



On the Research of High-efficient Cultivation of High-performance Students' Core Competence

Jiefeng Li^a, Qi Xiang^{*}

Civil Aviation Flight University of China, Guanghan City, Sichuan Province, China

lijiefeng882@163.com^a, 18280500318@163.com^{*}

Abstract. In this study, the efficient training method of high-performance students' core competence is discussed. Combined with the implementation of the new outline of CBTA, the main problems existing in current high-performance flight training and their optimization paths are analyzed. It is pointed out that with the popularization of high-performance aircraft courses in China, how to effectively improve the nine core competencies of students (technical ability, work quality, communication ability, problem solving ability, learning ability, service orientation, decision-making ability, risk management and teamwork ability) has become the key in training. By comparing the new version of CBTA syllabus with the old version, it is found that the new syllabus emphasizes the strengthening of theoretical knowledge and the training of changing complex state, thus improving the situational awareness and cockpit resource management ability of flight students. In addition, through the questionnaire survey of 100 high-performance students, it is found that the students' cognition of high-performance training is biased, and they think that the relevance between the course and the future company modification is weak, and there is a problem of insufficient learning motivation. In view of this phenomenon, the study puts forward five key measures to cultivate students' core competence efficiently. It is considered that the rational use of real aircraft resources and the comprehensive cultivation of core competence can effectively improve students' flying ability and adapt to the future operation of the company, and lay a solid foundation for the all-round development of pilots.

Keywords: Core Competence, High Performance Students, Teaching Innovation.

1 Introduction

Based on the 2016 edition of the 20-hour High Performance Multi-Engine Aircraft Training Course Syllabus as stated, the Flight Training Unit relies on the College's interpretation of the overall Course Training Syllabus for Airline Transport Pilots related to the High Performance Multi-Engine Aircraft Training Requirements and Criteria, and opens the High Performance Course for the purpose of providing the student with the ability to build on the knowledge and skills acquired from Commercial Pilot License

training in the future initial training for a large airplane, adding the basic knowledge skills and attitudes required in a multi-person Group Class II airplane [1].

And in recent years with the domestic high-performance alternative course training accounted for more and more, for high-performance training opportunities and challenges are also growing, to play the advantages of high-performance courses, we must keep abreast of the times, under the premise of maintaining the advantages of our courses, through attempts to teach the curriculum and management innovations, relying on the new version of the CBTA high-performance training syllabus, focusing on the improvement of high-performance trainees in the nine core competencies, so that the company and the flight students realize that the high performance course is of great significance to the students' future participation in the company's operation, and this is also the necessary innovation that the high performance course needs to carry out in order to continue to maintain its leading position at this stage in today's context [2].

The relationship between the instructor and the students has a profound impact on how much the students learn. To students, the instructor usually is a symbol of authority. Students expect the instructor to exercise certain controls, and they tend to recognize and submit to authority as a valid means of control. The instructor's challenge is to know what controls are best for the existing circumstances. The instructor should create an atmosphere that enables and encourages students to help themselves.

2 CBTA's new high-performance syllabus compared with the old training syllabus.

Compared with the old high-performance training program, the new high-performance training program of CBTA has obviously decreased the requirements for students' manipulation ability, while the demand for theoretical level has begun to increase, relying on a solid and sufficient ground theoretical foundation to assist practical training. For example, in the adjustment of the ground course, compared with the simple setting of the old syllabus, the new syllabus divides the ground course into three parts: general basic theory, specific model theory, program and operation [3]. It is emphasized that flight students need to receive theoretical knowledge teaching provided by flight instructors during training intervals.

Optimizing the distribution of training subjects in the syllabus is also the focus of the adjustment of the new syllabus. Under the premise of meeting the requirements of regulations and consultation circular, guided by the teaching rules, the difficulty of simulator training course is adjusted as a whole, which makes the transition from easy to difficult outline more natural and avoids the learning obstacles and high stress level caused by the difficulty of the course.

This adjustment is similar to the previous one, focusing on the optimization of account settings in the outline. Some failures and approaches in the syllabus were merged, which reduced unnecessary repetition of subjects, and made the adjusted syllabus focus on the primary goal of high-performance transition training-training pilots who meet the requirements of 121 transport aviation: being able to use threat and error management model to operate aircraft safely, economically and efficiently.

The training method of complex state prevention and recovery is introduced. Facts have proved that it is impossible to ensure flight safety only by threat management and error management, and pilots with complex state recovery technology are still the last resort to save aircraft.

Relevant supporting documents for complex state manipulation are added to the ground course and simulator course to further optimize the subject and effect setting.

In addition, in order to facilitate the implementation of the outline training for teachers, the new version of the outline has revised the contents that were not practical and easy to operate before, and specially formulated the "implementation rules" for teachers' reference. China Aircraft Academy will also use the Competency Assessment Tool (CET) to evaluate all high-performance students. The evaluation data can provide basic competency data for airlines and help colleges improve training quality [4]. On the other hand, the data will also be filed as a necessary document for the management of "pilot technology life cycle".

It can be seen that in the new CBTA training program, the requirements and emphasis of training subjects are obviously tilted towards cockpit resource management and situational awareness, which is undoubtedly an important step to play a high-performance advantage in line with the times. In addition, how to ensure that after the end of high-performance training, when entering the company for modification, it will be a new mission of the new CBTA high-performance training program.

3 Survey of Flight Students' Perceptions of High Performance Training

Through the course of the semester, I collected questionnaires from 100 high performance students in training. The questions on the questionnaire were as follows, one, do you think the high performance course will help you in your future company operation, 53 people answered that it should, 27 people answered that it is helpful, and 20 people felt that it is not helpful; two, which one would you choose if you could actively choose between the high performance course and the ACPC course, almost everyone chose the ACPC course, the reason is mainly two points the first one is that it is fast, compared to the first is fast, compared to the scheduling and training cycle of high-performance training, ACPC training saves time and effort, and the second is that most students believe that ACPC course content is the future participation in the company's operation of useful things, the reason for no other is to learn in advance the knowledge of the model and the corresponding procedures for the subsequent modification of the paved in advance and the psychological expectations.

4 High-performance teachers' reflection on the survey results

When summing up the results, I am not surprised by the results. I reflect on the results of the questionnaire survey and summarize the following pain points in the current high-performance training:

First, the pace of high-performance training is slow, and the orientation of inherent training results deviates from the expected results.

In many students' cognition, high performance is just a stumbling block before graduation. With this idea, it is almost impossible for natural students to make a big breakthrough in their ability development. I think that most students who have graduated from junior high school now have some cognitive problems in their learning concepts and ideas. For a brand-new model, they often ignore the flight performance, system and tasks, and only pay attention to the procedures of the model in each flight period [5]. Under the influence of this trend of thought, students often have extremely low learning efficiency, which makes them abandon their previous flight experience and have no understanding of new things, better performance, more systems and more functions of the new model than the old model.

Second, the connection between high-performance training and future company modification is not obvious, and the usability thinking is strong.

In the high-performance training, most students muddle along, because many seniors who have returned to the company show useless theories during the high-performance learning period when sharing their flying experiences, and most students will feel that their efforts seem to have nothing to do with future flying and feel depressed. During the high-performance training, I didn't learn the corresponding experience and methods in dealing with future company modification and other training. I will elaborate on the sixth point.

Third, the practice method of high-performance learning is blocked, teachers are out of touch with the company, and students are out of touch with teachers.

The ability to communicate effectively is essential for all aviation instructors. However, communication does not occur automatically even though the instructor has a high level of technical knowledge in a particular subject area. The beginning instructor must understand the complex process involved in communication, and become aware of the common barriers to effective communication. Mere awareness of these factors is not enough. The new instructor must also develop a comfortable style of communication that meets the goal of conveying information to students.

Students will only learn the new model by rote, and their learning efficiency is low. They copy what they learned in junior high school, and their subjective initiative is very weak. The teachers don't know the questions they asked on the plane, which makes the teachers unable to start teaching. Many training subjects have become experience and demonstration subjects, and it has become the norm that students don't fly or cooperate, and there is a disconnect between teachers and students. For a long time, teachers have not dealt with the actual flight team, so they can't teach the actual flight theory and learning methods from the root. Over time, high-performance training has become very closed and entered an infinite loop.

5 Core Competencies of the High Performance Program

The nine core competencies for pilots that have been revised and added to the new CBTA High Performance Syllabus are, in my opinion, the core strengths of the future High Performance program, as described below:

The nine core competencies of pilots include technical ability, work quality, communication skills, problem solving skills, learning ability, service orientation, decision-making skills, risk management and teamwork skills. For the first time, the new version of the syllabus includes a training and assessment model for the nine core competencies and begins to use the concept of “competency-based training”.

Technical competence is a core skill required by pilots, including knowledge, skills and experience in aircraft control, navigation, meteorological awareness and emergency handling. During flight training, trainees need to be proficient in these techniques and continuously improve their skills to cope with complex flight environments and emergencies.

Quality of work is the extent to which pilots adhere to safety, efficiency and standardization in performing flight tasks. Pilots need to strictly comply with flight rules and standard operating procedures to ensure safety and standardization during flight. At the same time, pilots need to pay attention to the details and quality of their work to ensure that high standards are met on every flight mission.

Communication skills are a pilot's ability to communicate effectively with other pilots, controllers, passengers and crew [6]. Pilots need to be able to communicate well, both verbally and in writing, to be able to convey information and instructions clearly, as well as to be able to effectively receive and understand information and feedback from others.

Problem solving skills are the ability of pilots to make quick and accurate decisions and deal with in-flight problems when faced with them. Pilots need to have rich flight knowledge and experience to be able to analyze and judge problems in a short time and take effective measures to solve them.

Learning ability is the ability of pilots to continuously improve their skills and knowledge. Pilots need to continuously learn and master new flight techniques and knowledge, and at the same time be able to apply what they have learned to actual flight.

Service orientation is the pilot's awareness and behavior of passenger-centered service. Pilots need to pay attention to passenger needs and feedback, provide quality service and care, and also be able to effectively handle passenger complaints and suggestions.

Decision-making ability is the pilot's ability to make quick and accurate decisions and deal with unexpected situations in flight. Pilots need to have rich flight knowledge and experience to be able to quickly assess and analyze unexpected situations and make correct decisions and handling.

Risk management is the pilot's ability to anticipate and manage risks during flight. Pilots need to understand the various risk factors in flight and take effective measures to predict and manage them to ensure flight safety.

Teamwork ability is the ability of collaboration and cooperation between pilots and other crew members. Pilots need to establish good communication and collaboration with crew members, controllers and other relevant personnel to accomplish flight tasks and ensure safety.

In flight training, the development and improvement of the nine core competencies is the key to enhancing the skills and qualities of trainees and pilots. Relevant training organizations and educational institutions need to focus on the all-round development of trainees and provide comprehensive training and education to help trainees master the nine core competencies and improve their flying skills and qualities, thus laying a solid foundation for becoming an outstanding pilot.

Personally, I believe that the High Performance Program has another advantage over the ACPC Program, which is the real-aircraft phase of High Performance. The real aircraft is the real core advantage of the high performance, play it well, it can let students simulate the advance into the future of the company operation, for the students, can be accumulated in advance of the future operation experience, it can make students understand and experience, in the 121 part of the operating environment, their own role inside the cockpit, to cultivate the cockpit resources of the collaboration and management of the experience, and then this experience into the future to really participate in the company operation, this first-mover advantage is a very important advantage of the high performance program, and it is also a very important advantage of the high performance program. There is never any substitute for this first-mover advantage in company operations. It is very important to change the concept and focus of training by rationally utilizing real aircraft resources and promoting high-performance training based on the nine core competencies, which are also the core advantages of high-performance nowadays.

6 The main contradictions in the teaching of current high-performance courses

I think there are four contradictions in the current teaching of high-performance courses.

The first is the contradiction between the students' mechanical learning methods and the relatively fixed subjects of the syllabus. To tell the truth, I personally have never found a word that makes me feel accurate to sum up this contradiction accurately. As I mentioned in the fourth point just now, the learning methods of most students are contrary to the preparation of the course and the goals that the students want to achieve after the course is completed, especially in the simulator course. In the past six months, nearly half of the students showed their flying level in the third and fourth lessons of the simulator. As far as the outline course is concerned, it must meet the requirements and even be considered excellent. However, after entering the real training, most of the students can't maintain their ability level on the simulator. It can be said that most of them have almost returned to the original point, and in the real environment, they have almost no self-judgment and situational awareness, which is worthy of deep reflection.

The second point is the contradiction between the students' ignorance of the idea of high-performance stage and the lack of strict punishment in the course stage. Due to the influence of epidemic situation and other factors, there is a serious backlog of flight students at all stages of the college, especially the backlog of high-performance students. As the last stage of flight students before returning to the company after graduation, the high-performance stage is naturally a relatively easy stage to solve the backlog problem. For the students, it has been mentioned that most students lack a correct understanding of high-performance courses. Under the blessing of this trend of thought, some students have a fearless mentality. "Anyway, I will not stop flying at this stage." The spread of this mentality undoubtedly adds a lot of difficulties to the teaching of high-performance courses. In addition, it may be influenced by this trend of thought. Sometimes, we check that the standards are not uniform in the stage inspection, giving students more illusions of "will not fail", which requires us to sum up and reflect;

The third is the contradiction between the lack of training resources and how to play the core advantages of high performance. As I mentioned above, the core advantage of the high-performance course must be in the real machine training stage. In the daily teaching process, we find that even though most students think that the whole course is not very helpful to him, they are full of eager experience and curiosity about the first transition flight. We also found that as our available transition resources become less and less, students' ground preparation methods are getting closer to the previous mechanized mode. Combining with the so-called predecessors' experience, we blindly recite mechanically, and we don't know the take-off and approach briefs in place, and we ignore the release materials, route maps and charts, which sometimes leads to our transition courses not playing their due role.

The fourth is the contradiction between the real machine stage teaching and the teacher's letting go. The teaching of high-performance real machine stage, especially the transition stage, is very special under the framework of laws and regulations. Different from the transition in the school training, the transition task in the real machine stage has a great influence, which leads to the difficulty in achieving a suitable scale for the students' release even if there are two teachers on the plane. Too much hands-off will easily lead to serious consequences, which is not a case in previous teaching, so I won't list it here [7]. Too little hands-off will make it difficult for students to integrate into the whole task process, and even have the illusion of "going up by plane". This situation can ensure safety, but it has hardly improved students' own ability level and core competence. In the past training, teachers may choose more or less hands-off, after all, so that they can control the safety more, but with the increasingly fierce competition of high-performance alternative courses, we should now think about how to accurately control the hands-off of a student and give full play to the core competitive characteristics of our courses on the premise of ensuring safety.

7 How to efficiently develop the core competencies of high performance trainees

I have explained the advantages of high performance courses in the current training environment and summarized the contradictions of high performance training from the perspectives of the flight student and the flight instructor, so how can we revolutionize our teaching so that the student can improve his/her core competencies more efficiently in the high performance phase? I believe there are five key points:

First, strict management of trainees to improve the subjective initiative of trainees in learning and practicing. Trainees in the next branch of high-performance training may be junior high school teaching completion time has been relatively long, combined with most of the incorrect perception of the course, in the next branch of high-performance training for a considerable period of time most of the trainee's subjective initiative is insufficient. From the trainee's perspective, there is no sense of urgency here as there is in the lower branch for the initial instruction course, with low punishment pressure and no grounding anxiety. What we need to do is to break this incorrect cognition of the trainees, quantitative style management of the trainees, strict standardization of the phase of the inspection criteria, the punishment of trainees with incorrect cognition should be severe, the introduction of phase grounding and theoretical learning and other measures, the training process should be timely and accurate fill in the training records, so that the training records are true and transparent. Due to the short duration of the high-performance phase, it is essential that we manage it more strictly so that students begin to motivate themselves before they are ready for high-performance course training.

Secondly, improve the teaching content of the ground course and improve the assessment mechanism of the ground course. Compared with the old syllabus, the proportion of the ground course in the new syllabus of CBTA high performance has increased a lot, which I have already introduced in the second major point of the opening paragraph. At this stage, we should guide students to abandon mechanical learning habits on the basis of the course, teaching should be based on how to correctly learn the knowledge of the new model, how to correctly perceive the differences between the old and new models, if the correct understanding of the operating procedures, combined with the quantitative management of style and ground course assessment management, so as to fully stimulate the students' subjective initiative, so that students form a sense of urgency for the course training. Through these measures, try to ideologically change the trainee's perception of high-performance courses, so that trainees actively embrace the course; flight instructor-side reform should focus on high-quality courses, experience-sharing classroom, and regularly answer trainees' anxieties and doubts about the high-education courses and the future of the future into the company, and fully build the bridge of communication between inside and outside the school.

Thirdly, the four stages of flight are strict and the simulator teaching is three-dimensional [8]. The simulator training stage is the key stage for students to improve their core competency. In a more complex flight environment and cockpit environment, students have to first consolidate their manual and automatic flight management ability, start to have a basic understanding of flight routes, start to solidify the foundation of

communication, collaboration, decision-making and management ability, and start to form a more effective situational awareness with the opening of a broader vision of flight routes. Then the key lies in how to guide the students to have a correct growth process? In my opinion, the key lies with the instructor, who should utilize the four phases of flight to control the student's ability to improve. During the pre-flight preparation and evaluation, apart from explaining the syllabus subjects, the instructor should lead the students to enter different scenarios and think about the process of implementing the syllabus subjects like a thought experiment in physics, so as to make the students realize the significance of the subjects as well as the process, and then expand their knowledge appropriately. In the process of flight implementation, the requirements of the subject should not be based only on the results, and the student's performance should not be based only on the data, but should be judged from the perspective of the core competencies to determine whether the process and results of the subject implemented by the student meet the requirements of the curriculum, and in this process, the instructor should also determine whether the student's learning method is correct, which I believe is a necessary ability for high-performance instructors. Finally, in the post-flight evaluation, the instructor should summarize the students from the perspective of core competency, and guide the students to correctly think and solve the problems from the different perspectives of PF and PM. In this way, simulator teaching can be three-dimensional and efficient in all aspects;

Fourthly, we should take good care of the overall situation and do a good job of teaching on the real simulator. As mentioned above, I think the real aircraft teaching when the high-performance courses relative to other high-performance alternative courses of the biggest advantage, in the past teaching process, due to various reasons, we tend to ignore the advantages of this stage, so that most of the students of the real aircraft stage of the performance of the mere curiosity, and more or even think that they do not need to participate in the flight process. In today's environment, we should regain the advantages of our program. After the previous ground lessons and simulator training, the real airplane training is the key point to bring the students' ability to a higher level. In the previous training, we continue to stimulate the subjective initiative of the students, correct the students' learning methods, correctly guide the students to form an important core competencies, in the real aircraft, in the case of two instructors to keep a good gate, let the students give full play to the role of a PF should be the role of management, so that the students of the flight from the appearance of the landing to the landing slide back to shut down the car throughout the stage, give full play to their own ability, through the post-flight evaluation of the Through the post-flight evaluation, students can summarize and eliminate the knowledge loopholes, and combine at least two flights, so that students can have a basic understanding of the global framework of a complete flight, and have a more effective knowledge of the role of various aircraft systems and equipment, and know when and how to use them. In this way, we can truly link the flight knowledge that students have learned from middle school and high school together, and after returning to the company, students will have the operational framework and the correct learning method, and the growth efficiency will be greatly enhanced in the company's environment.

Fifth, high standards and strict requirements, unified phase inspection standards. The stage inspection of the high-performance course is the last stage inspection of the flight students in the school, which is the last inspection line for the students, and the control of the inspection instructors is the foundation of the college. The high standard and strict requirements of the high-performance course can play a very effective role in promoting the subjective initiative of the students, and in the long run, the students' motivation to learn and self-improvement will continue to increase, which can promote more students to take the initiative to learn and think, and ultimately enhance the core competencies more efficiently. In terms of student management, under such an atmosphere, management efficiency will be more efficient. The subjects of the stage inspection should not be exactly the same, if the subjects of the long-term inspection are similar, the students will only go back to the previous mechanical learning mode, so that no matter how to innovate in front of the final results will not be too different, only to develop a unified competency standard, to maintain a good diversity of inspection subjects, so as to play a good role in the inspection of the stage inspection.

8 Summary

Based on my own perspective and investigation, this paper briefly discusses the opportunities and challenges faced by high-performance courses in the current environment and the efficient ways to cultivate the core competence of high-performance students at this stage. High-performance courses are characterized by short time but high requirements. We need to stimulate the potential of students through some reforms and innovations, so as to better complete the requirements of curriculum.

With the continuous improvement and development of flight high-performance training, after the implementation and landing of the 2021 version of the outline, the effect evaluation of flight high-performance training has also changed. Nowadays, many pilots not only pay attention to the traditional evaluation criteria, such as the accuracy and speed of completing tasks, but also consider other factors, such as safety, reliability and sustainability in the training process.

The implementation of the new outline is to upgrade the basic flight logic at the origin of the change of flight concept in the new era, instead of simply evaluating the data, methods and results, it is to evaluate the overall ability and core competence of the pilots. Simplifying the evaluation process, simplifying the evaluation data and adjusting the evaluation model is a brand-new exploration for us. Only in this way can flight training be dynamic, sustainable and more advanced.

A lot of content in this article only talks about some contradictions and methods of high-performance training at this stage from my personal perspective. When there is an opportunity, I will try to detail how to describe the current teaching contradictions more accurately and how to teach courses more accurately. Since I started flying high-performance courses in Mianyang Branch for more than three years, I have witnessed the rising of high-performance alternative courses and the backlog of high-performance course students in the college. Under such circumstances, we should unswervingly do our teachers' jobs, constantly innovate and optimize courses, keep the bottom line of

aviation safety, and make positive contributions to promoting the high-quality development of the college with practical actions.

References

1. Bolstad, CA, Endsley, et al. Evaluation of Computer-Based Situation Awareness Training for General Aviation Pilots [J]. *INT J AVIAT PSYCHOL*, 2010.
2. Rogoi T, Jurii B, Etek F A, et al. ATCO radar training assessment and flight efficiency: the correlation between trainees' scores and fuel consumption in real-time simulations[J]. Cambridge University Press (CUP), 2021(1287).DOI:10.1017/AER.2020.142.
3. Author, F., Author, S., Author, T.: Book title. 2nd edn. Publisher, Location (1999). Viitanen T. Estimating the validated training envelope of simulators used in upset prevention and recovery training [J]. 2017.
4. Aviation Instructor's Handbook (FAA-H-8083-9)
5. Advani S J, Field J N. Upset Prevention and Recovery Training in Flight Simulators [J]. 2011.
6. WANG Yue, YANG Yonggang, SONG Ze. Flight training evaluation simulated for flight cadets based on competency [J]. *Journal of civil aviation university of China*, 2021, 39 (5): 51-54.
7. GUO Chao, YU Jianxin, PENG Boda, et al. A Model for Evaluating pilots competency based on entropy weight-AHP method and TOPSIS [J]. *Journal of Tongji University (Natural Science Edition)*, 2023, 51 (12): 1983-1990.
8. CHEN Lin, MI Yongsheng, HU Qitao. Research on the core competence of civil aviation flight cadets [J]. *China Transportation Review*, 2022, 44 (04): 73-79, 89.

Open Access This chapter is licensed under the terms of the Creative Commons Attribution-NonCommercial 4.0 International License (<http://creativecommons.org/licenses/by-nc/4.0/>), which permits any noncommercial use, sharing, adaptation, distribution and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons license and indicate if changes were made.

The images or other third party material in this chapter are included in the chapter's Creative Commons license, unless indicated otherwise in a credit line to the material. If material is not included in the chapter's Creative Commons license and your intended use is not permitted by statutory regulation or exceeds the permitted use, you will need to obtain permission directly from the copyright holder.

