face of major changes. OBE is currently a trend promoting educational reforms and policies internationally. Over the following decades, OBE has been extensively developed in various countries and disciplines, including China, which has implemented different education paradigms based on the OBE concept.

Therefore, applying the OBE concept to aviation security curriculum development is reasonable and appropriate. Determining the outcomes after curriculum implementation is a key aspect of OBE, ensuring the rationality of curriculum design and the effectiveness of training. Well-defined curriculum outcomes can directly affect curriculum implementation. Thus, it is crucial to determine the final training outcomes at the beginning of the curriculum design process.

Defining curriculum objectives based on the OBE concept.

According to the OBE concept, curriculum objectives should be defined by working backward from the desired outcomes after training. This reverse design process ensures that the curriculum is tailored to achieve specific results, making it more effective. When setting curriculum objectives, it is helpful to categorize the desired outcomes into three areas: knowledge, skills, and attitudes. Objectives should then be developed for each of these aspects. OBE is a holistic approach to education that clearly defines the learning outcomes and goals that students should achieve (Li et al., 2019). In the implementation process, achieving curriculum objectives directly translates into presenting curriculum outcomes. Therefore, setting clear curriculum objectives aligned with desired outcomes is conducive to the successful achievement of curriculum goals.

5.3.2 Recommendations for Future Studies

Based on the research findings, the following suggestions are proposed for future researchers:

1) Expanding the Scope of Application:

While this study focused on developing the NASIC, future research can extend the application of the combined OBE concept and ADDIE model to other aviation security courses. By validating the effectiveness of this methodology across various aviation security domains, researchers can determine its scalability and potential for widespread adoption.

2) Diversifying Participant Groups:

Although NASIs were the primary participants in this study, future research could explore the impact of the combined OBE and ADDIE approach on the training effectiveness of different aviation staff groups. This could include pilots, flight attendants, engineers, and other relevant personnel. Examining diverse participant groups will help assess the generalizability of the developed curriculum model across various roles within the aviation industry.

3) Increasing Sample Size and Duration:

Given the constraints of time and resources in this study, future researchers are encouraged to select larger experimental samples and extend the duration of the experiment. Increasing the sample size and duration will enhance the statistical power of the findings and generate more robust experimental results, contributing to greater confidence in the effectiveness of the developed curriculum model.

By addressing these research suggestions, future studies can further advance our understanding of curriculum development methodologies in aviation security training and contribute to the continuous improvement of training programs in the industry.

5.4 EDUCATIONAL IMPLICATIONS

Implications for Future Studies

The results of this research hold significant implications for future studies in the field of aviation security training. Other researchers can build upon these findings to conduct further in-depth investigations. By developing and evaluating the NASIC based on the OBE concept in conjunction with the ADDIE model, this study provides a valuable framework that can be applied to other aviation security curricula. Additionally, the outcomes of this research can inform curriculum development efforts at the International Civil Aviation Organization (ICAO). The specific implications are outlined below:

1) Extending the Curriculum Development Model:

Extending the curriculum development model based on the OBE concept to other aviation security curricula in China represents a significant opportunity. The OBE educational concept prioritizes outcome-oriented and learner-centered approaches, focusing on individual circumstances and student outcomes. In this study, the development of NASIC was grounded in the OBE concept, with curriculum objectives delineated first, followed by the design of curriculum content and teaching methodologies based on these objectives. The emphasis on results orientation in the OBE educational concept underscores the importance of focusing on students' learning outcomes and development.

By exploring these implications, future studies can further advance our understanding of effective curriculum development methodologies in aviation security training, contributing to the continuous improvement of training programs within the industry.

In developing NASIC, the curriculum's objectives and processes were established by elucidating the final learning outcomes expected from students. This approach fundamentally ensures the attainment of training objectives and the realization of training outcomes, thereby enhancing students' learning outcomes and overall quality of education. Given the similar curricular background and logic shared by many aviation security curricula, this study serves as a valuable reference for enhancing the quality of education in future aviation security courses. The findings of this research can be extrapolated to inform the development of other aviation security curricula in China.

The research outcomes offer a useful reference for setting curriculum objectives in future aviation security-related courses. By delineating clear and actionable learning objectives, it can assist learners in better understanding their learning and development trajectory, fostering enthusiasm for active learning, facilitating the formulation of effective learning plans, and ensuring optimal learning outcomes.

Generalization to ICAO Curriculum Development:

This study focused on developing the NASIC, aligning with the requirements of the International Civil Aviation Organization (ICAO). As China's NASIC is part of ICAO's broader curriculum framework, the findings of this research hold relevance for informing curriculum development practices within ICAO. The holistic nature of aviation security training curricula, along with their interconnectedness and shared logic, suggests that the positive outcomes of this study can be applied to other ICAO curricula.

ICAO's curriculum development processes often mirror those of the ADDIE model, as highlighted earlier in this study. Moreover, ICAO emphasizes competency-based training and curriculum design, closely aligning with the principles of the Outcome-Based Education (OBE) concept. Therefore, the integration of the OBE concept with the ADDIE model, as demonstrated in this research, holds significant potential for application in other ICAO curricula.

Given ICAO's mandate for curriculum design and training based on trainees' competencies, the approach proposed in this study offers a feasible and relevant methodology. By incorporating the OBE concept into the ADDIE model, curriculum developers within ICAO can ensure a learner-centered, outcome-oriented approach that meets the evolving needs of the aviation industry.

In summary, the results of this research, particularly the integration of the OBE concept with the ADDIE model, present a promising model for replication and application in ICAO curriculum development processes. This approach has the potential to enhance the effectiveness and relevance of aviation security training curricula within the global aviation community.

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APPENDICES

APPENDIX A

CERTIFICATE OF APPROVAL BY ETHICS REVIEW BOARD OF RANGSIT UNIVERSITY

COA. No. RSUERB2022-131

RSU-ERB

Certificate of Approval
By
Ethics Review Board of Rangsit University

COA. No.	**COA. No. RSUERB2022-131**
Protocol Title	**OUTCOMES-BASED EDUCATION IN NATIONAL AVIATION SECURITY CURRICULUM DEVELOPMENT AND EVALUATION**
Principle Investigator	**Zhang Yiyan**
Co-Investigator	**Asst.Prof.Dr. Supinda Lertlit**
Affiliation	**Suryadhep Teachers College, Rangsit University**
How to review	**Expedited Review**
Approval includes	**1. Project proposal** **2. Information sheet** **3. Informed consent form** **4. Data collection form/Program or Activity plan**

Date of Approval: **15 December 2022**
Date of Expiration: **15 December 2024**

The prior mentioned documents have been reviewed and approved by Ethics Review Board of Rangsit University based Declaration of Helsinki, The Belmont Report, CIOMS Guideline and International Conference on Harmonization in Good Clinical Practice or ICH-GCP

Signature..

(Associate Professor Dr. Panan Kanchanaphum)

Chairman, Ethics Review Board for Human Research

APPENDIX B

THE LIST OF IOC CHECK EXPERTS AND INVITATION LETTERS

The List of IOC Check Experts

1. **Dr. Natchaporn Dechrach**

    College of Liberal Arts, Rangsit University

    Thailand

2. **Dr. Kanchana Sirisitthimahachon**

    College of Liberal Arts, Rangsit University

    Thailand

3. **Dr. Zhou Zhu**

    Yunnan Minzu University

    China

4. **Dr. Yang Dang**

    Civil Aviation Management Institute of China

    China

RSU มหาวิทยาลัยรังสิต RANGSIT UNIVERSITY

มหาวิทยาลัยรังสิต เมืองเอก ถ.พหลโยธิน อ.เมืองปทุมธานี 12000 | Rangsit University Muang-Ake, Paholyothin Rd. Pathumthani 12000, Thailand | T. (66) 2997 2200-30 F. (66) 2791 5757 E. info@rsu.ac.th

STC 4800/0579.1

January 25, 2023

Subject: Invitation for you to be an Index Item - Objective Congruence (IOC) expert

Dear Dr. Zhou Zhu
Yunnan Minzu University

The Doctoral Degree Program in Education Studies, Suryadhep Teachers College at Rangsit University organized a Research Proposal Defense for Zhang Yiyan, Student Number 6306056 (Asst.Prof.Dr. Supinda Lertlit is her advisor) on August 14, 2022. Her research title is "OUTCOMES-BASED EDUCATION IN NATIONAL AVIATION SECURITY CURRICULUM DEVELOPMENT AND EVALUATION". Currently, she is in the middle of the instrument design phase and has come up with the instrument for her study.

Thus, the Program would like to invite you to be our IOC expert for examining the research instruments and we believe that you will give useful suggestions to improve our student's research by accepting our invitation. Suryadhep Teachers College truly appreciates the kind support you will give us.

Sincerely yours,

M. Pradittera

Malivan Praditteera, Ph.D.
Dean, Suryadhep Teachers College
Rangsit University

RSU มหาวิทยาลัยรังสิต RANGSIT UNIVERSITY

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STC 4800/0836

March 28, 2023

Subject: Invitation for you to be an Index Item - Objective Congruence (IOC) expert

Dear Dr. Yang Dang

Civil Aviation Management Institute of China

The Doctoral Degree Program in Education Studies, Suryadhep Teachers College at Rangsit University organized a Research Proposal Defense for Mrs. Zhang Yiyan, Student Number 6305056 (Asst. Prof. Dr. Supinda Lertlit is her advisor) on August 14, 2022. Her research title is "**Outcomes-Based Education in National Aviation Security Curriculum Development and Evaluation**". Currently, she is in the middle of the instrument design phase and has come up with the instrument for her study.

Thus, the Program would like to invite you to be our IOC expert for examining the research instruments and we believe that you will give useful suggestions to improve our student's research by accepting our invitation. Suryadhep Teachers College truly appreciates the kind support you will give us.

Sincerely yours,

Malivan Praditteera, Ed.D.

Dean, Suryadhep Teachers College

Rangsit University

RSU มหาวิทยาลัยรังสิต RANGSIT UNIVERSITY

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STC 4800/ 0836

January 25, 2023

Subject: Invitation for you to be an Index Item - Objective Congruence (IOC) expert

Dear Dr. Kanchana Sirisitthimahachon
College of Liberal Arts, Rangsit University

The Doctoral Degree Program in Education Studies, Suryadhep Teachers College at Rangsit University organized a Research Proposal Defense for Zhang Yiyan, Student Number 6306056 (Asst.Prof.Dr. Supinda Lertlit is her advisor) on August 14, 2022. Her research title is "OUTCOMES-BASED EDUCATION IN NATIONAL AVIATION SECURITY CURRICULUM DEVELOPMENT AND EVALUATION". Currently, she is in the middle of the instrument design phase and has come up with the instrument for her study.

Thus, the Program would like to invite you to be our IOC expert for examining the research instruments and we believe that you will give useful suggestions to improve our student's research by accepting our invitation. Suryadhep Teachers College truly appreciates the kind support you will give us.

Sincerely yours,

Dr. Malivan Praditteera
Dean, Suryadhep Teachers College
Rangsit University

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STC 4800/ 0836

January 25, 2023

Subject: Invitation for you to be an Index Item - Objective Congruence (IOC) expert

Dear Dr. Natchaporn Dechrach

Head of Department of Chinese Language and Assistant Dean for Academic Affairs

College of Liberal Arts, Rangsit University

The Doctoral Degree Program in Education Studies, Suryadhep Teachers College at Rangsit University organized a Research Proposal Defense for Zhang Yiyan, Student Number 6306056 (Asst.Prof.Dr. Supinda Lertlit is her advisor) on August 14, 2022. Her research title is "OUTCOMES-BASED EDUCATION IN NATIONAL AVIATION SECURITY CURRICULUM DEVELOPMENT AND EVALUATION". Currently, she is in the middle of the instrument design phase and has come up with the instrument for her study.

Thus, the Program would like to invite you to be our IOC expert for examining the research instruments and we believe that you will give useful suggestions to improve our student's research by accepting our invitation. Suryadhep Teachers College truly appreciates the kind support you will give us.

Sincerely yours,

Dr. Malivan Praditteera

Dean, Suryadhep Teachers College

Rangsit University

APPENDIX C

INDEX OF ITEM-OBJECTIVE CONGRUENCE (IOC)

OUTCOMES-BASED EDUCATION IN NATIONAL AVIATION SECURITY CURRICULUM DEVELOPMENT AND EVALUATION

By
YIYAN ZHANG

Terrorism threatens the security of all humanity and is a great threat to global peace. The terrorist turned civil aviation airliners into "killer bombs" in the events of 911. Because of the enormous impact of attacks on civil aviation, it has become a target for terrorist attacks, as a result of recent international media coverage of terrorist attacks at airports, there is greater awareness of the risks posed by terrorism to flight and the need for security measures in the aviation industry.

National Aviation Security Instructors (NASI) are professional aviation security personnel in China's civil aviation, and undertake the task of training aviation security regulations and security measures for various security positions and personnel at airports or airlines. The National Aviation Security Instructor Curriculum (NASIC) is an important guarantee to ensure that NASI are equipped with all the competencies required by their job duties and regulations. The NASIC in this study is designed based on the OBE concept and ADDIE model, which is more in line with the current requirements of aviation security training.

This study aims to achieve three objectives: 1) To identify the objectives of the NASIC based on the OBE concept, 2) To develop the NASIC, and 3) To evaluate the effectiveness of the NASIC implementation based on OBE concepts. This study adopts the mixed of quantitative and qualitative experimental research approach. The data collection instruments are three questionnaires for NASI students from airports and airlines all over the country. The population is a total of 2000; Simple Random Sampling method was used to obtain 128 participants as samples.

The following form consists three parts: Part I National Aviation Security Instructors Curriculum Theory Examination, Part II National Aviation Security Instructors Curriculum Practical Examination, and Part III National Aviation Security Instructors Attitude Questionnaire. The expert is kindly requested to examine each item of the research instrument for its content validity.

Thank you very much.

Yiyan Zhang
Researcher

Index of Item-Objective Congruence (IOC) Part I National Aviation Security Instructors Curriculum Theory Examination					
The expert is kindly requested to examine each item of the research instrument for its content validity.		Expert's Review			
NO.	Questionnaire for Participants (Question and Answer) **Items**	**Agree** **+1**	**Not Sure** **0**	**Disagree** **-1**	**Comment**
1	What are the main job responsibilities of the National Aviation Security Instructor?（国家航空安保教员的主要岗位职责是什么？）				
2	As a National Aviation Security Instructor, what are the two capabilities needed?（作为国家航空安保教员， 需要具备哪两个方面的能力？）				
3	What are the main concept of the aviation security curriculum design?（航空安保课程设计的主要原则是？）				
4	What are the three aspects of the capabilities of aviation security personnel?（航空安保人员的能力表现在哪三个方面？）				
5	When encountering the problems in security work, which aspects can be considered to solve?（当遇到航空安保工作中的问题时， 可以从哪几个方面考虑来解决？）				
6	What is the main models for aviation security curriculum design?（航空安保课程设计的主要模型有哪些？）				
7	What are the main steps in the aviation security curriculum design?（航空安保课程设计的主要步骤是什么？）				
8	What are the important links in the design of aviation security curriculum?（航空安保课程设计的重要环节有哪些?)				
9	In the design of aviation security curriculum title, what matters should be paid attention to?（航空安保课程设计中， 标题的制定需要注意的事项有哪些？）				
10	How to choose the title of the aviation security curriculum?（航空安保课程标题该怎样选择？）				

Index of Item-Objective Congruence (IOC)

Part I National Aviation Security Instructors Curriculum Theory Examination

The expert is kindly requested to examine each item of the research instrument for its content validity.		Expert's Review			
NO.	Questionnaire for Participants (Question and Answer) **Items**	**Agree** **+1**	**Not Sure** **0**	**Disagree** **-1**	**Comment**
11	What are the three categories into which the course objectives can be divided in the aviation security curriculum design?（航空安保课程设计中，课程目标可以分为哪三类？）				
12	How to develop curriculum objectives in aviation security curriculum design?（航空安保课程设计中，如何编写课程目标？）				
13	How to structure the curriculum in aviation security curriculum design? （航空安保课程设计中，如何搭建课程结构？）				
14	How to enrich the content in aviation security curriculum design? （航空安保课程设计中，如何充实课程内容？）				
15	What are the common teaching methods used in the aviation security curriculum? （航空安保课程中常用的教学方法有哪些）				
16	What are the main principles of courseware making in the aviation security curriculum design?（航空安保课程设计中，课件制作的主要原则有哪些？）				
17	How many words is appropriate for each page of slide in the design of aviation security curriculum?（航空安保课程设计中，课件制作每页幻灯片字数是多少比较合适？）				
18	What are the competencies that an NASI should have? （国家航空安保教员应该具备的能力有哪些？）				
19	What are the teaching skills that an NASI should have? (国家航空安保教员应该具备的授课技巧有哪些？)				
20	How to assess student learning as a NASI? (作为国家航空安保教员如何去评估学生的学习效果?)				

Index of Item-Objective Congruence (IOC) Part II National Aviation Security Instructors Curriculum Practical Examination					
The expert is kindly requested to examine each item of the research instrument for its content validity.		Expert's Review			
NO.	Questionnaire for Participants (1-5 Likert rating-scales) **Items**	**Agree** **+1**	**Not Sure** **0**	**Disagree** **-1**	**Comment**
1	The course title is determined accurately and is a summary of the main content of the course.（课程标题确定准确，是课程主要内容的概括）				
2	The course objectives are clear and written in accordance with the standards.（课程目标清晰，书写符合规范）				
3	The course structure is built using the proper principle with a clear hierarchy.（课程结构搭建使用了合理的模型，层次清晰）				
4	Teaching content is full and logical.（教学内容充实，逻辑清晰）				
5	In-depth understanding of the course content and the ability to deliver the course content in a clear and complete manner.（对课程内容有深入的理解，能将课程内容讲授的清晰完整）				
6	Clear and fluent expression, making good use of body language.（表达清晰、流畅，善用肢体语言）				
7	The lecture schedule is reasonable, and the length of the lecture content can be adjusted according to the on-site response of the students.（授课进度安排合理，能根据学员的现场反应调整授课内容所用时长）				
8	Strong interaction with students, able to give timely feedback on their responses.（与学员互动性强，能对学员的反应给与及时反馈）				
9	PPT is made in accordance with standards, with beautiful graphics and high technical skills.（PPT 制作符合标准，画面精美，技术含量高）				
10	Assessment of learner learning effectiveness with appropriate instruments.（能用合适的工具对学员学习效果进行评估）				

Index of Item-Objective Congruence (IOC) **Part III National Aviation Security Instructors Attitude Questionnaire**					
The expert is kindly requested to examine each item of the research instrument for its content validity.		Expert's Review			
NO.	Questionnaire for Participants (1-5 Likert rating-scales) **Items**	**Agree** **+1**	**Not Sure** **0**	**Disagree** **-1**	**Comment**
1	I believe that the work of National Aviation Security Instructors has an important role to play in safeguarding national aviation safety.（我认为国家航空安保教员的工作对保障国家航空安全有重要作用。）				
2	I believe that the National Aviation Security Instructor is an important guide to the career development of security personnel.（我认为国家航空安保教员对员工的职业发展有重要的指导意义。）				
3	I am proud to be a National Aviation Security Instructor.（我为自己是一名国家航空安保教员而自豪。）				
4	I think being a National Aviation Security Instructor fits my career plan.（我认为做一名国家航空安保教员符合自己的职业规划。）				
5	Teaching the aviation security curriculum fills me with enthusiasm.（教授国家航空安保课程让我充满热情。）				
6	I can take my duties as a National Aviation Security Instructor seriously.（我能认真对待国家航空安保教员职责范围内的工作。）				
7	I will be proactive in learning various skills related to the National Aviation Security Instructor career.（我会积极主动地去学习和国家航空安保教员职业有关的各种技能。）				

Please add your comments (if any):

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SAMPLE
QUESTIONNAIRE

Dear Participants, （亲爱的参与者：）

Please read each question carefully and answer truly. Thank you for your cooperation.（请仔细阅读每一个问题，并写成你真实的答案。谢谢你的参与。）

Part I National Aviation Security Instructors Curriculum Theory Examination

Please write your answer under each question.（请在每个问题下面写出你的答案。）

1. What are the main job responsibilities of the National Aviation Security Instructor?（国家航空安保教员的主要岗位职责是什么？）

   Answer:

2. As a National Aviation Security Instructor, what are the two capabilities needed?（作为国家航空安保教员，需要具备哪两个方面的能力？）

   Answer:

3. What are the main concepts of the aviation security curriculum design?（航空安保课程设计的主要原则是？）

   Answer:

4. What are the three aspects of the capabilities of aviation security personnel?（航空安保人员的能力表现在哪三个方面？）

   Answer:

5. When encountering the problems in security work, which aspects can be considered to solve?（当遇到航空安保工作中的问题时，可以从哪几个方面考虑来解决？）

   Answer:

6. What is the main model for aviation security curriculum design?（航空安保课程设计的主要模型有哪些？）

   Answer:

7. What are the main steps in the aviation security curriculum design?（航空安保课程设计的主要步骤是什么？）

Answer:

8. What are the important links in the design of aviation security curriculum?（航空安保课程设计的重要环节有哪些?)

Answer:

9. In the design of aviation security curriculum title, what matters should be paid attention to?（航空安保课程设计中，标题的制定需要注意的事项有哪些？）

Answer:

10.How to choose the title of the aviation security curriculum?（航空安保课程标题该怎样选择？）

Answer:

11.What are the three categories into which the course objectives can be divided in the aviation security curriculum design?（航空安保课程设计中，课程目标可以分为哪三类？）

Answer:

12. How to develop curriculum objectives in aviation security curriculum design?（航空安保课程设计中，如何编写课程目标？）

Answer:

13. How to structure the curriculum in aviation security curriculum design? （航空安保课程设计中，如何搭建课程结构？）

Answer:

14.How to enrich the content in aviation security curriculum design? （航空安保课程设计中，如何充实课程内容？）

Answer:

15. What are the common teaching methods used in the aviation security curriculum?（航空安保课程中常用的教学方法有哪些)

Answer:

16. What are the main principles of courseware making in the aviation security curriculum design?（航空安保课程设计中，课件制作的主要原则有哪些？）

Answer:

17. How many words are appropriate for each page of slide in the design of aviation security curriculum?（航空安保课程设计中，课件制作每页幻灯片字数是多少比较合适？）

Answer:

18. What are the competencies that an NASI should have?（国家航空安保教员应该具备的能力有哪些？）

Answer:

19. What are the teaching skills that an NASI should have? (国家航空安保教员应该具备的授课技巧有哪些？)

Answer:

20. How to assess student learning as a NASI? (作为国家航空安保教员如何去评估学生的学习效果?)

Answer:

Part II National Aviation Security Instructors Curriculum Skill Examination

Instruction: Please read the content of each item below and select the appropriate number based on the student's performance in the lecture assessments. （请阅读下面的项目，并根据学员授课考核的表现选择相应的数字。）
1= Poor, 2=Fair, 3=Good, 4=Very Good, 5 = Excellent
（1=很不好，2=一般，3=好，4=很好，5=优秀）

Please put a tick (√) on the number of your preferred opinion.（请在你选择的数字下画“√”。）

No.	Item	Poor	Fair	Good	Very Good	Excellent
1	The course title is determined accurately and is a summary of the main content of the course.（课程标题确定准确，是课程主要内容的概括）					
2	The course objectives are clear and written in accordance with the standards.（课程目标清晰，书写符合规范）					
3	The course structure is built using the proper principle with a clear hierarchy.（课程结构搭建使用了合理的模型，层次清晰）					
4	Teaching content is full and logical.（教学内容充实，逻辑清晰）					
5	In-depth understanding of the course content and the ability to deliver the course content in a clear and complete manner.（对课程内容有深入的理解，能将课程内容讲授的清晰完整）					
6	Clear and fluent expression, making good use of body language.（表达清晰、流畅，善用肢体语言）					
7	The lecture schedule is reasonable, and the length of the lecture content can be adjusted according to the on-site response of the students（授课进度安排合理，能根据学员的现场反应调整授课内容所用时长）					
8	Strong interaction with students, able to give timely feedback on their responses.（与学员互动性强，能对学员的反应给与及时反馈）					

9	PPT is made in accordance with standards, with beautiful graphics and high technical skills.（PPT 制作符合标准，画面精美，技术含量高）					
10	Assessment of learner learning effectiveness with appropriate instruments.（PPT 制作符合标准，画面精美，技术含量高）					

Part III National Aviation Security Instructors Attitude Questionnaire

Instruction: Please read the content of each item below and select the appropriate number according to your actual situation. （请阅读下面的每一个项目，并根据你的实际情况选择相应的数字。）
1 = Strongly Disagree, 2 = Disagree, 3 = Not sure, 4 = Agree, 5 = Strongly Agree. （1=十分不符合，2=不符合，3=不确定，4=同意，5=非常同意）

Please put a tick (√) on the number of your preferred opinion.（请在你选择的数字下面画“√”。）

No.	Item	Strongly Disagree	Disagree	Not sure	Agree	Strongly Agree
1	I believe that the work of National Aviation Security Instructors has an important role to play in safeguarding national aviation safety. （我认为国家航空安保教员的工作对保障国家航空安全有重要作用。）					
2	I believe that the National Aviation Security Instructor is an important guide to the career development of security personnel.（我认为国家航空安保教员对员工的职业发展有重要的指导意义。）					
3	I am proud to be a National Aviation Security Instructor.（我为自己是一名国家航空安保教员而自豪。）					
4	I think being a National Aviation Security Instructor fits my career plan. （我认为做一名国家航空安保教员符合自己的职业规划。）					
5	Teaching the aviation security curriculum fills me with enthusiasm. （教授国家航空安保课程让我充满热情。）					
6	I can take my duties as a National Aviation Security Instructor seriously.（我能认真对待国家航空安保教员职责范围内的工作。）					
7	I will be proactive in learning various skills related to the National Aviation Security Instructor career.（我会积极主动地去学习和国家航空安保教员职业有关的各种技能。）					

APPENDIX D

THE RESULTS OF IOC CHECK FOR INSTRUMENTS

IOC Result of the Research Instrument

Items	Rating by Experts					IOC Average	Remarks
	Expert 1	Expert 2	Expert 3	Expert 4	Expert 5		
Part Ⅰ National Aviation Security Instructors Curriculum Theory Examination							
1	+1	+1	+1	+1	+1	1	
2	+1	+1	+1	0	+1	0.8	
3	+1	+1	+1	+1	+1	1	
4	+1	+1	+1	0	+1	0.8	
5	+1	+1	+1	+1	+1	1	
6	+1	+1	+1	0	+1	0.8	
7	+1	+1	+1	+1	+1	1	
8	+1	+1	+1	+1	+1	1	
9	+1	+1	+1	+1	+1	1	
10	+1	+1	+1	0	+1	0.8	
11	+1	+1	+1	0	+1	0.8	
12	+1	+1	+1	+1	+1	1	
13	+1	+1	+1	+1	+1	1	
14	+1	+1	+1	+1	+1	1	
15	+1	+1	+1	+1	+1	1	
16	+1	+1	+1	+1	+1	1	
17	+1	+1	+1	+1	+1	1	
18	+1	0	+1	+1	+1	0.8	
19	+1	+1	+1	+1	+1	1	
20	+1	+1	+1	+1	+1	1	
Part II National Aviation Security Instructors Curriculum Practical Examination							
1	+1	+1	+1	+1	+1	1	
2	+1	+1	+1	0	+1	0.8	
3	+1	+1	+1	+1	+1	1	
4	+1	+1	+1	0	+1	0.8	
5	+1	+1	0	+1	+1	0.8	
6	+1	+1	0	+1	+1	0.8	
7	+1	+1	+1	+1	+1	1	
8	+1	+1	+1	+1	+1	1	
9	+1	+1	+1	0	+1	0.8	
10	+1	+1	+1	+1	+1	1	

Part III National Aviation Security Instructors Attitude Questionnaire							
1	+1	+1	+1	+1	+1	1	
2	+1	+1	+1	+1	+1	1	
3	+1	+1	+1	-1	0	0.4	
4	+1	+1	+1	+1	+1	1	
5	+1	+1	+1	+1	+1	1	
6	+1	+1	+1	0	0	0.6	
7	+1	+1	+1	+1	+1	1	

APPENDIX E

THE SAMPLE EXAMINATION

SAMPLE EXAMINATION

Dear Participants, （亲爱的参与者：）

Please read each question carefully and answer truly. Thank you for your cooperation.（请仔细阅读每一个问题，并写成你真实的答案。谢谢你的参与。）

Part I National Aviation Security Instructors Curriculum Theory Examination

Please write your answer under each question.（请在每个问题下面写出你的答案。）

1. What are the main job responsibilities of the National Aviation Security Instructor?（国家航空安保教员的主要岗位职责是什么？）

   Answer:

2. As a National Aviation Security Instructor, what are the two capabilities needed?（作为国家航空安保教员，需要具备哪两个方面的能力？）

   Answer:

3. What are the main concepts of the aviation security curriculum design?（航空安保课程设计的主要原则是？）

   Answer:

4. What are the three aspects of the capabilities of aviation security personnel?（航空安保人员的能力表现在哪三个方面？）

   Answer:

5. When encountering the problems in security work, which aspects can be considered to solve?（当遇到航空安保工作中的问题时，可以从哪几个方面考虑来解决？）

   Answer:

6. What is the main model for aviation security curriculum design?（航空安保课程设计的主要模型有哪些？）

   Answer:

7. What are the main steps in the aviation security curriculum design?（航空安保课程设计的主要步骤是什么？）

Answer:

8. What are the important links in the design of aviation security curriculum?（航空安保课程设计的重要环节有哪些?）

Answer:

9. In the design of aviation security curriculum title, what matters should be paid attention to?（航空安保课程设计中，标题的制定需要注意的事项有哪些？）

Answer:

10.How to choose the title of the aviation security curriculum?（航空安保课程标题该怎样选择？）

Answer:

11.What are the three categories into which the course objectives can be divided in the aviation security curriculum design?（航空安保课程设计中，课程目标可以分为哪三类？）

Answer:

12. How to develop curriculum objectives in aviation security curriculum design?（航空安保课程设计中，如何编写课程目标？）

Answer:

13. How to structure the curriculum in aviation security curriculum design? （航空安保课程设计中，如何搭建课程结构？）

Answer:

14.How to enrich the content in aviation security curriculum design? （航空安保课程设计中，如何充实课程内容？）

Answer:

15. What are the common teaching methods used in the aviation security curriculum?（航空安保课程中常用的教学方法有哪些）

Answer:

16. What are the main principles of courseware making in the aviation security curriculum design?（航空安保课程设计中，课件制作的主要原则有哪些？）

Answer:

17. How many words are appropriate for each page of slide in the design of aviation security curriculum?（航空安保课程设计中，课件制作每页幻灯片字数是多少比较合适？）

Answer:

18. What are the competencies that an NASI should have?（国家航空安保教员应该具备的能力有哪些？）

Answer:

19. What are the teaching skills that an NASI should have? (国家航空安保教员应该具备的授课技巧有哪些？)

Answer:

20. How to assess student learning as a NASI? (作为国家航空安保教员如何去评估学生的学习效果?)

Answer:

Part II National Aviation Security Instructors Curriculum Skill Examination

Instruction: Please read the content of each item below and select the appropriate number based on the student's performance in the lecture assessments. （请阅读下面的项目，并根据学员授课考核的表现选择相应的数字。）
1= Poor, 2=Fair, 3=Good, 4=Very Good, 5 = Excellent
（1=很不好，2=一般，3=好，4=很好，5=优秀）

Please put a tick (√) on the number of your preferred opinion.（请在你选择的数字下画“√”。）

No.	Item	Poor	Fair	Good	Very Good	Excellent
1	The course title is determined accurately and is a summary of the main content of the course. (课程标题确定准确，是课程主要内容的概括)					

2	The course objectives are clear and written in accordance with the standards.（课程目标清晰，书写符合规范）					
3	The course structure is built using the proper principle with a clear hierarchy.（课程结构搭建使用了合理的模型，层次清晰）					
4	Teaching content is full and logical.（教学内容充实，逻辑清晰）					
5	In-depth understanding of the course content and the ability to deliver the course content in a clear and complete manner.（对课程内容有深入的理解，能将课程内容讲授的清晰完整）					
6	Clear and fluent expression, making good use of body language.（表达清晰、流畅，善用肢体语言）					
7	The lecture schedule is reasonable, and the length of the lecture content can be adjusted according to the on-site response of the students（授课进度安排合理，能根据学员的现场反应调整授课内容所用时长）					
8	Strong interaction with students, able to give timely feedback on their responses.（与学员互动性强，能对学员的反应给与及时反馈）					
9	PPT is made in accordance with standards, with beautiful graphics and high technical skills.（PPT 制作符合标准，画面精美，技术含量高）					
10	Assessment of learner learning effectiveness with appropriate instruments.（PPT 制作符合标准，画面精美，技术含量高）					

Part III National Aviation Security Instructors Attitude Questionnaire

Instruction: Please read the content of each item below and select the appropriate number according to your actual situation. （请阅读下面的每一个项目，并根据你的实际情况选择相应的数字。）

1 = Strongly Disagree, 2 = Disagree, 3 = Not sure, 4 = Agree, 5 = Strongly Agree. （1=十分不符合，2=不符合，3=不确定，4=同意，5=非常同意）

Please put a tick (√) on the number of your preferred opinion.（请在你选择的数字下面画“√”。）

No.	Item	Strongly Disagree	Disagree	Not sure	Agree	Strongly Agree
1	I believe that the work of National Aviation Security Instructors has an important role to play in safeguarding national aviation safety.（我认为国家航空安保教员的工作对保障国家航空安全有重要作用。）					
2	I believe that the National Aviation Security Instructor is an important guide to the career development of security personnel.（我认为国家航空安保教员对员工的职业发展有重要的指导意义。）					
3	I think being a National Aviation Security Instructor fits my career plan.（我认为做一名国家航空安保教员符合自己的职业规划。）					
4	I can take my duties as a National Aviation Security Instructor seriously.（我能认真对待国家航空安保教员职责范围内的工作。）					
5	I will be proactive in learning various skills related to the National Aviation Security Instructor career.（我会积极主动地去学习和国家航空安保教员职业有关的各种技能。）					

APPENDIX F

THE DELPHI SURVEY QUESTIONNAIRE

National Aviation Security Instructor Competency Element Survey Form

(Delphi Survey Questionnaire Round 1)

I. General Information

Instructions: Please answer the questions according to your actual situation.

1.1 What is your name?

1.2 What is your age?

1.3 What is your gender?

1.4 What is your job position?

1.5 How long have you been as a National Aviation Security Instructor (NASI)?

1.6 How long have you taught as a National Aviation Security Instructor (NASI)?

2. The Survey of Competency Elements

Instruction: Based on your perspective of the competencies that a National Aviation Security Instructor (NASI) should possess, please score the importance of each competency item. Based on your perspective, please choose the answer closest to you. 1= Strongly Unimportant, 2= Unimportant, 3= Neutral, 4= Important, 5= Strongly Important.

Please put a tick (√) on the number of your preferred opinion.

No.	Competency Projects	code	Competency Elements	1	2	3	4	5
1	**Requirements investigation capability**	1	The basic situation of the training target, such as job position, experience, education, etc., is clarified through					

			investigation.					
		2	The lack of knowledge, skills and attitudes of the training participants is clarified through investigation.					
		3	The investigation enables clarity on the expected security training.					
		4	The investigation can provide the clear objectives of the aviation security training curriculum.					
2	**The ability to produce teaching plans**	5	The ability to clarify the purpose and role of the teaching plan.					
		6	The ability to clarify the main components of a teaching plan.					
		7	The ability to write standardized curriculum objectives.					
		8	The ability to structure a lesson in a teaching plan.					
		9	The ability to select appropriate teaching methods based on course content and clearly describe them in a teaching plan.					
		10	The ability to describe the key elements of each unit of the course in a teaching plan.					
3	**The ability to produce the courseware**	11	The ability to create courseware using PowerPoint (PPT) templates appropriate to the training topic.					
		12	The ability to create courseware according to PowerPoint (PPT) authoring principles.					
		13	The ability to incorporate appropriate images and videos into courseware (PPT).					
		14	Produced PowerPoint (PPT) that is well laid out and has good looking pages.					
4	**The ability to organize and manage**	15	The ability to implement training and prepare for teaching according to the teaching plan.					
		16	The ability to select the appropriate instructor and classroom based on the training topic.					
		17	The ability to do a good job of supporting the training, including teaching software equipment and hardware equipment.					
		18	The ability to create and properly maintain training files and assessment records.					
5	**The ability to teaching**	19	The ability to rationalize the pace of instruction based on teaching plans.					
		20	The ability to focus on key points during teaching.					
		21	The ability to stand reasonably and walk appropriately during teaching.					

		22	The ability to make good eye contact with trainee during teaching.					
		23	The ability to stimulate and sustain trainee interest during teaching.					
		24	The ability to pay attention to the state and reaction of the trainee to the lesson during teaching.					
		25	The ability to communicate effectively both verbally and non-verbally during teaching.					
		26	The ability to adjust the pace of teaching according to the response of the students in the class at the right time.					
		27	Utilization of pedagogical methods and tools.					
		28	The ability to use gestures, silence and body language effectively.					
		29	The ability to use effective questioning techniques.					
		30	The ability to use appropriate communication skills.					
		31	The ability to keep participants on course topics by starting, ending, monitoring and controlling them.					
6	**The ability to curriculum evaluation**	32	The ability to perform randomized quizzes on the effectiveness of the trainee's training.					
		33	Be the ability to assess the learner's learning outcomes in an appropriate way at the end of the course.					
		34	The ability to self-evaluate the effectiveness of the delivery in an appropriate way at the end of the course.					
		35	The ability to improve and apply the course based on the findings of this training evaluation.					

3. Fill in Your Other Opinions

Instruction: Based on your perspective, please answer the following question.

Are there any other capabilities that the National Aviation Security Instructors (NASI) will need to have? Please share your comments or suggestions.

4. Survey on Your Familiarity with the above Questionnaire

Instruction: Please put a tick (√) on the number of your preferred opinion.

Q: What is your level of familiarity with the competency areas expected of National Aviation Security Instructors (NASI)?

Expert Familiarity and the Degree of Influence	
Degree of familiarity	Familiarity coefficient
Very unfamiliar	
Less familiar	
Familiar	
More familiar	
Very familiar	

5. Investigation on the Basis of Option Judgment

Instruction: Please put a tick (√) on the number of your preferred opinion.

Q: Which of the following factors influenced your degree of choice in your selection of an instructor's ability on the above questionnaire?

Judgement Basis and the Degree of Influence			
Judgment Criterion	Score for degree of influence on expert judgment		
	Large	Medium	Small
Theoretical analyze			
Practical experience			
Domestic and International Literature			
Intuitive feeling			

National Aviation Security Instructor Competency Element Survey Form

(Delphi Survey Questionnaire Round 2)

I. The Survey of Competency Elements

Instruction: Based on your perspective of the competencies that a National Aviation Security Instructor (NASI) should possess, please score the importance of each competency item. Based on your perspective, please choose the answer closest to you. 1= Strongly Unimportant, 2= Unimportant, 3= Neutral, 4= Important, 5= Strongly Important.

Please put a tick (√) on the number of your preferred opinion.

No.	Competency Projects	code	Competency Elements	1	2	3	4	5
1	**Requirements investigation capability**	1	The basic situation of the training target, such as job position, experience, education, etc., is clarified through investigation.					
		2	The lack of knowledge, skills and attitudes of the training participants is clarified through investigation.					
		3	The investigation enables clarity on the expected security training.					
		4	The investigation can provide the clear objectives of the aviation security training curriculum.					
2	**The ability to produce teaching plans**	5	The ability to clarify the purpose and role of the teaching plan.					
		6	The ability to clarify the main components of a teaching plan.					
		7	The ability to write standardized curriculum objectives.					
		9	The ability to select appropriate teaching methods based on course content and clearly describe					

			them in a teaching plan.					
		10	The ability to describe the key elements of each unit of the course in a teaching plan.					
3	**The ability to produce the courseware**	11	The ability to create courseware using PowerPoint (PPT) templates appropriate to the training topic.					
		12	The ability to create courseware according to PowerPoint (PPT) authoring principles.					
		14	Produced PowerPoint (PPT) that is well laid out and has good looking pages.					
4	**The ability to organize and manage**	15	The ability to implement training and prepare for teaching according to the teaching plan.					
		16	The ability to select the appropriate instructor and classroom based on the training topic.					
		17	The ability to do a good job of supporting the training, including teaching software equipment and hardware equipment.					
		18	The ability to create and properly maintain training files and assessment records.					
5	**The ability to teaching**	19	The ability to rationalize the pace of instruction based on teaching plans.					
		20	The ability to focus on key points during teaching.					
		21	The ability to stand reasonably and walk appropriately during teaching.					
		22	The ability to make good eye contact with trainee during teaching.					
		23	The ability to stimulate and sustain trainee interest during teaching.					
		24	The ability to pay attention to the state and reaction of the trainee to the lesson during teaching.					

		25	The ability to communicate effectively both verbally and non-verbally during teaching.					
		26	The ability to adjust the pace of teaching according to the response of the students in the class at the right time.					
		27	Utilization of pedagogical methods and tools.					
		28	The ability to use gestures, silence and body language effectively.					
		29	The ability to use effective questioning techniques.					
		30	The ability to use appropriate communication skills.					
		31	The ability to keep participants on course topics by starting, ending, monitoring and controlling them.					
		33	Be the ability to assess the learner's learning outcomes in an appropriate way at the end of the course.					
		34	The ability to self-evaluate the effectiveness of the delivery in an appropriate way at the end of the course.					
		35	The ability to improve and apply the course based on the findings of this training evaluation.					
	Additional capacity items	36	The ability to summarize the content presented in appropriate language after each lesson content.					
		37	The ability to have good verbal tabulation skills					
		38	The ability to have good classroom control techniques					

2. Fill in Your Other Opinions

Instruction: Based on your perspective, please answer the following question.

Are there any other capabilities that the National Aviation Security Instructors (NASI) will need to have? Please share your comments or suggestions.

3. Survey on Your Familiarity with the above Questionnaire

Instruction: Please put a tick (√) on the number of your preferred opinion.

Q: What is your level of familiarity with the competency areas expected of National Aviation Security Instructors (NASI)?

Expert Familiarity and the Degree of Influence	
Degree of familiarity	Familiarity coefficient
Very unfamiliar	
Less familiar	
Familiar	
More familiar	
Very familiar	

4. Investigation on the Basis of Option Judgment

Instruction: Please put a tick (√) on the number of your preferred opinion.

Q: Which of the following factors influenced your degree of choice in your selection of an instructor's ability on the above questionnaire?

Judgement Basis and the Degree of Influence			
Judgment Criterion	Score for degree of influence on expert judgment		
	Large	Medium	Small
Theoretical analyze			
Practical experience			
Domestic and International Literature			
Intuitive feeling			

National Aviation Security Instructor Competency Element Survey Form

(Delphi Survey Questionnaire Round 3)

I. The Survey of Competency Elements

Instruction: Based on your perspective of the competencies that a National Aviation Security Instructor (NASI) should possess, please score the importance of each competency item. Based on your perspective, please choose the answer closest to you. 1= Strongly Unimportant, 2= Unimportant, 3= Neutral, 4= Important, 5= Strongly Important.

Please put a tick (√) on the number of your preferred opinion.

No.	Competency Projects	code	Competency Elements	1	2	3	4	5
1	**Requirements investigation capability**	1	The basic situation of the training target, such as job position, experience, education, etc., is clarified through investigation.					
		2	The lack of knowledge, skills and attitudes of the training participants is clarified through investigation.					
		3	The investigation enables clarity on the expected security training.					
		4	The survey can provide post-course training results for the determination of course objectives.					
2	**The ability to produce teaching plans**	5	The ability to clarify the purpose and role of the teaching plan.					
		6	The ability to clarify the main components of a teaching plan.					
		7	The ability to write standardized curriculum objectives.					
		9	The ability to select appropriate teaching methods based on course content and clearly describe them in a teaching plan.					
		10	The ability to describe the key elements of each unit of the course in a teaching plan.					
3	**The ability to produce the courseware**	11	The ability to create courseware using PowerPoint (PPT) templates appropriate to the training topic.					
		12	The ability to create courseware according to PowerPoint (PPT)					

			authoring principles.					
		14	Produced PowerPoint (PPT) that is well laid out and has good looking pages.					
4	**The ability to organize and manage**	15	The ability to clarify what preparations are needed for the implementation of training courses.					
		16	The ability to select the appropriate instructor and classroom based on the training topic.					
		17	The ability to do a good job of supporting the training, including teaching software equipment and hardware equipment.					
		18	The ability to create and properly maintain training files and assessment records.					
5	**The ability to teaching**	19	The ability to rationalize the pace of instruction based on teaching plans.					
		20	The ability to focus on key points during teaching.					
		21	The ability to stand reasonably and walk appropriately during teaching.					
		22	The ability to make good eye contact with trainee during teaching.					
		23	The ability to stimulate and sustain trainee interest during teaching.					
		24	The ability to pay attention to the state and reaction of the trainee to the lesson during teaching.					
		25	The ability to communicate effectively both verbally and non-verbally during teaching.					
		26	The ability to adjut the pace of teaching according to the response of the students in the class at the right time.					
		27	The ability to apply teaching methods and tools.					
		28	The ability to use gestures, silence and body language effectively.					
		29	The ability to use effective questioning techniques.					
		30	The ability to use appropriate communication skills.					
		31	The ability to keep participants on course topics by starting, ending, monitoring and controlling them.					
		33	Be the ability to assess the learner's learning outcomes in an appropriate way at the end of the course.					

		35	The ability to improve and apply the course based on the findings of this training evaluation.					
	Additional capacity items	36	The ability to summarize the content presented in appropriate language after each lesson content.					
		37	The ability to have good verbal tabulation skills					
		38	The ability to have good classroom control techniques					

2. Fill in Your Other Opinions

Instruction: Based on your perspective, please answer the following question.

Are there any other capabilities that the National Aviation Security Instructors (NASI) will need to have? Please share your comments or suggestions.

3. Survey on Your Familiarity with the above Questionnaire

Instruction: Please put a tick (√) on the number of your preferred opinion.

Q: What is your level of familiarity with the competency areas expected of National Aviation Security Instructors (NASI)?

Expert Familiarity and the Degree of Influence	
Degree of familiarity	Familiarity coefficient
Very unfamiliar	
Less familiar	
Familiar	
More familiar	
Very familiar	

4. Investigation on the Basis of Option Judgment

Instruction: Please put a tick (√) on the number of your preferred opinion.

Q: Which of the following factors influenced your degree of choice in your selection of an instructor's ability on the above questionnaire?

Judgement Basis and the Degree of Influence			
Judgment Criterion	Score for degree of influence on expert judgment		
	Large	Medium	Small
Theoretical analyze			
Practical experience			
Domestic and International Literature			
Intuitive feeling			

APPENDIX G

CONSENT FORM

Date................ /................../..............

My name is..,
aged............years old, address ……………................
Road/Street..
District..
Province..Postal
code……….........Tel. ....

I hereby express my consent to participate as a subject in the research project entitled OUTCOMES-BASED EDUCATION IN NATIONAL AVIATION SECURITY CURRICULUM DEVELOPMENT AND EVALUATION.

In so doing, I am informed of the research project's origin and purposes; its procedural details to carry out or to be carried out; its expected benefits and risks that may occur to the subjects, including methods to prevent and handle harmful consequences; and remuneration, and expense. I thoroughly read the detailed statements in the information sheet given to research subjects. I was also given explanations and my questions were answered by the head of the research project.

I therefore consent to participate as a subject in this research project.

On the condition that I have any questions about the research procedures, or on the condition that I suffer from an undesirable side effect from this research, I can contact ZHANGYIYAN, 18087559155. (Indicate the name of the person in charge who is 24-hour ready for contact by phone).

On the condition that I am not treated as indicated in the information sheet distributed to subjects, I can contact the Chair of Rangsit University Ethics Review Board, (RSU-ERB), Rangsit University, 52/347 Phahonyothin Rd, Tambon Lak Hok, Amphoe Muang, Pathum Thani Province 12000, Thailand (Building 1, 5th Floor, Room 504) Tel 66-2-7915688, Fax 66-2-7915689.

I am aware of my right to further information concerning benefits and risks from the participation in the research project and my right to withdraw or refrain from the participation anytime without any consequence on the service or health care I am to receive in the future. I consent to the researchers' use of my private information obtained in this research, but do not consent to an individual disclosure of private information. The information must be presented as part of the research results as a whole.

I thoroughly understand the statements in the information sheet for the research subjects and in this consent form. I thereby give my signature.

Signature... Participants

(...)

Date......../......../........

Signature... Principal Investigator

(...)

Date......../......../........

APPENDIX H

THE CURRICULUM FOR NATIONAL AVIATION SECURITY INSTRUCTOR

National Aviation Security Instructor Curriculum

Curriculum Type：Certification Courses

Curriculum duration：40 credit hours

Applicable Targets： Airports and airlines are required to achieve national aviation security instructor certification.

1. Curriculum Orientation and Design Ideas

1.1 Curriculum Orientation

The National Aviation Security Instructor Curriculum (NASIC) belongs to one of the national aviation security qualification training curricula. The NASIC plays a very important role in the training of aviation security instructors, and it is a curriculum that must be completed by those who are responsible for security training in airports and airlines, as well as other enterprises and public institutions, so that the implementation of the NASIC must be very rigorous and attentive.

1.2 Design Ideas for the Curriculum

The curriculum is designed around the OBE concept, which ensures that national aviation security instructor trainees are trained to meet the competency requirements of their positions, and that the implementation of their legal duties is the fundamental goal and end result of the training. The design of the Aviation Security Instructor course is centered on the implementation of the statutory duties, firstly, through the research and analysis of the results of the research, and in conjunction with the requirements of the aviation security laws and regulations at the national level for the aviation security instructor position, all the content of the course is designed to focus on the implementation of the knowledge, skills and attitudes required for the position. After determining the specific content of the job competencies of aviation security instructors, the curriculum objectives of the training are determined according to the specific content of the competencies, and then the content of the curriculum system and teaching methods are designed and determined according to the curriculum objectives.

2. Purpose of the Curriculum

In accordance with the provisions of the Civil Aviation Security Training Programme, participants are provided with a clear understanding of the duties and responsibilities of aviation security instructors, and are equipped with the general knowledge and skills, such as pedagogical and didactic skills, required for the performance of their duties and are able to apply them in the delivery of specialized courses on aviation security.

3. Objectives of the Curriculum

There are a total of 10 curriculum objectives, categorized into knowledge, skills, and attitudes objectives.

3.1 Knowledge Objectives

1. The trainees will be able to grasp the basic concepts of teaching and learning principles.
2. The trainees will be able to acquire the main steps in curriculum design.

3.2 Skill Objectives

1. The trainees can have the ability to determine course titles, written course objectives.
2. The trainees can have the ability to build course structure.
3. The trainees will be able to to select appropriate teaching methods based on course content.
4. The trainees will be able to acquire the t method of writing teaching plan.
5. The trainees will be able to acquire knowledge and skills to creation courseware.
6. The trainees will be able to apply teaching skill to deliver aviation security curriculum.

3.3 Attitude Objectives

1. The trainees will be able to understand the roles of NASI.

2. The trainees will be able to understand the responsibilities of NASI.

4. Curriculum Content Framework

NO.	Curriculum Module Title	Competency requirements	credit hours
1	Unit 1 The role and responsibility of the national aviation security instructor	1.1 Mastering the roles and responsibilities of an aviation security instructor	4
		1.2 Understanding the mission of an aviation security instructor	
		1.3 Understanding the values of aviation security instructors	
2	Unit 2 Important concept and the main steps in aviation security curriculum development	2.1 Knowing the core principles of the OBE concept	4
		2.2 Knowing the key steps of the ADDIE curriculum development model	
3	Unit 3 The important steps in the aviation security curriculum design	3.1 Familiarity with the principles and main steps of course design	4
		3.2 Knowing the principles for determining the title of a course	
		3.3 Determining the title of the course	
		3.4 Knowing the basic elements and formulas for determining course objectives	
		3.5 Knowing the method of determination of the construction of the course structure	
4	Unit 4 The teaching method	4.1 Be familiar with the teaching methods commonly used in aviation security courses	4
		4.2 Matching teaching methods to different content	
		4.3 Mastering the basic methods of instructor-learner communication	
5	Unit 5 Production the teaching plan of the aviation security curriculum	5.1 Mastery of the methods of writing teaching plans for aviation security courses	5
		5.2 The ability to apply course lesson plan development methodology to security courses	
6	Unit 6 Production the	6.1 Master the principles of courseware development for aviation security courses	4

	courseware of the aviation security curriculum	6.2 The ability to apply methods of courseware development for aviation security courses to security	
7	Unit 7 Teaching abilities and skills	7.1 Recognizing Basic Skills for Teaching 7.2 Mastering basic teaching skills 7.3 Recognizing the factors that influence the effectiveness of a lecture	5
8	Unit 8 Curriculum evaluation and summarizing	8.1 Being able to pass a knowledge theory exam 8.2 Being able to create standards-compliant lesson plans and courseware 8.3 Being able to pass an on-site lecture test for an aviation security course	10

5. Correspondence between Content and Curriculum Objectives

Contents	**Knowledge objectives**		**Skill objectives**						**Attitude objectives**	
	1.1	**1.2**	**2.1**	**2.2**	**2.3**	**2.4**	**2.5**	**2.6**	**3.1**	**3.2**
Unit 1										
Unit 2										
Unit 3										
Unit 4										
Unit 5										
Unit 6										
Unit 7										
Unit 8										

6. Overview of Teaching Content

The course consists of a total of 8 units.

Unit 1 Topic: The Role and Responsibility of the National Aviation Security Instructor (4 credit hours)

Course Contents:

Module I: The role of the National Aviation Security Instructor

Module II Responsibilities of the National Aviation Security Instructor

Focused Contents:

Module II Responsibilities of the National Aviation Security Instructor

Difficult Contents:

Module I: The role of the National Aviation Security Instructor

Unit 2 Topic: Unit 2 Important Concept and the Main Steps in Aviation Security Courses Development (4 credit hours)

Course Contents:

Module I: Important concept in aviation security courses development

Module II: The Model in the development of aviation security courses

Focused Contents:

Module II: The Model in the development of aviation security courses

Difficult Contents:

Module II: The Model in the development of aviation security courses

Unit 3 Topic: The Important Steps in the Aviation Security Course Design (4 credit hours)

Course Contents:

Module I: Course Title

Module II: Course Objective

Module III: Course Structure

Module IV: Course Contents

Focused Contents:

Module II: Course Objective

Module III: Course Structure

Difficult contents:

Module III: Course Structure;

Unit 4 Topic: The Teaching Method (4 credit hours)

Course Contents:

Module I: Lecture

Module II: Presentation Teaching Method

Module III: Game Teaching Method

Module IV: Case Teaching Method

Module V: Role Playing Teaching Method

Focused Contents:

Module II: Presentation Teaching Method

Module IV: Case Teaching Method

Difficult Contents:

Module IV: Case Teaching Method

Unit 5 Topic: Production the Teaching Plan of Aviation Security Course (5 credit hours)

Course Contents:

Production the teaching plan of aviation security course.

Focused Contents:

Production the teaching plan of aviation security course.

Difficult Contents:

Production the teaching plan of aviation security course.

Unit 6 Topic: Production the Courseware of Aviation Security Course (5 credit hours)

Course Contents:

Production the courseware of aviation security course.

Focused Contents:

Production the courseware of aviation security course.

Difficult Contents:

Production the courseware of aviation security course.

Unit 7 Topic: Teaching Abilities and Skills (5 credit hours)

Course Contents:

Module I: Competencies Expected of the Instructor

Module II: A Few Key Competencies

Focused Contents:

Module I: Competencies Expected of the Instructor

Difficult Contents:

Module II: A Few Key Competencies

Unit 8 Topic: Curriculum Evaluation and Summarizing (10 credit hours)

Course Contents:

Module I: Curriculum Evaluation

Module II: Curriculum Summarizing

Focused Contents:

Module I: Curriculum Evaluation

Difficult Contents:

Module I: Curriculum Evaluation

7. Implementation of the Curriculum

7.1 Teaching Method

Combining multiple teaching methods, including Lecture teaching method, Presentation teaching method, Game teaching method, Case teaching method, Questioning method of teaching, Group discussion method. Use facilitation techniques and methods to guide participants to think positively, ask questions, actively participate in group discussions, and engage in team co-creation.

7.2 Correspondence between Teaching Methods and Curriculum Objectives

Teaching method	Knowledge Objectives		Skill Objectives						Attitude Objectives	
	1.1	1.2	2.1	2.2	2.3	2.4	2.5	2.6	3.1	3.2
Lecture teaching method	√	√	√	√	√	√	√	√	√	√
Presentation teaching method			√	√	√	√	√	√		
Game teaching method			√							
Case teaching method					√	√	√	√		
Questioning method of teaching	√	√	√	√	√	√	√	√	√	√
Group discussion method	√	√	√	√	√	√	√	√	√	√

8. Evaluation of the Curriculum

8.1 Evaluation Purpose

The trainee will be qualified to serve as a NASI and will have the specialized knowledge and competencies required to implement the teaching of aviation security personnel.

8.2 Evaluation Scope

Evaluation of trainees participating as NASI.

8.3 Evaluation Principles

Adherence to the principles of consistency, objectivity, fairness, and openness.

8.4 Evaluation Content and Criteria

The evaluation is divided into three sections, a theoretical examination, a teaching ability evaluation and teaching attitude evaluation.

8.4.1 Theoretical Examination

1) Examination Content: theoretical knowledge on teaching concepts, teaching methods, production of lesson plans and courseware, etc.

2) Evaluation Number and Marks Questions and Answers, 20 questions, 5 points each, out of 100 points, above 70 is a pass.

The details are as follows:

1. What are the main job responsibilities of the National Aviation Security Instructor?

2. As a National Aviation Security Instructor, what are the two capabilities needed?

3. What are the main concepts of the aviation security curriculum design?

4. What are the three aspects of the capabilities of aviation security personnel?

5. When encountering the problems in security work, which aspects can be considered to solve?

6. What is the main model for aviation security curriculum design?

7. What are the main steps in the aviation security curriculum design?

8. What are the important links in the design of aviation security curriculum?

9. In the design of aviation security curriculum title, what matters should be paid attention to?

10. How to choose the title of the aviation security curriculum?

11. What are the three categories into which the course objectives can be divided in the aviation security curriculum design?

12. How to develop curriculum objectives in aviation security curriculum design?

13. How to structure the curriculum in aviation security curriculum design?

14. How to enrich the content in aviation security curriculum design?

15. What are the common teaching methods used in the aviation security curriculum?

16. What are the main principles of courseware making in the aviation security curriculum design?

17. How many words are appropriate for each page of slide in the design of aviation security curriculum?

18. What are the competencies that an NASI should have?

19. What are the teaching skills that an NASI should have?

20. How to assess student learning as a NASI?

8.4.2 Teaching Ability Evaluation

Trainees are required to prepare a 10-minute teaching plan and courseware and deliver a 10-minute lecture. The evaluation of the training ability of the trainees is based on the performance of the trainees using an evaluation scale. There are 10 evaluation items, each item is worth 10 points, divided into 1-5 to score, corresponding to 2-10 points respectively. A full score of 100 points, above 70 is qualified.

The scoring table is shown in the table below:

No.	Item	Poor	Fair	Good	Very Good	Excellent
1	The course title is determined accurately and is a summary of the main content of the course.					
2	The course objectives are clear and written in accordance with the standards.					
3	The course structure is built using the proper principle with a clear hierarchy.					
4	Teaching content is full and logical.					
5	In-depth understanding of the course content and the ability to deliver the course content in a clear and complete manner.					
6	Clear and fluent expression, making good use of body language.					

7	The lecture schedule is reasonable, and the length of the lecture content can be adjusted according to the on-site response of the students					
8	Strong interaction with students, able to give timely feedback on their responses.					
9	PPT is made in accordance with standards, with beautiful graphics and high technical skills.					
10	Assessment of learner learning effectiveness with appropriate instruments.					

8.4.3 Teaching Attitude Evaluation Evaluation

For the trainees' assessment of the roles and responsibilities of the instructor, there are five evaluation items of 20 points each, divided into 1-5 to score, corresponding to 4-20 points respectively. A full score of 100 points and above 70 points is a pass. The scoring table is shown in the table below:

No.	Item	Strongly Disagree	Disagree	Not sure	Agree	Strongly Agree
1	I believe that the work of National Aviation Security Instructors has an important role to play in safeguarding national aviation safety.					
2	I believe that the National Aviation Security Instructor is an important guide to the career development of security personnel.					
3	I think being a National Aviation Security Instructor fits my career plan.					
4	I can take my duties as a National Aviation Security Instructor seriously.					
5	I will be proactive in learning various skills related to the National Aviation Security Instructor career.					

9. Other Notes

In the process of teaching and learning according to the actual teaching and learning, the use of existing teaching hardware resources, the development of human-centered teaching resources.

9.1 Teaching Facilities Conditions

A multimedia classroom capable of accommodating two classes of students.

9.2 Team of Teachers

Staffed with teachers who are certified as aviation security instructors.

APPENDIX I

THE TEACHING PLAN FOR NATIONAL AVIATION SECURITY INSTRUCTOR CURRICULUM

Unit 1		**Name: The role and responsibility of the national aviation security instructor**	**4 credit hours**
Module Course Objectives	**Knowledge objectives**	1. Cognizant of the selection and regulations to stop teaching activities for instructors. 2. Clarification of instructor's responsibilities.	
	Skill objectives	None	
	Attitude objectives	1. The ability to correctly understand the role of the instructor. 2. The ability to value training and a deep understanding of the importance of instructors in security training.	
Teaching methods and approaches	**Teaching method design**	The teaching method is based on interactive teaching and case study teaching, and adopts an action learning model, using facilitation techniques and methods to guide participants to think actively, ask questions, and actively participate in group discussions and team co-creation.	
	Teaching techniques	A combination of teaching methods, such as lectures, questioning, group discussions, case studies, and other action-oriented teaching methods.	
Design for after-school learning	**Assignment**	Writing reflections on the roles and responsibilities of aviation security instructors.	
	Reference material	How to be a good teacher? How to organize training?	
	Website	https://wenku.baidu.com/tfview https://www.cnki.net/index/ https://www.wanfangdata.com.cn https://www.oalib.com/	

	After-school activities	Organizing a discussion among the panel lists on how to conduct the training.	
Evaluation Design	**Knowledge examination points**	The elements of the NASI's duties.	
	Attitude evaluation points	The responsibility and sense of mission expected of a NASI.	
	Forms of evaluation	Written examination	Oral examination
		√	

Objectives of the course and distribution of teaching hours

Course Modules	**Course content**	**Capability point**	**Learning outcomes**	**Credit hours**
Module 1 The role of the NASI	1. The concept of the teacher; 2. Excellent characteristics as a instructor in his or her own person hood.	Understanding of the instructor's role in aviation security training.	Strong understanding of the instructor role.	2
Module 2 Responsibilities of the NASI	1. Responsibilities of the NASI; 2. Criteria for the selection of instructors; 3. Regulations to stop teaching activities.	Clarifying the responsibilities of NASI.	Mastering the duties of a NASI.	2

Course content and requirements

Module 1

The Role of the NASI

1. Content Analysis

1.1 Main Contents

The role of the NASI and analyzing the good characteristics and weaknesses you have as an instructor.

1.2 Focus Contents

The role of the NASI.

1.3 Difficult Contents:

The role of the NASI.

2. Design of Teaching Methods

A combination of teaching methods, lectures, questioning, group discussions and other action-oriented teaching methods.

3. Teaching Process Design

1) Throwing out the question, what role do NASI play in the field of aviation security training?
2) Explaining the definition of a teacher and an analysis of what the role of a teacher is;
Instruction on what the role of the NASI is;
3) Analyzing the advantages and disadvantages of the trainee as a NASI;
4) Increasing confidence as a NASI.

4. Assignments or Thinking Questions

Writing an understanding of the role of a NASI.

Module 2
Responsibilities of the NASI

1. Content Analysis

1.1 Main Contents
Responsibilities of the NASI, Criteria for the selection of instructors, Regulations to stop teaching activities.

1.2 Focus Contents
Responsibilities of the NASI.

1.3 Difficult Contents:

Responsibilities of the NASI.

2. Design of Teaching Methods
A combination of teaching methods, lectures, questioning, group discussions and other action-oriented teaching methods.

3. Teaching Process Design
1) Throwing out the question, what are the responsibilities of the NASI?
2) Explaining the the responsibilities of the NASI.
3) Explaining the Criteria for the selection of instructors.
4) Explaining the regulations to stop teaching activities.

4. Assignments or Thinking Questions
Writing the the responsibilities of the NASI, and inter-group discussions.

Teaching Plan

Curriculum Name

Unit 2 Important concept and the main steps in aviation security curriculum development

Responsible Department

Security Department

Drafting time

June 2023

Unit 2		**Name: Important concept and the main steps in aviation security Curriculum development**	**4 credit hours**
Module Course Objectives	**Knowledge objectives**	1. Mastering the core principles of the OBE concept. 2. Mastering the main steps of the ADDIE curriculum development model.	
	Skill objectives	None	
	Attitude objectives	1. Emphasizing the learning of educational concepts.	
Teaching methods and approaches	**Teaching method design**	The teaching method is based on interactive teaching and case study teaching, and adopts an action learning model, using facilitation techniques and methods to guide participants to think actively, ask questions, and actively participate in group discussions and team co-creation.	
	Teaching techniques	A combination of teaching methods, such as lectures, questioning, group discussions, case studies, and other action-oriented teaching methods.	
Design for after-school learning	**Assignment**	What other advanced teaching concepts are currently available.	
	Reference material	1. Research and Practice of a Six-Step Teaching Approach under the Concept of OBE. 2. How to organize training?	
	Website	https://wenku.baidu.com/tfview https://www.cnki.net/index/ https://www.wanfangdata.com.cn https://www.oalib.com/	
	After-school activities	History of the creation and application of the OBE concept.	

<table>
<tr><td rowspan="3">Evaluation Design</td><td>Knowledge examination points</td><td colspan="3">Core principles of the OBE Concept.
The main steps of ADDIE.</td></tr>
<tr><td rowspan="2">Forms of evaluation</td><td colspan="2">Written examination</td><td>Oral examination</td></tr>
<tr><td colspan="2">√</td><td></td></tr>
<tr><td colspan="5">Objectives of the course and distribution of teaching hours</td></tr>
<tr><td>Course Modules</td><td>Course content</td><td>Capability point</td><td>Learning outcomes</td><td>Credit hours</td></tr>
<tr><td>Module 1 Important concept in aviation security Curriculum development</td><td>1. The meaning of the OBE concept;
2. Core principles of the OBE Concept.</td><td>Mastery of Key principles of the OBE concept.</td><td>Strong understanding of the Key principles of the OBE concept.</td><td>2</td></tr>
<tr><td>Module 2 The Model in the development of a aviation security Curriculum</td><td>1. The main steps of ADDIE.
2. The relationship among several steps of the ADDIE model is cyclic.</td><td>Clarifying the main steps of ADDIE and the relationship among several steps.</td><td>Mastering the main steps of ADDIE and the relationship among several steps.</td><td>2</td></tr>
<tr><td colspan="5">Course content and requirements</td></tr>
<tr><td colspan="5"></td></tr>
</table>

Module 1
Important Concept in Aviation Security Curriculum Development

1. Content Analysis

1.1 Main Contents

The main principles of the OBE concept.

1.2 Focus Contents

The main principles of the OBE concept

1.3 Difficult Contents:

Application of OBE Concepts to the Aviation Security curriculum

2. Design of Teaching Methods

A combination of teaching methods, lectures, questioning, group discussions and other action-oriented teaching methods.

3. Teaching Process Design

1) The three core principles that introduce the OBE philosophy are first introduced.
2) Throwing out the question, how to apply the OBE concept of being results-oriented to aviation security courses?
3) A summary of the methods used in the OBE concept in the aviation security course.

4. Assignments or Thinking Questions

How to apply OBE concepts to aviation security courses and group discussion.

Module 2
Responsibilities of the NASI

1. Content Analysis

1.1 Main Contents

The main steps of ADDIE model, etc.

1.2 Focus contents

The main steps of ADDIE model

1.3 Difficult Contents:

The main steps of ADDIE model

2. Design of Teaching Methods

A combination of teaching methods, lectures, questioning, group discussions and other action-oriented teaching methods.

3. Teaching Process Design

1) Throwing out the question, what are the starting points and main steps in designing a curriculum?
2) Given a case study of designing a course, summarize the ADDIE model and the main seven steps in conducting a course design;
3) A summary of the steps of curriculum development.

4. Assignments or Thinking Questions

Analyzing and group discussion of how the ADDIE model can be applied to aviation security courses.

Teaching Plan

Curriculum Name

Unit 3 The important steps in the aviation security Curriculum design

Responsible Department

Security Department

Drafting time

June 2023

Unit 3		Name: The important steps in the aviation security Curriculum design	4 credit hours
Module Course Objectives	**Knowledge objectives**	1. The ability to master the design of the National Aviation Security Curriculum; 2. Mastering the principles for determining course titles; 3. Mastering the four elements and formulas for writing curriculum objectives; 4. Mastering the methods of structuring the course.	
	Skill objectives	1. The ability to define course titles as required; 2. The ability to write course objectives as required; 3. The ability to structure a course as required.	
	Attitude objectives	1. The ability to emphasize the methods and steps of course design.	
Teaching methods and approaches	**Teaching method design**	The teaching method is based on interactive teaching and case study teaching, and adopts an action learning model, using facilitation techniques and methods to guide participants to think actively, ask questions, and actively participate in group discussions and team co-creation.	
	Teaching techniques	A combination of teaching methods, such as lectures, questioning, group discussions, case studies, and other action-oriented teaching methods.	
Design for after-school learning	**Assignment**	The main steps and methods included in the course design.	
	Reference material	1. Fundamentals of Curriculum and Materials Design 2. Principles and Methods of Instructional Design 3. Adult Education and Training Curriculum Development	

		4. Corporate Training Course Design and Development	
	Website	https://wenku.baidu.com/tfview https://www.cnki.net/index/ https://www.wanfangdata.com.cn https://www.oalib.com/	
	After-school activities	Panel discussion on how the steps of curriculum design can be applied in an aviation security course.	
Evaluation Design	**Knowledge examination points**	1. The design of the National Aviation Security Curriculum; 2. The principles for determining course titles; 3. The four elements and formulas for writing curriculum objectives; 4. The methods of structuring the course.	
	Skill evaluation points	1. The course title was determined to be in accordance with the requirements; 2. Curriculum objectives are written to meet the requirements; 3. The course structure is built to meet the requirements.	
	Forms of evaluation	Written examination	Oral examination
		√	

Objectives of the course and distribution of teaching hours				
Course Modules	**Course content**	**Capability point**	**Learning outcomes**	**credit hours**
Module 1 Curriculum	1. The design of the National Aviation	Mastery of the principles for	Knowing how the course title	0.5

Title	Security Curriculum; 2. The principles for determining course titles.	determining course titles.	should be determined.	
Module 2 Curriculum Objective	1. The four elements for writing curriculum objectives; 2. The formulas for writing curriculum objectives.	Clarifying the four elements and the formulas for writing curriculum objectives.	Mastering the four elements and the formulas for writing curriculum objectives.	1
Module 3 Curriculum structure	1. A classic model of the Curriculum structure; 2. The structure model of "N" building — the pyramid model 3. The focus model is the golden circle model	Mastering the three models of course structure building.	Possession of the ability to apply the three models of course structure building to the aviation security course	2
Module 4 Curriculum contents	1. The Curriculum contents are logical and be focused; 2. "PEP model"	Knowing that the course content is the principle of focusing on the content.	The ability to organize the content of training courses against the unit's job manuals	0.5
Course content and requirements				

Module 1

Curriculum Title

1. Content Analysis

1.1 Main Contents

The design of the National Aviation Security Curriculum. The principles for determining course titles.

1.2 Focus Contents

The principles for determining course titles.

1.3 Difficult Contents:

The principles for determining course titles.

2. Design of Teaching Methods

A combination of teaching methods, lectures, questioning, group discussions and other action-oriented teaching methods.

3. Teaching Process Design

1) First, a case study was used to provoke the participants to think about what to look for in determining the title of the course?
2) Then explaining the principles and considerations for determining course titles.
3) Summarizing knowledge about course titles.

4. Assignments or Thinking Questions

Panel discussion on how the steps of curriculum design can be applied in an aviation security course.

Module 2
Curriculum Objective

1. Content Analysis

1.1 Main Contents

The four elements for writing curriculum objectives. The formulas for writing curriculum objectives.

1.2 Focus Contents

The formulas for writing curriculum objectives.

1.3 Difficult Contents:

The four elements for writing curriculum objectives.

2. Design of Teaching Methods

A combination of teaching methods, lectures, questioning, group discussions and other action-oriented teaching methods.

3. Teaching Process Design

1) First the participants are given a case study and are asked to write a lesson objective based on their ideas and share their answers.
2) A summary based on the participants' sharing and an explanation of the four elements of objective.
3) Explaining the formula for writing objectives and practicing it with the trainees.
4) Summarizing knowledge of course objectives.

4. Assignments or Thinking Questions

Analyzing and group discussion of how The four elements of objective and the formula for writing objectives can be applied to aviation security courses.

Teaching Plan

Curriculum Name
Unit 4 The teaching method

Responsible Department
Security Department

Drafting time
June 2023

Unit 4		Name: The teaching method	4 credit hours
Module Course Objectives	**Knowledge objectives**	1. The ability to master common teaching methods used in aviation security courses. 2. The ability to match teaching methods to different content areas.	
	Skill objectives	1. The ability to utilize appropriate teaching methods in different aviation security courses.	
	Attitude objectives	1. The ability to emphasize the application of a variety of teaching methods.	
Teaching methods and approaches	**Teaching method design**	The teaching method is based on interactive teaching and case study teaching, and adopts an action learning model, using facilitation techniques and methods to guide participants to think actively, ask questions, and actively participate in group discussions and team co-creation.	
	Teaching techniques	A combination of teaching methods, such as lectures, questioning, group discussions, case studies, and other action-oriented teaching methods.	
Design for after-school learning	**Assignment**	Looking up teaching methods online in addition to what is taught in class.	
	Reference material	1. Teaching methodology 2. Adult Education Principles and Techniques 3. Corporate Training Course Design and Development	
	Website	https://wenku.baidu.com/tfview https://www.cnki.net/index/ https://www.wanfangdata.com.cn https://www.oalib.com/	

<table>
<tr><td></td><td>After-school activities</td><td colspan="3">Groups to discuss how teaching methods can be applied in an aviation security course.</td></tr>
<tr><td rowspan="4">Evaluation Design</td><td>Knowledge examination points</td><td colspan="3">1. What is the lecture teaching method?
2. What is the presentation teaching method?
3. What is the game teaching method?
4. What is the case teaching method?
5. What is the role playing teaching method?</td></tr>
<tr><td>Skill evaluation points</td><td colspan="3">1. Applying a variety of teaching methods to aviation security courses.</td></tr>
<tr><td rowspan="2">Forms of evaluation</td><td colspan="2">Written examination</td><td>Oral examination</td></tr>
<tr><td colspan="2">√</td><td>√</td></tr>
<tr><td colspan="5">Objectives of the course and distribution of teaching hours</td></tr>
</table>

Course Modules	**Course content**	**Capability point**	**Learning outcomes**	**credit hours**
Module 1 Lecture teaching method	1. Definition of the lecture teaching method. 2. The three key stages of the lecture teaching method.	Mastery of the three key stages of the lecture teaching method.	Knowing the three key stages of the lecture teaching method.	0.5
Module 2 Presentation teaching method	1. Definition of the presentation teaching method. 2. The application scenarios. 3. The main forms	Clarifying the application scenarios of the presentation teaching method.	Mastering the application scenarios of the presentation teaching	1

	and steps.		method.	
Module 3 Game teaching method	1. Definition of the game teaching method. 2. The four keys to game teaching method. 3. The matters needing attention of the game teaching method.	Mastering the four keys to game teaching method.	4. Mastering the four keys to game teaching method and the matters needing attention of the game teaching method.	0.5
Module 4 Case-based teaching method	1. Definition of the case teaching method. 2. Suitable scene. 3. Four special facts. 4. Four elements.	1. Knowing the suitable scene, four special facts and four elements.	Mastering the application scenarios of the case-based teaching methodology and four steps.	1
Module 5 Role playing teaching method	1. What is the role playing teaching method? 2. Role-playing method design key points and matters needing to attention.	1. Knowing the Role-playing method design key points and matters needing to attention.	Mastering the Role-playing method design key points and matters needing to attention.	1
Course content and requirements				

Module 1
Lecture Teaching Method

1. Content Analysis

1.1 Main Contents

Definition of the lecture teaching method. The three key stages of the lecture teaching method.

1.2 Focus Contents

The three key stages of the lecture teaching method.

1.3 Difficult Contents:

The three key stages of the lecture teaching method.

2. Design of Teaching Methods

A combination of teaching methods, lectures, questioning, group discussions and other action-oriented teaching methods.

3. Teaching Process Design

1) Throw out the question, what is the lecture teaching method?
2) Explaining the definition of lecture teaching method.
3) Explaining the three main steps of the lecture teaching method.
4) A summary of the lecture teaching method.

4. Assignments or Thinking Questions

Lecture teaching method application scenarios and course types.

Module 2
Presentation Teaching Method

1. Content Analysis

1.1 Main Contents

Definition of the presentation teaching method. The application scenarios. The main forms and steps.

1.2 Focus Contents

The main forms and steps.

1.3 Difficult Contents:

The main forms and steps.

2. Design of Teaching Methods

A combination of teaching methods, lectures, questioning, group discussions and other action-oriented teaching methods.

3. Teaching Process Design

1) Throw out the question, what is the presentation teaching method.
2) Explaining the definition of the presentation teaching method.
3) Explaining the main steps of the presentation teaching method.
4) Explaining the scenarios and course categories in which the presentation teaching method is applied.
5) Summarizing knowledge of the presentation teaching method.

4. Assignments or Thinking Questions

Groups work together to discuss scenarios and types of courses in which demonstration pedagogy is applied.

Module 3
Game Teaching Method

1. Content Analysis

1.1 Main Contents

Definition of the game teaching method. The four keys to game teaching method. The matters needing attention of the game teaching method.

1.2 Focus Contents

The four keys to game teaching method.

1.3 Difficult Contents

The matters needing attention of the game teaching method.

2. Design of Teaching Methods

A combination of teaching methods, lectures, questioning, group discussions and other action-oriented teaching methods.

3. Teaching Process Design

1) Throw out the question, what is the game teaching method.
2) Explaining the definition of the game teaching method.
3) Explaining the main steps of the game teaching method.

4) Explaining the cautionary notes when applying the game teaching method.
5) Summarizing knowledge of the game teaching method.

4. Assignments or Thinking Questions

Panel discussion: How to the game teaching method in a national aviation security instructor course.

Module 4
Case-based Teaching Method

1. Content Analysis

1.1 Main Contents

Definition of the case-based teaching method. Suitable scene. Four special facts. Four elements.

1.2 Focus Contents

The four special facts of the case-based teaching method and four elements.

1.3 Difficult Contents:

The four special facts of the case-based teaching method.

2. Design of Teaching Methods

A combination of teaching methods, lectures, questioning, group discussions and other action-oriented teaching methods.

3. Teaching Process Design

1) Throw out the question, what is the case-based teaching method.
2) Explaining the definition of the case-based teaching method.
3) Explaining the special facts of the case-based teaching method.
4) Explaining the four elements of the case-based teaching method.
5) Summarizing knowledge of the case-based teaching method.

4. Assignments or Thinking Questions

Panel discussion: How to the case-based teaching method in a national aviation security instructor course.

Module 5
Role Playing Teaching Method

1. Content Analysis

1.1 Main Contents
Definition of the role playing teaching method. Designing key points and matters needing to attention.

1.2 Focus Contents
Designing key points and matters needing to attention.

1.3 Difficult Contents:

Designing key points and matters needing to attention.

2. Design of Teaching Methods
A combination of teaching methods, lectures, questioning, group discussions and other action-oriented teaching methods.

3. Teaching Process Design
1) Throw out the question, what is the role playing teaching method.
2) Explaining the definition of the role playing method.
3) Explaining the designing key points and matters needing to attention of the role playing teaching method.
4) Summarizing knowledge of the role playing teaching method.

4. Assignments or Thinking Questions
Panel discussion: How to the role playing teaching method in a national aviation security instructor course.

Teaching Plan

Curriculum Name

Unit 5 Production the teaching plan of aviation security Curriculum

Responsible Department

Security Department

Drafting time

June 2023

Unit 5		Name: Production the teaching plan of aviation security Curriculum	4 credit hours
Module Course Objectives	Knowledge objectives	1. The ability to know the important components of a teaching plan. 2. The ability to know the functions of the components of a teaching plan and how they relate to the objectives of the course.	
	Skill objectives	1. The ability to know how teaching plans are written. 2. The ability to produce an aviation security course lesson plan using the teaching plan writing approach.	
	Attitude objectives	1. Be an aware of the functions of the components of a teaching plan and how they relate to the objectives of the course.	
Teaching methods and approaches	Teaching method design	The teaching method is based on interactive teaching and case study teaching, and adopts an action learning model, using facilitation techniques and methods to guide participants to think actively, ask questions, and actively participate in group discussions and team co-creation.	
	Teaching techniques	A combination of teaching methods, such as lectures, questioning, group discussions, case studies, and other action-oriented teaching methods.	
Design for after-school learning	Assignment	What are the common forms used to find information lesson plans online.	
	Reference material	1. Great Lesson Plans and Wonderful Classes 2. Teaching plan development	

<table>
<tr><td rowspan="2"></td><td>Website</td><td colspan="3">https://wenku.baidu.com/tfview
https://www.cnki.net/index/
https://www.wanfangdata.com.cn
https://www.oalib.com/</td></tr>
<tr><td>After-school activities</td><td colspan="3">Groups to discuss how teaching plan writing methods can be applied in an aviation security course.</td></tr>
<tr><td rowspan="4">Evaluation Design</td><td>Knowledge examination points</td><td colspan="3">1. The components of a teaching plan.
2. The functions of the components of a teaching plan.
3. Teaching plans writing method.</td></tr>
<tr><td>Skill evaluation points</td><td colspan="3">1. How teaching plans are written.
2. Produce an aviation security course lesson plan using the teaching plan writing approach.</td></tr>
<tr><td rowspan="2">Forms of evaluation</td><td>Written examination</td><td colspan="2">Oral examination</td></tr>
<tr><td>√</td><td colspan="2">√</td></tr>
<tr><td colspan="5">Objectives of the course and distribution of teaching hours</td></tr>
<tr><td>Course Modules</td><td>Course content</td><td>Capability point</td><td>Learning outcomes</td><td>credit hours</td></tr>
<tr><td>Module 1 What is the teaching plan</td><td>1. Definition of the lecture teaching method.
2. The three key stages of the lecture teaching method.</td><td>Mastering the functions of the components of a teaching plan and how they relate to the objectives of the course.</td><td>Knowing the functions of the components of a teaching plan and how they relate to the objectives of the course.</td><td>1</td></tr>
<tr><td>Module 2 The</td><td>Course title , course objectives,</td><td>Clarifying the application scenarios</td><td>Mastering the application</td><td>2</td></tr>
</table>

components of a teaching plan	course structure chart, teaching methods, specific course content, etc. (Seeing the sample teaching plan for details)	of the presentation teaching method.	scenarios of the presentation teaching method.	
Module 3 Training in the production of teaching plan	1. Each trainee will choose an aviation security course topic of their own choice and produce a 10-minute teaching plan.	Mastering the three key stages and the components of a teaching plan.	Mastering the three key stages and the components of a teaching plan.	3

Course content and requirements

Module 1
What is the Teaching Plan

1. Content Analysis

1.1 Main Contents

Definition of the teaching plan. The function of teaching plans. Main forms of teaching plans.

1.2 Focus Contents

The function of teaching plans.

1.3 Difficult Contents:

The function of teaching plans.

2. Design of Teaching Methods

A combination of teaching methods, lectures, questioning, group discussions and other action-oriented teaching methods.

3. Teaching Process Design
1) Throw out the question, what is the teaching method?
2) Explaining the definition of the teaching method.
3) Explaining the the purpose of teaching plan.
4) A summary of the teaching method.

4. Assignments or Thinking Questions
How to write a teaching plan for an aviation security course?

Module 2
Components of a Teaching Plan

1. Content Analysis

1.1 Main Contents
What are the main elements included in a teaching plan? Styles of teaching plans. Approach to teaching lesson plans for aviation security courses based on sample teaching lesson.

1.2 Focus Contents
Approach to teaching lesson plans for aviation security courses based on sample teaching lesson.

1.3 Difficult Contents:

Approach to teaching lesson plans for aviation security courses based on sample teaching lesson.

2. Design of Teaching Methods
A combination of teaching methods, lectures, questioning, group discussions and other action-oriented teaching methods.

3. Teaching Process Design
1) Throw out the question, what elements should be included in a teaching plan.
2) Explaining what elements should be included in a teaching plan.
3) Giving sample teaching plans.
4) Explaining how to fill out a teaching plan for an aviation security course based the sample teaching plans.
5) Summarizing knowledge of the teaching plan.

4. Assignments or Thinking Questions
Groups work together to discuss how to write a teaching plan for an aviation security course.

Module 3

Training in the Production of Teaching Plan

1. Content Analysis

1.1 Main Contents

Each trainee will choose an aviation security course topic of their own choice and produce a 10-minute teaching plan.

1.2 Focus Contents

Applying the three key stages and the components of the teaching plan for the aviation security course.

1.3 Difficult Contents:

Applying the three key stages and the components of the teaching plan for the aviation security course.

2. Design of Teaching Methods

A combination of teaching methods, lectures, questioning, group discussions and other action-oriented teaching methods.

3. Teaching Process Design

Organizing the trainees to choose an aviation security course topic and produce a 10-minute teaching plan.

4. Assignments or Thinking Questions

How to produce aviation security teaching plan.

Example Course Teaching Plan

Course Teaching Plan

Ⅰ. General Overview of the Course

Name of course title	****		
Teacher	****	**Credit hour**	****
Course objects	****	**Course type**	Initial training or retraining
Course purpose	****		
Course objectives	**Through this one-hour study, the students will achieve the following gains:** **1. Knowledge category:** **2. Skill category:** **3. Attitude category:** (All of the above three course objectives must not be filled out, just fill in the category objectives involved in the course)		
Course structure	(Draw the three-level course structure diagram including the course title, and refer to the course structure sample given in the class courseware)		
Courses content	(Description the main content of the course, mainly the course catalogue)		
Key teaching points	(Describe the key parts of the course content.)		
Teaching preparation	(Describe the equipment and tools used for teaching)		

Ⅱ. Specific Presentation of the Main Elements of the Course

primary coverage	Credit hour	Teaching main contents key points	Teaching method	matters need attention
Introduce oneself	* minute	Hello, everyone. I'm the teacher of today. My name is ***	Method of lecture	
Warm-up activities (optional)	* minute	Guide all the staff to participate in the "* * *" small game		Related to the course content
Course administrative matters	* minute	Classroom discipline requirements, * * * training theme introduction		
Course objectives	* minute	The objectives of this course are to:		
Unit 1 ***	* minute	This training directory is listed below:		
Model 1 ***	* minute	(Describe the main content of this section.)		
1.***	* minute	(Describe the main content of this section.)		
2.***	* minute	(Describe the main content of this section.)		
……	* minute	(Describe the main content of this section.)		
Model 2 ***	* minute	(Describe the main content of this section.)		
1.***	* minute	(Describe the main content of this section.)		
2.***	* minute	(Describe the main content of this section.)		
……	* minute	(Describe the main content of this section.)		

Unit 2 ***	* minute	(Describe the main content of this section.)		
Model 1 ***	* minute	(Describe the main content of this section.)		
1.* **	* minute	(Describe the main content of this section.)		
2.* **	* minute	(Describe the main content of this section.)		
……	* minute	(Describe the main content of this section.)		
Model 2 ***				
1.* **	* minute	(Describe the main content of this section.)		
2.* **	* minute	(Describe the main content of this section.)		
……	* minute	(Describe the main content of this section.)		
Unit 3 ***				
……	* minute	(Describe the main content of this section.)		
Course review and summary	* minute	Lead the students to review today's highlights...	Method of lecture	

Teaching Plan

Curriculum Name

Unit 6 Production the courseware of aviation security Curriculum

Responsible Department

Security Department

Drafting time

June 2023

Unit 6		Name: Production the courseware of aviation security Curriculum	4 credit hours
Module Course Objectives	**Knowledge objectives**	1. The ability to master common teaching methods used in aviation security courses. 2. The ability to match teaching methods to different content areas.	
	Skill objectives	1. The ability to utilize appropriate teaching methods in different aviation security courses.	
	Attitude objectives	1. The ability to emphasize the application of a variety of teaching methods.	
Teaching methods and approaches	**Teaching method design**	The teaching method is based on interactive teaching and case study teaching, and adopts an action learning model, using facilitation techniques and methods to guide participants to think actively, ask questions, and actively participate in group discussions and team co-creation.	
	Teaching techniques	A combination of teaching methods, such as lectures, questioning, group discussions, case studies, and other action-oriented teaching methods.	
Design for after-school learning	**Assignment**	Looking up teaching methods online in addition to what is taught in class.	
	Reference material	1. Teaching methodology 2. Great Teaching Software for the Classroom	
	Website	https://wenku.baidu.com/tfview https://www.cnki.net/index/ https://www.wanfangdata.com.cn https://www.oalib.com/	

<table>
<tr><td></td><td>After-school activities</td><td colspan="3">Groups to discuss how teaching methods can be applied in an aviation security course.</td></tr>
<tr><td rowspan="4">Evaluation Design</td><td>Knowledge examination points</td><td colspan="3">1. What is the lecture teaching method?
2. What is the presentation teaching method?
3. What is the game teaching method?
4. What is the case teaching method?
5. What is the role playing teaching method?</td></tr>
<tr><td>Skill evaluation points</td><td colspan="3">1. Applying a variety of teaching methods to aviation security courses.</td></tr>
<tr><td rowspan="2">Forms of evaluation</td><td colspan="2">Written examination</td><td>Oral examination</td></tr>
<tr><td colspan="2">√</td><td>√</td></tr>
<tr><td colspan="5">Objectives of the course and distribution of teaching hours</td></tr>
<tr><td>Course Modules</td><td>Course content</td><td>Capability point</td><td>Learning outcomes</td><td>credit hours</td></tr>
<tr><td>Module 1 Requirements for the production of courseware</td><td>1. Arrangement of text, images and video in the production of courseware.
2. Requirements for fonts, font sizes, number of words, line spacing, and margins when producing courseware.</td><td>Mastery of the requirements for the production of courseware.</td><td>Knowing the requirements for the production of courseware.</td><td>1</td></tr>
</table>

Module 2 Principles for producing courseware	1. Lining up in correct order. 2. Repetition same elements. 3. Categorization. 4. Emphasizing by contrast.	Clarifying the principles for producing courseware.	Mastering the principles for producing courseware.	1
Module 3 Training in the production of courseware	1. Each trainee will choose an aviation security course topic of their own choice and produce a 10-minute courseware based on the principles against the 10-minute teaching plan the produced earlier.	Mastering the principles and methods for producing aviation security courseware.	Mastering the principles and methods for producing aviation security courseware.	2

Course content and requirements

Module 1
Requirements for the Production of Courseware

1. Content Analysis

1.1 Main Contents

Arrangement of text, images and video in the production of courseware.

Requirements for fonts, font sizes, number of words, line spacing, and margins when producing courseware.

1.2 Focus Contents

Arrangement of text, images and video in the production of courseware.

1.3 Difficult Contents:

Requirements for fonts, font sizes, number of words, line spacing, and margins when producing courseware.

2. Design of Teaching Methods
A combination of teaching methods, lectures, questioning, group discussions and other action-oriented teaching methods.

3. Teaching Process Design

1) Throw out the question, what is the requirements for the production of courseware?
2) Explaining the the requirements for the production of courseware.
3) Emphasizing the requirements for the layout and other aspects of producing courseware.
4) A summary of the requirements for the production of courseware.

4. Assignments or Thinking Questions
Panel discussion on how to produce aviation security courseware.

Module 2

Principles for Producing Courseware

1. Content Analysis

1.1 Main Contents
Lining up in correct order; Repetition same elements; Categorization ; Emphasizing by contrast.

1.2 Focus Contents
Repetition same elements; Categorization ; Emphasizing by contrast.

1.3 Difficult Contents:

Repetition same elements.

2. Design of Teaching Methods
A combination of teaching methods, lectures, questioning, group discussions and other action-oriented teaching methods.

3. Teaching Process Design
1) Throw out the question, what is the principles for producing courseware.
2) Explaining the principles for producing courseware.
3) Explaining how these principles can be applied when producing courseware for aviation security courses;
4) Summarizing knowledge of the requirements and the principles producing courseware.

4. Assignments or Thinking Questions
How to produce aviation security courseware?

Module 3

Training in the Production of Courseware

1. Content Analysis

1.1 Main Contents
Each trainee will choose an aviation security course topic of their own choice and produce a 10-minute courseware based on the principles against the 10-minute teaching plan the produced earlier.

1.2 Focus Contents
Applying the principles of courseware production in the process of producing courseware for the aviation security course.

1.3 Difficult Contents:

Applying the principles of courseware production in the process of producing courseware for the aviation security course.

2. Design of Teaching Methods
A combination of teaching methods, lectures, questioning, group discussions and other action-oriented teaching methods.

3. Teaching Process Design
Organizing the trainees to produce a 10-minute aviation security courseware based on a previously produced teaching plan, applying the principles of production courseware.

4. Assignments or Thinking Questions
How to produce aviation security courseware, what were the difficulties encountered in the production courseware.

Unit 7		Name: Teaching abilities and skills	5 credit hours
Module Course Objectives	**Knowledge objectives**	1. The ability to knowing the competencies expected of the instructor.	
	Skill objectives	1. The ability to apply a variety of competencies to the delivery of aviation security courses.	
	Attitude objectives	2. The ability to emphasize the competencies of delivery.	
Teaching methods and approaches	**Teaching method design**	The teaching method is based on interactive teaching and case study teaching, and adopts an action learning model, using facilitation techniques and methods to guide participants to think actively, ask questions, and actively participate in group discussions and team co-creation.	
	Teaching techniques	A combination of teaching methods, such as lectures, questioning, group discussions, case studies, and other action-oriented teaching methods.	
Design for after-school learning	**Assignment**	A discussion of the use of instructional competencies in aviation security training.	
	Reference material	1. Teaching methodology 2. How to teach brilliantly	
	Website	https://wenku.baidu.com/tfview https://www.cnki.net/index/ https://www.wanfangdata.com.cn https://www.oalib.com/	
	After-school activities	Groups discussion of the use of instructional competencies in aviation security training.	

Evaluation Design	**Knowledge examination points**	The competencies expected of the instructor.			
	Skill evaluation points	The ability to use competencies and techniques of instruction in teaching aviation.			
	Forms of evaluation	Written examination		Oral examination	
		√		√	
Objectives of the course and distribution of teaching hours					
Course Modules	**Course content**	**Capability point**	**Learning outcomes**	**credit hours**	
Module 1 Competencies expected of the instructor	1. Eight competencies for aviation security instructors.	Knowing the eight competencies for aviation security instructors.	Knowing eight competencies for aviation security instructors.	1	
Module 2 A few key competencies	1. Basic teaching skills. 2. Classroom management.	Clarifying the key competencies.	Mastering key competencies.	1	
Module 3 Delivery competency training	1. Delivery competency training on a topic of one's choice in a group.	The ability to apply lecture competencies to the aviation security course.	Mastering the competencies in the aviation security course.	3	
Course content and requirements					

Module 1

Competencies Expected of the Instructor

1. Content Analysis

1.1 Main Contents

Eight competencies for aviation security instructors: Articulation; Ability of thinking; Training technology; Classroom management; Level of expertise; Learning ability; Professional capacity; Communication & Coordination.

1.2 Focus Contents

Articulation; Training technology; Classroom management.

1.3 Difficult contents:

Classroom management.

2. Design of Teaching Methods

A combination of teaching methods, lectures, questioning, group discussions and other action-oriented teaching methods.

3. Teaching Process Design

1) Throw out the question, what is the competencies expected of the instructor?
2) Explaining the competencies expected of the instructor.
3) Emphasizing the importance of the competencies expected of the instructor.
4) A summary of the competencies expected of the instructor.

4. Assignments or Thinking Questions

Think about what the instructor's competencies are in addition to what is taught in class.

Module 2

A Few Key Competencies

1. Content Analysis

1.1 Main Contents

Basic teaching skills; Classroom management.

1.2 Focus contents

Classroom management.

1.3 Difficult contents:

Classroom management.

2. Design of teaching methods

A combination of teaching methods, lectures, questioning, group discussions and other action-oriented teaching methods.

3. Teaching process design

1) Throw out the question, what are the key competencies.
2) Explaining the the key competencies of delivering national security courses.
3) Explaining the basic teaching skills.
4) Explaining the classroom management.
5) Summarizing knowledge of the key competencies.

4. Assignments or thinking questions

Think about what the instructor's competencies are in addition to what is taught in class.

Module 3

Delivery competency training

1. Content analysis

1.1 Main contents

Delivery competency training on a topic of one's choice in a group.

1.2 Focus contents

Application of competencies in the delivery of aviation security courses.

1.3 Difficult contents:

Application of competencies in the delivery of aviation security courses.

2. Design of teaching methods

A combination of teaching methods, lectures, questioning, group discussions and other action-oriented teaching methods.

3. Teaching process design

Organizing trainees to train in small groups to deliver lectures based on previously done courseware.

4. Assignments or thinking questions

Panel discussion on how to deliver a good aviation security course.

Unit 8		Name: Curriculum evaluation and summarizing	8 credit hours
Module Course Objectives	**Knowledge objectives**	1. For the evaluate the theory covered in the course.	
	Skill objectives	1. Evaluating the ability to do teaching plans and courseware for aviation security courses. 2. Evaluating the delivery competencies to teach the aviation security course.	
	Attitude objectives	1. Evaluating understanding of instructor roles, responsibilities, and attitudes toward teaching as a national aviation security instructor.	
Teaching methods and approaches	**Teaching method design**	The teaching method is based on interactive teaching and case study teaching, and adopts an action learning model, using facilitation techniques and methods to guide participants to think actively, ask questions, and actively participate in group discussions and team co-creation.	
	Teaching techniques	A combination of teaching methods, such as lectures, questioning, group discussions, case studies, and other action-oriented teaching methods.	
Design for after-school learning	**Assignment**	How to make good teaching plans, courseware and deliver an aviation security course.	
	Reference material	1. How to be a good teacher 2. How to organize training 3. Teaching methodology 4. How to teach brilliantly	
	Website	https://wenku.baidu.com/tfview https://www.cnki.net/index/	

		https://www.wanfangdata.com.cn https://www.oalib.com/	
	After-school activities	Groups discussion of making good teaching plans, courseware and deliver an aviation security course.	
Evaluation Design	**Knowledge examination points**	1. The theory covered in the course.	
	Skill evaluation points	1. The ability to do teaching plans and courseware for aviation security courses; 2. The delivery competencies to teach the aviation security course.	
	Forms of evaluation	Written examination	Oral examination
		√	√

Objectives of the course and distribution of teaching hours

Course Modules	Course content	Capability point	Learning outcomes	credit hours
Module 1 Evaluation as aviation security instructors	1. National Aviation Security Instructors Curriculum Theory Examination. 2. National Aviation Security Instructors Curriculum Practical Examination. 3. National Aviation Security	The ability to pass the National Aviation Security Instructor Theory, Skills and Attitude examinations.	Enable mastering of national aviation security instructor theories, skills and attitudes.	7

	Instructors Attitude Questionnaire.			
Module 2 Curriculum summarizing	An overall review and summary of the course contents.	The ability to pass the National Aviation Security Instructor Theory, Skills and Attitude examinations.	Enable mastering of national aviation security instructor theories, skills and attitudes.	1
Course content and requirements				

Module 1
Competencies Expected of the Instructor

1. Content Analysis

1.1 Main Contents
National Aviation Security Instructors Curriculum Theory Examination; National Aviation Security Instructors Curriculum Practical Examination; National Aviation Security Instructors Attitude Questionnaire.

1.2 Focus Contents
Theory Examination; Practical Examination; Attitude Questionnaire.

1.3 Difficult Contents

Practical Examination.

2. Design of Teaching Methods
A combination of teaching methods, lectures, questioning, group discussions and other action-oriented teaching methods.

3. Teaching Process Design
1) Students are first given a theory test, which lasts 0.5 hours.
2) Evaluation of delivery skills based on courseware produced by trainees.
3) Final evaluation of the trainee's attitudinal aspects as a national aviation security

instructor.

4. Assignments or Thinking Questions
Summarizing one's strengths and weaknesses in the categories of knowledge, skills and attitudes through the assessment.

Module 2

Curriculum Summarizing

1. Content Analysis

1.1 Main Contents
An overall review and summary of the course contents, summarizing the knowledge, skills and attitudes that aviation security instructors should have and master.

1.2 Focus Contents
The knowledge, skills and attitudes that aviation security instructors should have and master.

1.3 Difficult Contents:

The knowledge, skills and attitudes that aviation security instructors should have and master.

2. Design of Teaching Methods
A combination of teaching methods, lectures, questioning, group discussions and other action-oriented teaching methods.

3. Teaching Process Design
1) Reviewing and summarizing the problems in the knowledge aspect in response to the results of the evaluation.
2) Reviewing and summarizing the problems in the skill aspect in response to the results of the evaluation.
3) Reviewing and summarizing the problems in the attitude aspect in response to the results of the evaluation.

4. Assignments or Thinking Questions
Think about what the instructor's competencies are in addition to what is taught in class.

APPENDIX J

THE TEACHING MATERIALS FOR NATIONAL AVIATION SECURITY INSTRUCTOR

The Teaching Meterial For
National Aviation Security
Instructor

Unit 1
The role and responsibility
of the national aviation
security instructor

one

The role of the
national aviation
security instructor

Discussing:

How do you understand the role of the national aviation security instructor ?

The concept of "Teacher" :

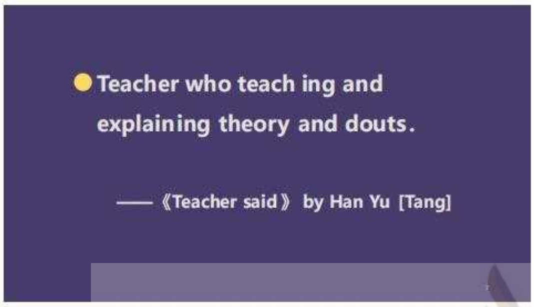
In all levels of all kinds of schools, to educate and cultivate students' professional knowledge and life as the responsibility of professional workers [1].

[1]https://baike.baidu.com/item/%e8%80%81%e5%b8%88/5533

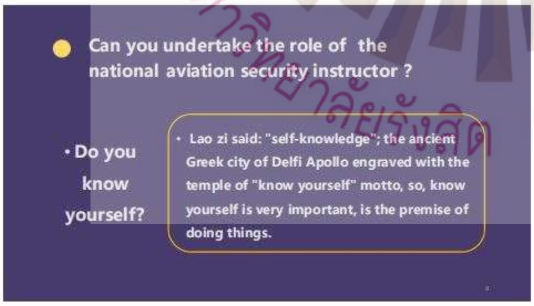
Teacher

Refers to the teacher is a broad name, generally refers to the education of others for the occupation of a class of people called. A teacher refers to a school teacher who teaches as his profession, and a teacher who imparts the craft as his profession is sometimes called a teacher [1].

[1]https://baike.baidu.com/item/%E6%95%99%E5%91%98/1355750?from Module=lemma-qiyi_sense-lemma


Teacher who teach ing and
explaining theory and douts.
——《Teacher said》 by Han Yu [Tang]

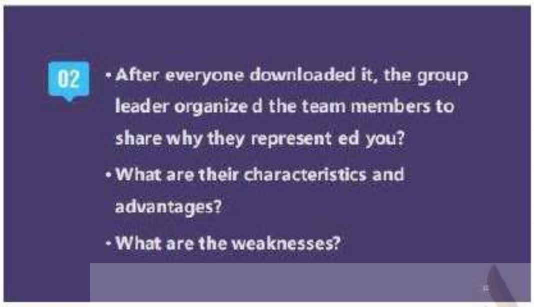

The role of the aviation
security instructor
Teaching and solving doubts in the
field of aviation security


Can you undertake the role of the
national aviation security instructor ?
• Do you
know
yourself?
• Lao zi said: "self-knowledge"; the ancient
Greek city of Delfi Apollo engraved with the
temple of "know yourself" motto, so, know
yourself is very important, is the premise of
doing things.

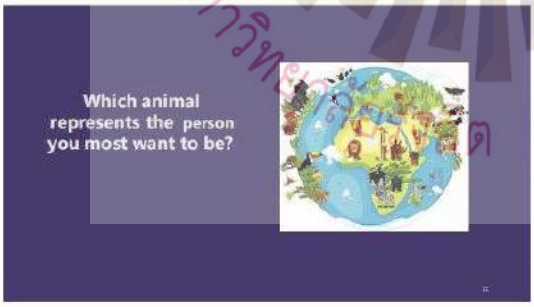

"Forest treasure hunt ing"
Find ing the qualities for the role of the national aviation security instructor


01
• In the forest, based on the national security instructor, which animal do you think best represents you now? Go to find it and download the picture.


Which animal best represents you right now?


02
• After everyone downloaded it, the group leader organize d the team members to share why they represent ed you?
• What are their characteristics and advantages?
• What are the weaknesses?


03
• In the forest, based on the status of security instructor, which animal do you most want to be? Go to find it and download the picture.


Which animal represents the person you most want to be?

04

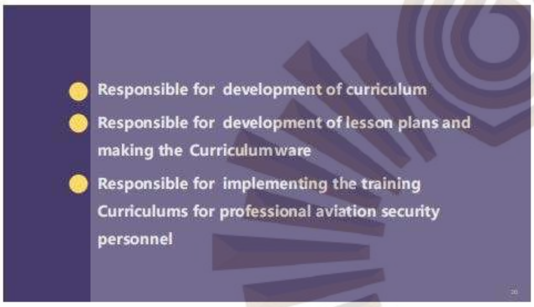
- After everyone downloaded it, the group leader organize d the group members to share why them were?
- What are their characteristics and advantages?
- What can you make up for you now?

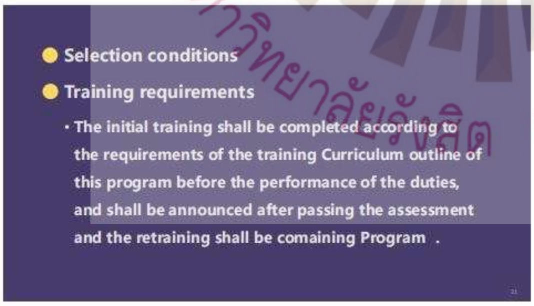
05

- If you use three words to describe the three great qualities you want most, which words are the most likely words?

- Please write it down on the note paper with a crayon .
- Hand it down to the group leader to paste the description of these excellent qualities on the whiteboard.


two
Responsibilities of the
national aviation
security instructor


Responsible for development of curriculum
Responsible for development of lesson plans and making the Curriculumware
Responsible for implementing the training Curriculums for professional aviation security personnel


Selection conditions
Training requirements
• The initial training shall be completed according to the requirements of the training Curriculum outline of this program before the performance of the duties, and shall be announced after passing the assessment and the retraining shall be comaining Program .

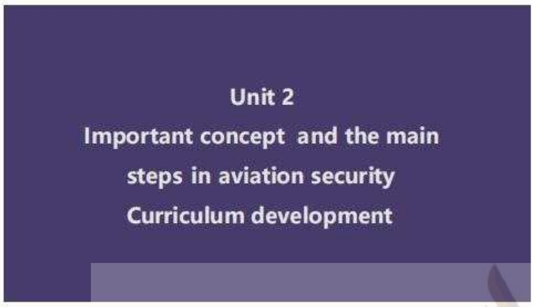
- Regulations to stop teaching activities
  - (1) Being subjected to criminal punishment for committing a crime;
  - (2) Violating professional ethics and having a bad influence.

- Regulations to stop teaching activities

  (3) Failing to complete the retraining on time;

  (4) Other circumstances that need to stop.

- Training object: aviation security personnel
  - Aviation security personnel refer to the employees responsible for aviation security responsibilities .


Unit 2
Important concept and the main
steps in aviation security
Curriculum development


one
Important concept
in aviation security
Curriculum
development


01
Concept
OBE Concept

- OBE is "results-oriented education" also known as results-based education (outcomes based education) english abbreviation, using the expected learning results to reverse set educational goals and adjust educational content and methods [1].

[1] Ma Jia, Wang Hongyan. Review of literature on achievement-oriented education (OBE) [J]. Theoretical Research and Practice of Innovation and Entrepreneurship, 2019,2 (16): 88-89.

- The OBE concept was proposed by Spady et al. in 1981 and it has become the mainstream educational concept of education reform in the United States, the United Kingdom, Canada and other countries [2].

[2] Li Zhiyi (2014). Analyze the achievement-oriented concept of engineering education professional certification. Chinese Higher Education, 17 (7), 10.

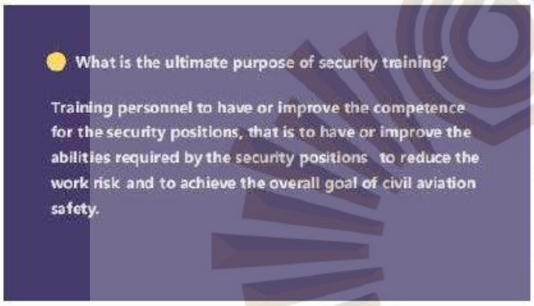
- Three core principles of the OBE concept

1) Results-oriented

2) Learner-centered

3) Continuous improvement


1) Results-oriented
For security training, "Results" >>> ?


What is the ultimate purpose of security training?
Training personnel to have or improve the competence for the security positions, that is to have or improve the abilities required by the security positions to reduce the work risk and to achieve the overall goal of civil aviation safety.


According to laws and regulations and airport and company documents
For security training "Results"
Capability required for the trainee security position
To design the content of the training
Knowledge
Skill
Attitude

2) Learner-centered

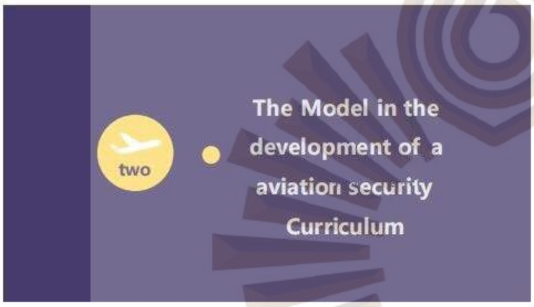
What should be trained by the learners
what the learner lack, what the training fill ig

Capabilities required for the security positions
- knowledge
- Skill
- Attitude

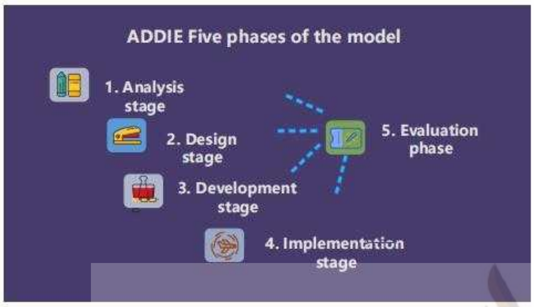
- The teaching methods used in the training should be based on the situation of the students, such as age, educational background, work experience, knowledge reserve and other......
- The language used in the lecture should be in line with the students' situation, such as age, educational background, work experience, knowledge reserve and other......

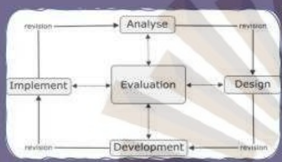
Analyze the personnel characteristics of each training Curriculum, such as educational background, working background, age, working years, current knowledge and skills reserves ......


3) Continuous improvement
Update
Continuous
improvment


two
The Model in the
development of a
aviation security
Curriculum


An important
model for
aviation security
Curriculum
design and
development
ADDIE





ADDIE model [1]

[1] Bamrara, A., & Chauhan, P.(2018).Applying ADDIE model to evaluate faculty development programs.International Journal of Smart Education and Urban Society (IJSEUS), 9(2), 25-38.

Unit 3

The important steps in the aviation security Curriculum design

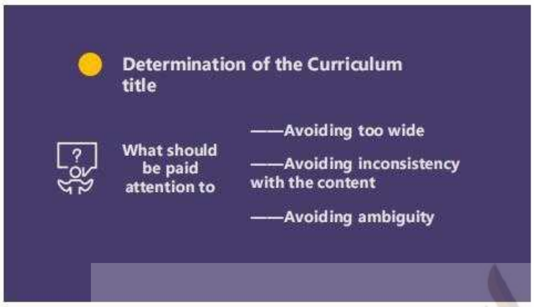
1. Determination of the Curriculum title
2. Preparation of the Curriculum objectives
3. The construction of the Curriculum structure
4. Filling of Curriculum content

1
Curriculum
Title

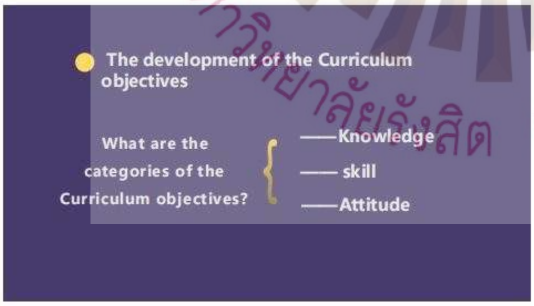
Determination of the Curriculum title

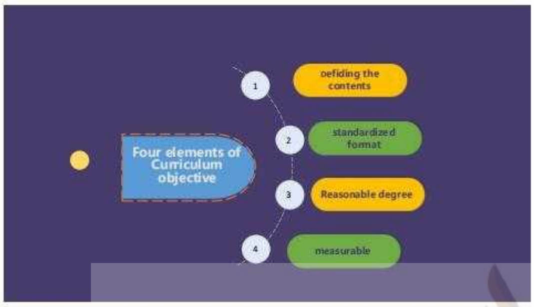
What is the Curriculum title for

——Is the high overview of the main content of the Curriculum

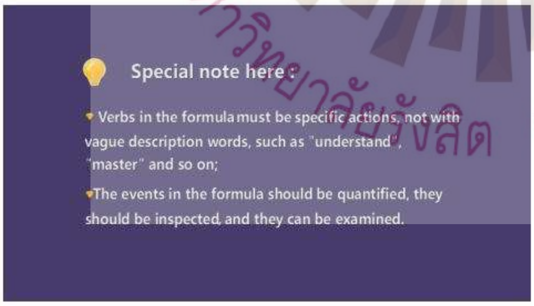

Determination of the Curriculum title
What should be paid attention to
Avoiding too wide
Avoiding inconsistency with the content
Avoiding ambiguity

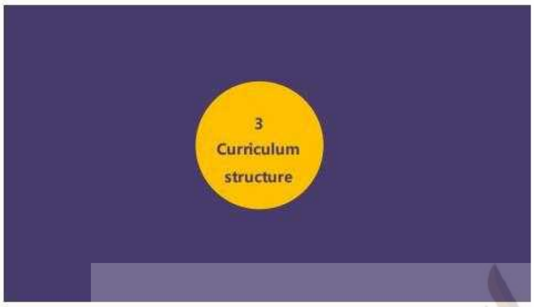

2
Curriculum
Objective

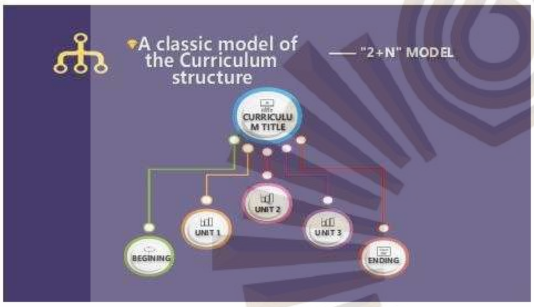

The development of the Curriculum objectives
What are the categories of the Curriculum objectives?
Knowledge
skill
Attitude

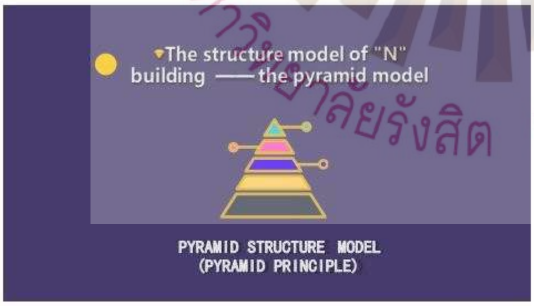

Four elements of Curriculum objective
1
oefiding the contents
2
standardized format
3
Reasonable degree
4
measurable

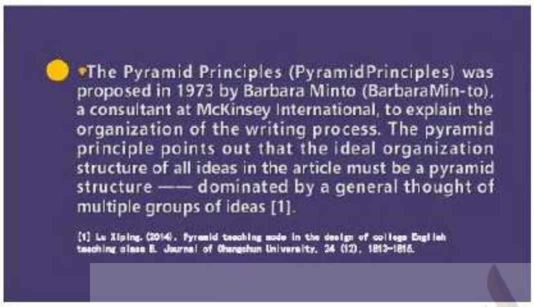

How to write a clear Curriculum goal
—— Target writing formula
condition
target
move ment
event
N


Special note here :
Verbs in the formula must be specific actions, not with vague description words, such as "understand", "master" and so on;
The events in the formula should be quantified, they should be inspected, and they can be examined.

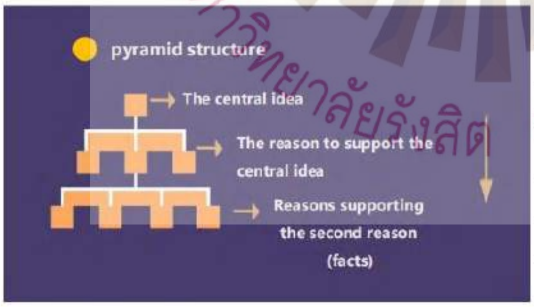

3
Curriculum
structure

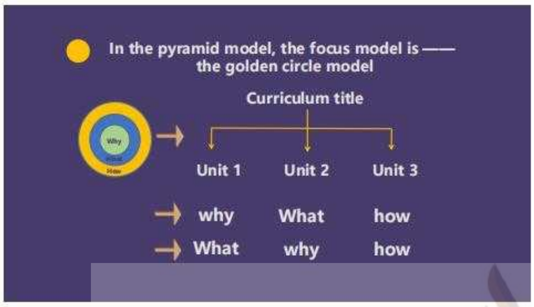

A classic model of the Curriculum structure
—— "2+N" MODEL
CURRICULUM TITLE
UNIT 1
UNIT 2
UNIT 3
BEGINING
ENDING


The structure model of "N" building —— the pyramid model
PYRAMID STRUCTURE MODEL
(PYRAMID PRINCIPLE)

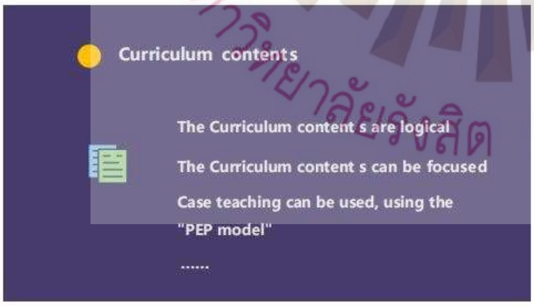

The Pyramid Principles (PyramidPrinciples) was proposed in 1973 by Barbara Minto (BarbaraMin-to), a consultant at McKinsey International, to explain the organization of the writing process. The pyramid principle points out that the ideal organization structure of all ideas in the article must be a pyramid structure —— dominated by a general thought of multiple groups of ideas [1].
[1] Lu Xiping. (2014). Pyramid teaching mode in the design of college English teaching class B. Journal of Changchun University, 24 (12), 1813-1816.

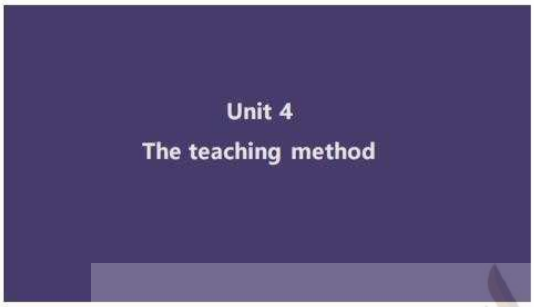

The Pyramid Principle (PyramidPrinciples)
The central idea is clear and the conclusion comeing first
Under the above system, classification and grouping, logical progression
First important after secondary, first global before detail
Conclusion before cause, result before process [1]
[1] Xie Yuxiong. (2019). Pyramid principle. China Economic Press.


pyramid structure
The central idea
The reason to support the central idea
Reasons supporting the second reason (facts)


In the pyramid model, the focus model is ——
the golden circle model
Curriculum title
Unit 1
Unit 2
Unit 3
why
What
how
What
why
how

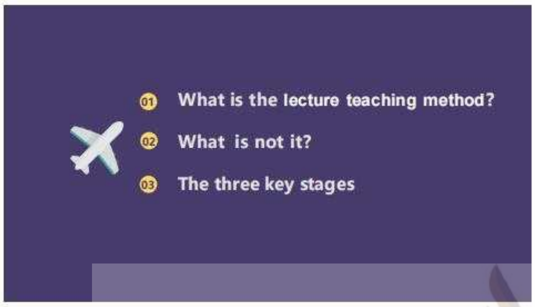

4
Curriculum
contents

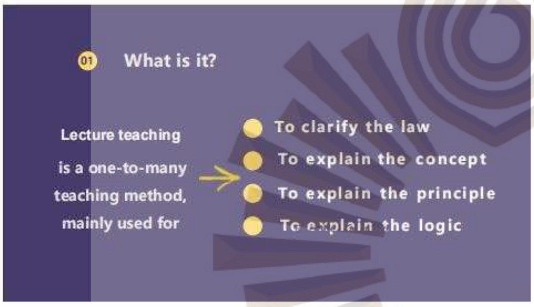

Curriculum contents
The Curriculum content s are logical
The Curriculum content s can be focused
Case teaching can be used, using the
"PEP model"
……

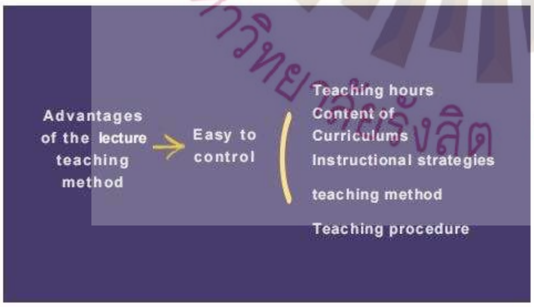

Unit 4
The teaching method

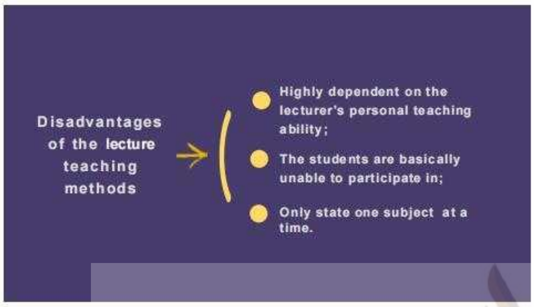

5
1. Lecture
2. Presentation teaching method
3. Game teaching method
4. Case-based teaching method
5. Role playing teaching method

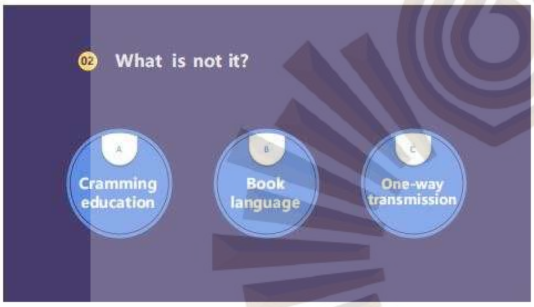

one
1. Lecture
teaching method

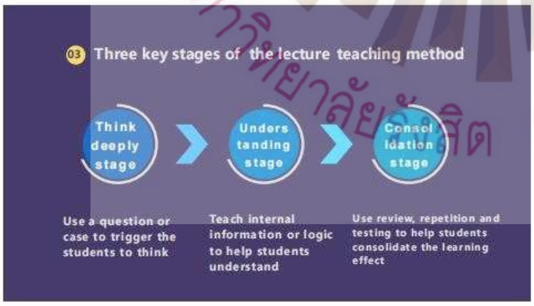

01 What is the lecture teaching method?
02 What is not it?
03 The three key stages

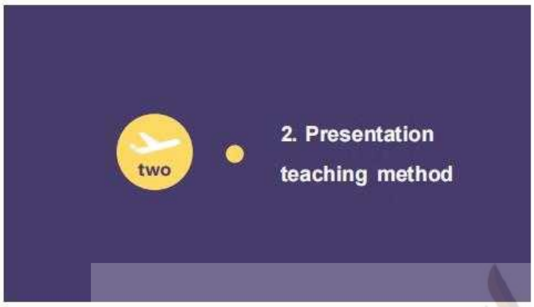

01 What is it?
Lecture teaching is a one-to-many teaching method, mainly used for
To clarify the law
To explain the concept
To explain the principle
To explain the logic

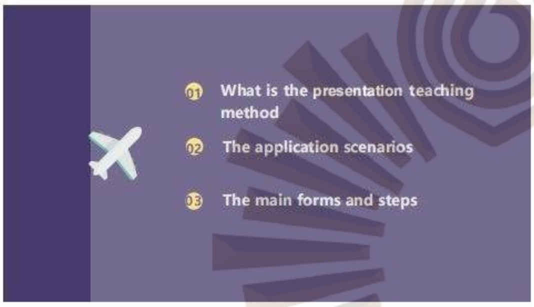

Advantages of the lecture teaching method
Easy to control
Teaching hours
Content of Curriculums
Instructional strategies
teaching method
Teaching procedure

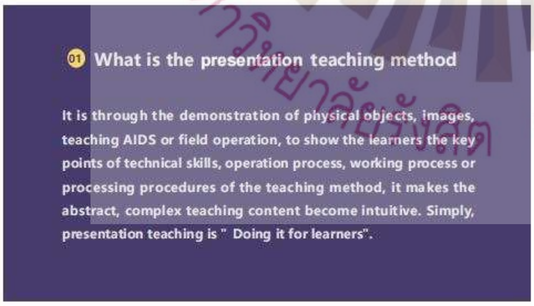

Disadvantages of the lecture teaching methods
Highly dependent on the lecturer's personal teaching ability;
The students are basically unable to participate in;
Only state one subject at a time.


02 What is not it?
Cramming education
Book language
One-way transmission

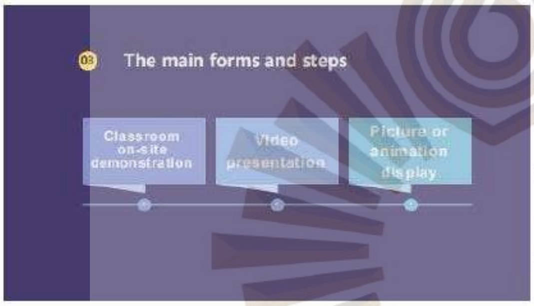

03 Three key stages of the lecture teaching method
Think deeply stage
Understanding stage
Consolidation stage
Use a question or case to trigger the students to think
Teach internal information or logic to help students understand
Use review, repetition and testing to help students consolidate the learning effect


two
2. Presentation
teaching method


01 What is the presentation teaching method
02 The application scenarios
03 The main forms and steps

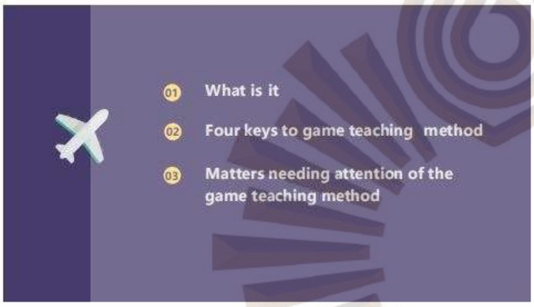

01 What is the presentation teaching method
It is through the demonstration of physical objects, images, teaching AIDS or field operation, to show the learners the key points of technical skills, operation process, working process or processing procedures of the teaching method, it makes the abstract, complex teaching content become intuitive. Simply, presentation teaching is " Doing it for learners".

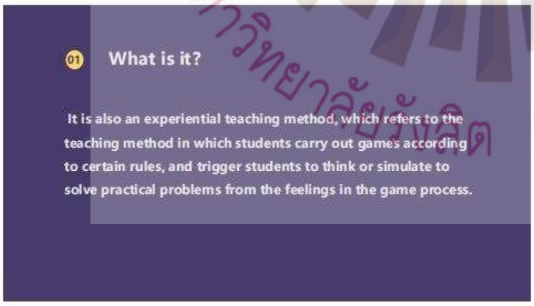

02
The application scenario
Motor skill
Direct action:
Standardized
operation
Mental skill
Cognitive activity:
Mind and experience that
control the mind
Skills such as mental
arithmetic, writing,
observation, and analysis


03
The main forms and steps
Classroom
on-site
demonstration
Video
presentation
Picture or
animation
display


03
The main steps
Doing it to
the learner
The
learner
doing it

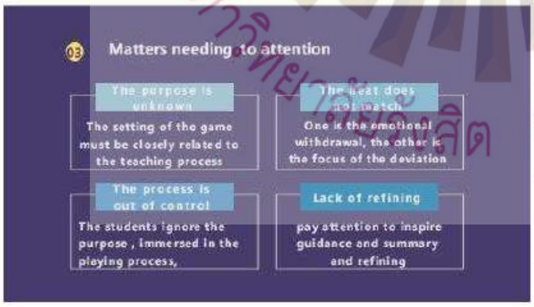

three
Game teaching
method

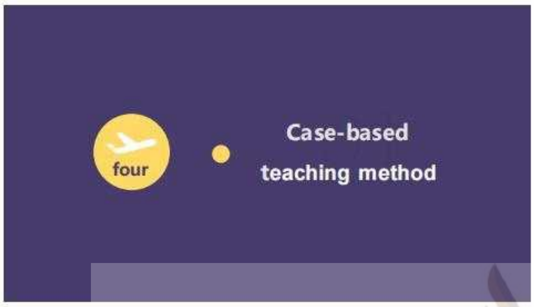

01 What is it
02 Four keys to game teaching method
03 Matters needing attention of the game teaching method

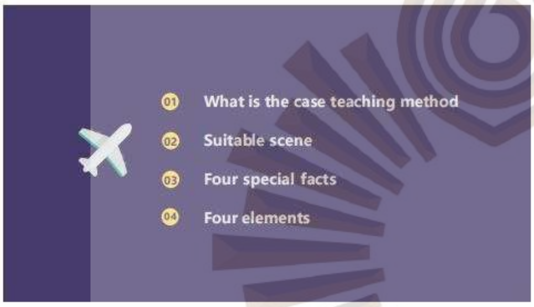

01 What is it?
It is also an experiential teaching method, which refers to the teaching method in which students carry out games according to certain rules, and trigger students to think or simulate to solve practical problems from the feelings in the game process.

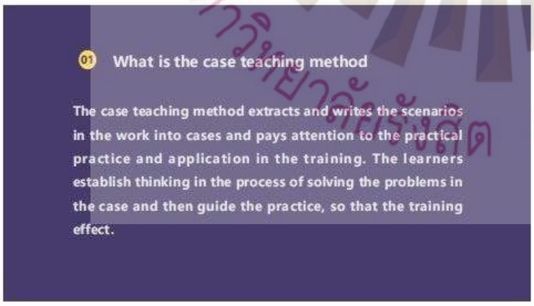

01
What is it?
Through vivid, interesting activities to achieve a certain purpose of learning. The game can be big or small, the number of participants can be more or less, the time can be short or long. Usually used in ice-breaking, enlightening teaching, and transmission of certain knowledge.


02
The four keys of game teaching method,
Seting up games around the teaching purpose
Focuing on task control game process
Four key aspects
Inspiring the students to devote the whole study
Summaring and refining of the game

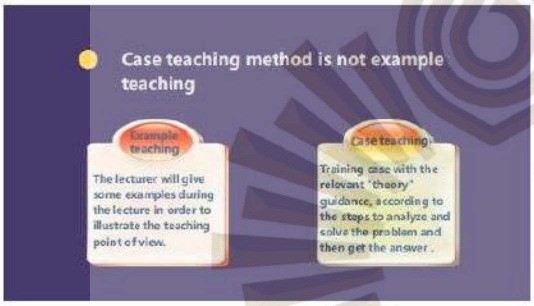

03
Matters needing to attention
The purpose is unknown
The setting of the game must be closely related to the teaching process
One is the emotional withdrawal, the other is the focus of the deviation
The process is out of control
The students ignore the purpose , immersed in the playing process,
Lack of refining
pay attention to inspire guidance and summary and refining

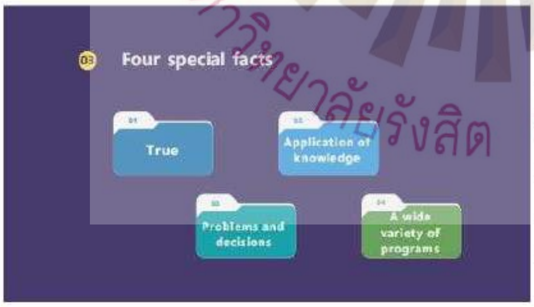

four
Case-based
teaching method

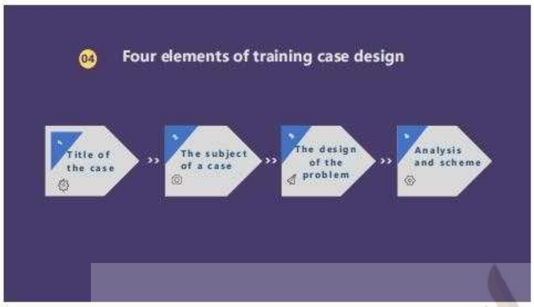

01 What is the case teaching method
02 Suitable scene
03 Four special facts
04 Four elements

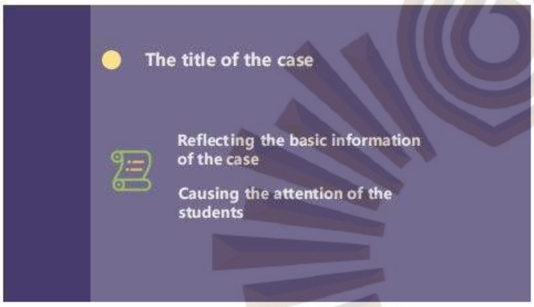

01 What is the case teaching method
The case teaching method extracts and writes the scenarios in the work into cases and pays attention to the practical practice and application in the training. The learners establish thinking in the process of solving the problems in the case and then guide the practice, so that the training effect.

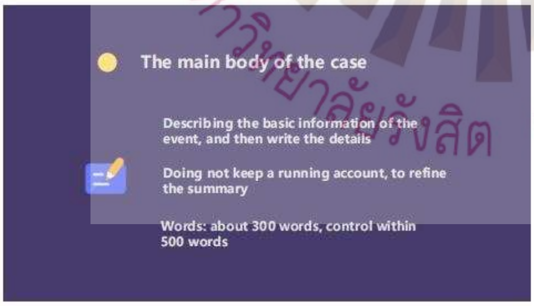

02
Suitable scene
Core knowledge application (principles, principles, processes, policies, etc.)
Skill strategy (job skill, method)
Role recognition (mindset adjustment)


Case teaching method is not example teaching
Example teaching
The lecturer will give some examples during the lecture in order to illustrate the teaching point of view.
Case teaching
Training case with the relevant "theory" guidance, according to the steps to analyze and solve the problem and then get the answer.

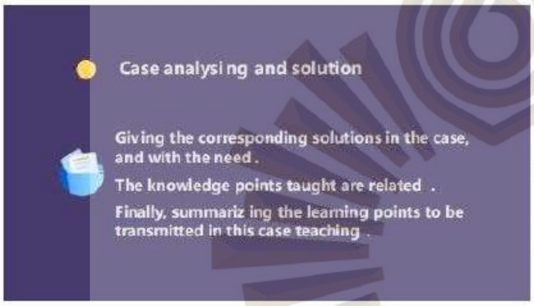

03
Four special facts
True
Application of knowledge
Problems and decisions
A wide variety of programs

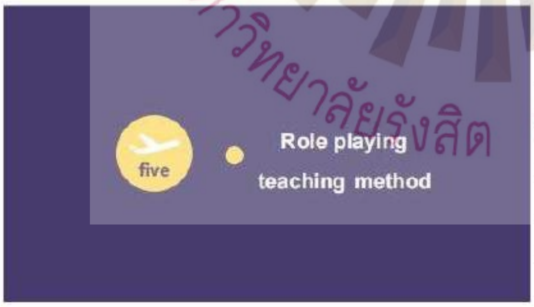

04
Four elements of training case design
Title of the case
The subject of a case
The design of the problem
Analysis and scheme

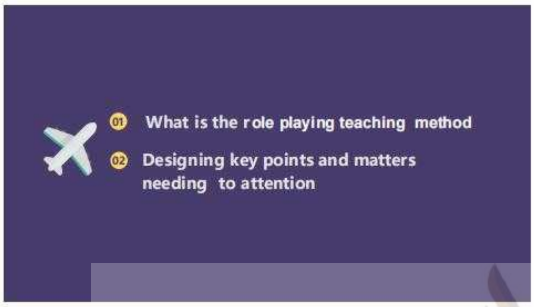

The title of the case
Reflecting the basic information of the case
Causing the attention of the students

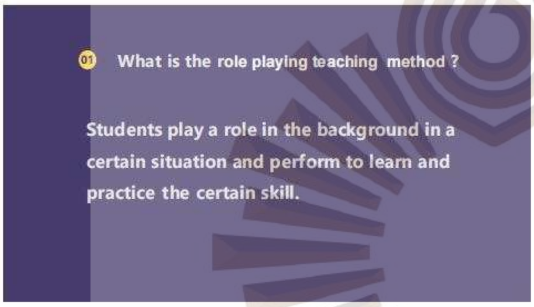

The main body of the case
Describing the basic information of the event, and then write the details
Doing not keep a running account, to refine the summary
Words: about 300 words, control within 500 words

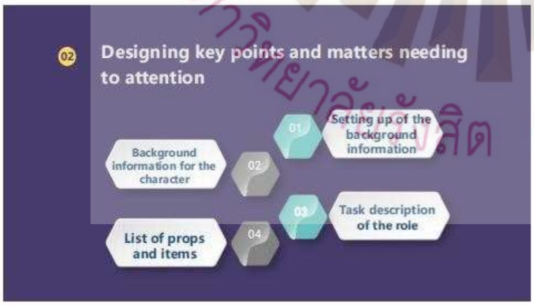

Problem design ing
Extracting the case intention and the main topics of discussion
Designing around the knowledge points that need a case explanation
Generally no more than three questions


Case analysi ng and solution
Giving the corresponding solutions in the case, and with the need .
The knowledge points taught are related .
Finally, summariz ing the learning points to be transmitted in this case teaching .


five
Role playing
teaching method


01 What is the role playing teaching method
02 Designing key points and matters needing to attention


01 What is the role playing teaching method ?
Students play a role in the background in a certain situation and perform to learn and practice the certain skill.


02 Designing key points and matters needing to attention
01 Setting up of the background information
02 Background information for the character
03 Task description of the role
04 List of props and items

Thinking :

which are the teaching methods with high student participation in the above five teaching methods ?

Action-oriented teaching method

Action-oriented teaching method originated in vocational education. Since the 1980s, the German vocational education circle has launched the discussion of action-oriented teaching method and achieved great success, which has had a profound impact on German vocational education.

At present, this method has become the mainstream development trend of modern vocational education and training in China.

Action-oriented teaching method

Action-oriented teaching method does not refer to a specific teaching method, but consists of a series of teaching methods and technologies.

Its main contents include: brainstorming method, role-playing method, case teaching method, card display method, etc.

Action-oriented teaching method

The vocational education circles around the world, it is as a new curriculum concept, an advanced educational concept, a guiding ideology, a complete vocational education mode, a new trend of thought, and a synonym for reform.

Action-oriented teaching method

The basis of the implementation of its teaching methods

Heart + Hands + Brain using

(vocational activities)

Unit 5

Production the teaching plan of the aviation security Curriculum one

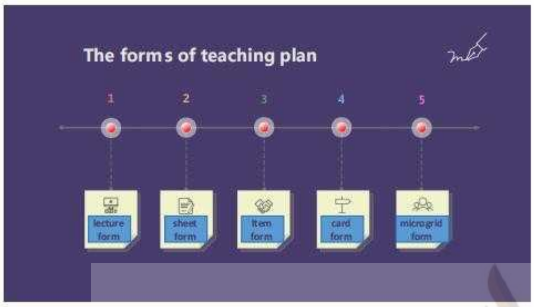
What is the teaching plan

What is the teaching plan?

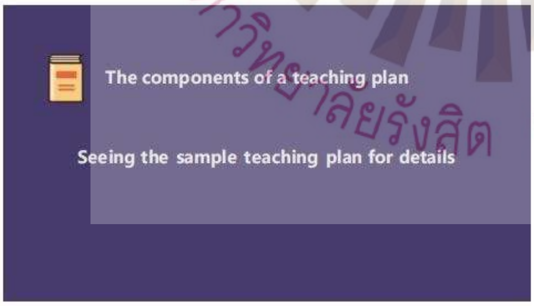
Teaching plan is a practical teaching document in which teachers design and arrange the teaching activities smoothly and effectively according to the teaching standards, the requirements of the teaching syllabus and textbooks and the actual situation of students. Including teaching purpose, teaching steps, key points and difficult points, teaching preparation, teaching tools, teaching process and practice design, etc.

The purpose of teaching plan

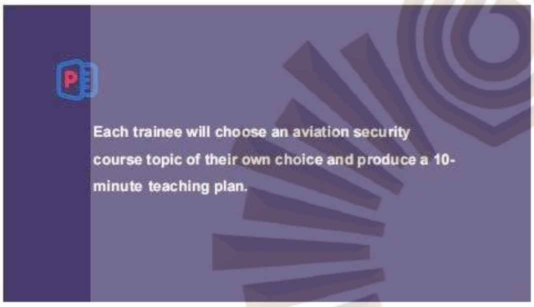
It is conducive for teachers to understand the content of the teaching material, accurately grasp the key points and difficult points of the teaching material, and then choose scientific and appropriate teaching methods, which is conducive to teachers to scientifically and reasonably control the classroom time, better organize teaching activities, improve the teaching quality, and receive the expected teaching effect .

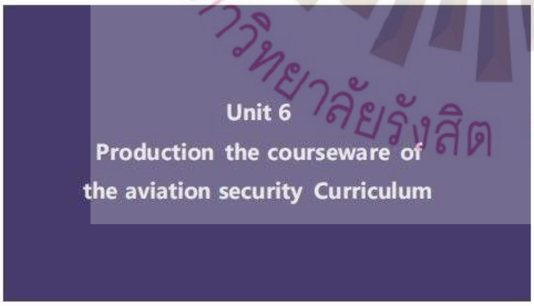

The forms of teaching plan
1
2
3
4
5
lecture form
sheet form
Item form
card form
microgrid form


two
The components
of a teaching plan

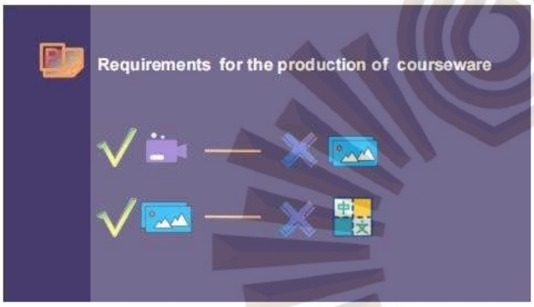

The components of a teaching plan
Seeing the sample teaching plan for details

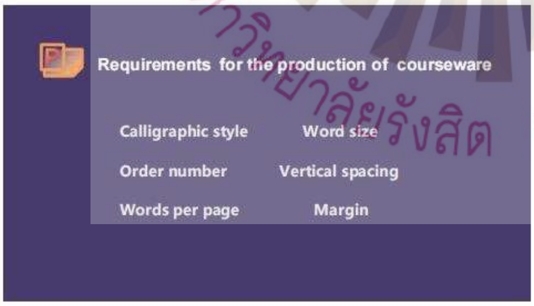

three
Training in the
production of
teaching plan

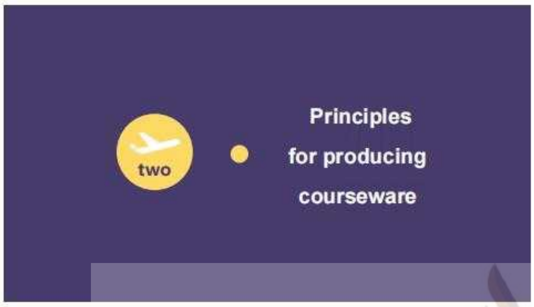

Each trainee will choose an aviation security
course topic of their own choice and produce a 10-
minute teaching plan.


Unit 6
Production the courseware of
the aviation security Curriculum


one
Requirements
for the production
of courseware


Requirements for the production of courseware


Requirements for the production of courseware
Calligraphic style
Word size
Order number
Vertical spacing
Words per page
Margin

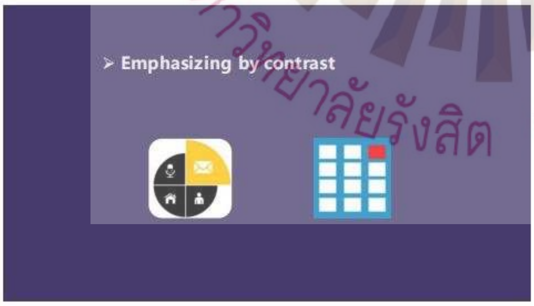

two
Principles
for producing
courseware


Principles for producing courseware
➢ Lining up in correct order
➢ Repetition Same elements
➢ Categorization
➢ Emphasizing by contrast

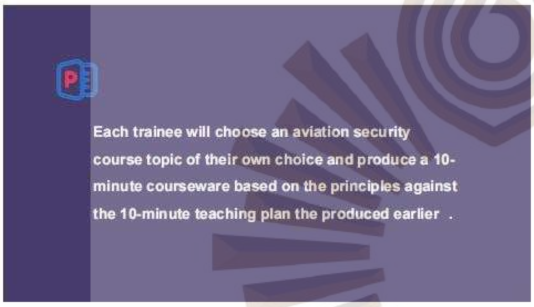

➢ lining up in correct order


Repetition Same elements
Use a unified master version to let the PPT form a unified style;
Let an element (font, color scheme, symbol, etc.) repeat itself


Categorization


Emphasizing by contrast

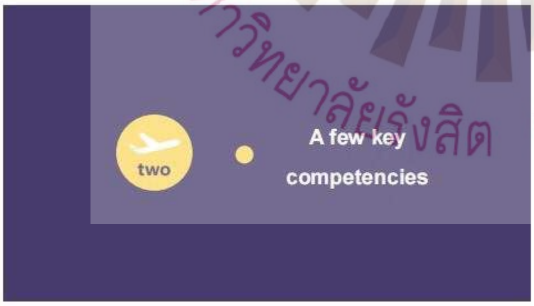

three
Training in the
production of
courseware


Each trainee will choose an aviation security course topic of their own choice and produce a 10-minute courseware based on the principles against the 10-minute teaching plan the produced earlier .


Unit 7
Teaching abilities and skills


one
Competencies
expected of the
instructor

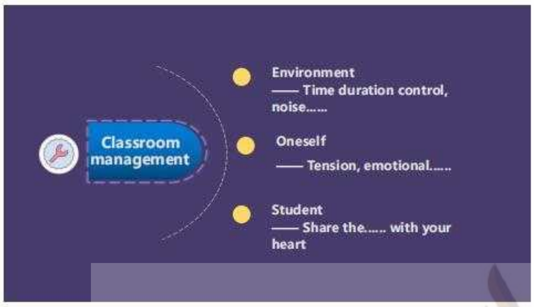

Eight competencies for aviation security instructor
Articulation
Communication & Coordination
Ability of thinking
Professional capacity
Training technology
Learning ability
Classroom management
Level of expertise
100
80
60
20


two
A few key
competencies

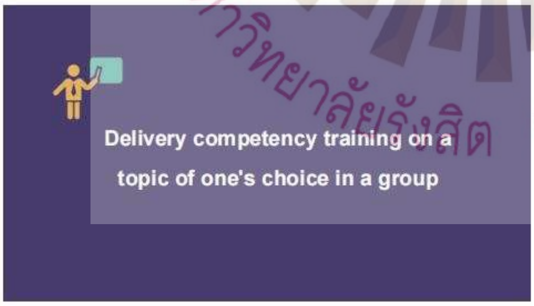

Basic teaching skills
The teacher's lecture position
The voice of the teacher lecturing
The physical movements of the teacher lecturing


ALBERT MEEREBI, A SCHOLAR WHO SPECIALIZES IN NONVERBAL COMMUNICATION, proposed A FORMULA:
INFORMATION TRANSFER


Contents 7%
Pronunciation and intonation 38%
Body movements 55%


Classroom management
Environment
—— Time duration control, noise……
Oneself
—— Tension, emotional……
Student
—— Share the…… with your heart


three
Delivery competency training

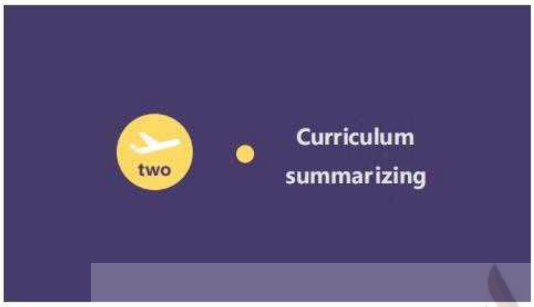

Delivery competency training on a topic of one's choice in a group

Unit 8
Curriculum evaluation and summarizing

one

Evaluation as aviation security instructors

- National Aviation Security Instructors Curriculum Theory Examination
- National Aviation Security Instructors Curriculum Practical Examination
- National Aviation Security Instructors Attitude Questionnaire


two
Curriculum
summarizing


An overall review and summary
of the course content s


Thank You!

BIOGRAPHY

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