

# Exploration on the realization path of Ideological and political construction of Airport Engineering Foundation Course

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**Abstract:** under the fundamental educational goal of Building Morality and cultivating people, the ideological and political construction of courses is the main reform direction of professional courses in Colleges and universities in the process of talent cultivation. This paper studies the application-oriented undergraduate education, through in-depth excavation of the ideological and political elements contained in the course of “Fundamentals of Airport Engineering”, demonstrates and optimizes the teaching content of the course in teaching practice, expands the content of each course module, and combines the spirit of scientific research, the ability of systematic thinkingThe attitude of keeping pace with the world’s cutting-edge development and major national needs and keeping pace with the times are integrated into the curriculum system and knowledge teaching, and the professional basic courses are effectively combined with the ideological and political content, so as to achieve the goal of Building Morality and cultivating people.

**Key words:** transportation major;Curriculum ideological and political education;Airport Engineering Foundation;Curriculum education;Applied Undergraduate

It is the central task of colleges and universities to implement the fundamental task of Building Morality and cultivating talents and cultivate high-quality talents with all-round development. It is an important method for colleges and universities to comprehensively improve the ability and effect of personnel training by adhering to the whole process and all-round education. It is a natural and inevitable choice for college curriculum teaching to integrate value building, knowledge imparting and ability training. In the teaching of the course “airport engineering foundation” for transportation majors, the author has conducted research and practical exploration on the ideological and political construction of the course, carefully considered the principles of the ideological and political construction of the course, made necessary argumentation on the purpose of the ideological and political construction of the course, and systematically designed the content of the ideological and political construction of the course, The implementation plan of the course Ideological and political education has been carefully arranged, and the teaching materials of the course Ideological and political education have been fully prepared. In the process of professional knowledge teaching and professional ability training, we try to organically integrate moral education, family and country feelings training, value concept education, engineering ethics education, scientific spirit and scientific methodology education and other related contents, and strive to make students gain both adult success through course learning, so as to not only acquire knowledge and improve ability, Moreover, the spiritual world has become richer, the outlook on life, morality and interests has been improved, the value attitude of doing things has been improved, the overall ideological and moral quality has been improved, and the understanding of the scientific spirit and scientific thinking methods necessary for professional work has been more profound.

## 1 Principles and objectives of Ideological and political construction of Airport Engineering Foundation Course

The course of “airport engineering foundation” is a professional basic course for transportation major, and it is a course about the research and design of airport asphalt and cement concrete pavement structure. Its main contents include: common pavement materials, the role and influence of aircraft or natural factors on the pavement, soil base, base and cushion, structural design of cement or asphalt concrete pavement, surface performance of airport pavement, etc. It not only provides the necessary knowledge base for learning the follow-up professional courses, but also involves the application technology closely related to the professional qualification examination of constructors. It is an important professional basic course of transportation.

### 1.1 Principles of curriculum ideological and political construction

In order to ensure that ideological and political education in the curriculum becomes an effective educational link and the overall goal of the curriculum is realized, the following principles should be followed in the process of Ideological and political construction in the curriculum:

1. closely related. As for the content mining of Ideological and political teaching elements, we should pay attention to the close relationship between the learning of professional knowledge and the cultivation of technical ability, and put an end to mechanically inserting some ideological and political conclusions, and do not “label” fragments. Avoid formalism and empty talk.

2. fit in properly. The selection and insertion timing of Ideological and political elements should be carefully considered and carefully arranged. First, it can not be inserted at will, which will damage the original logical system of the professional content of the course and affect the normal understanding and thinking of students. Second, we should pay attention to adapt to the emotional needs of students in the specific professional learning situation, so that students are willing to accept and accept effectively, so as to guide students to internalize values and change value attitudes from the ideological perspective, and promote the generation and sublimation of students’ scientific thinking.

### 1.2 The goal of curriculum ideological and political construction

The ideological and political construction of science and engineering courses has become the focus and difficulty of college curriculum construction. Professional course teachers have more contact with students, which has a great impact on students. In the past, many professional course teachers focused on imparting professional knowledge and paid less attention to students' moral education. Airport Engineering Foundation is a professional basic course for transportation major. Based on the in-depth exploration of Ideological and political elements and the grasp of the connotation of Ideological and political education, the teaching goal of integrating professional knowledge and ideological and political education is explored and realized, mainly including the following five aspects:

1. sublimate students' feelings of home and country. Take the construction of major national projects such as the Hong Kong Zhuhai Macao Bridge and Daxing airport as examples, integrate with the professional knowledge of relevant teaching modules, while imparting professional knowledge, let students feel the wisdom and strength of China, enhance national self-esteem and pride, and cultivate patriotism and political identity of "national consciousness".

2. strengthen students' correct outlook on life and values. Combining with the reality, we should educate students to correctly handle the relationship between the realization of personal values and the contribution to society, establish a correct view of interests, reasonably handle the conflict of professional interests, promote the enrichment and improvement of students' spiritual world, and improve their ideological and moral level.

3. improve students' sense of social responsibility. Being responsible to the public is an important part of engineering ethics. College Students' sense of social responsibility is not only related to the development of the country and the realization of the Chinese dream, but also related to their own development. Combined with the actual engineering cases, strengthen the students' sense of responsibility to the public, and let the students understand that having a high sense of social responsibility and being responsible to the public is not only the inevitable requirement of the professional development of engineers, but also the bottom line of doing things.

4. strengthen the concept of sustainable development. The concept of sustainable development is not only an important concept of development, but also an important concept of engineering ethics. Educate students to understand and pursue the concept of sustainable development. While pursuing the interests of contemporary people, they should adhere to the intergenerational moral code that does not harm the interests of the next generation, and turn the concept of rational utilization of resources and energy conservation and environmental protection into a habit.

## 2 Design of Ideological and political teaching content of Airport Engineering Foundation Course

The teaching of airport engineering foundation course is roughly divided into seven key knowledge teaching modules: road materials, the role of aircraft on the pavement, the influence of natural factors on the pavement structure system, soil base, base and cushion, airport cement concrete pavement design and airport asphalt concrete pavement design. Each course module can be used as a topic for in-depth discussion. However, due to the time limit of the course plan, according to the difficulty of the chapters and the actual needs of the project, the airport cement concrete pavement design and airport asphalt concrete pavement design are important and difficult chapters to explain, while other chapters are to pave the way for the understanding of these two chapters. By combing the teaching content and excavating the ideological and political education elements, the ideological and political teaching content of "airport engineering foundation" course is designed as follows:

### 2.1 Combine the application of road materials to cultivate the feelings of home and country and the sense of social responsibility

The knowledge module of road materials mainly introduces sand and gravel materials, asphalt materials, asphalt mixture and cement concrete. This part of professional knowledge is the basis and support of the whole course. Combined with the application of road materials in this knowledge module, the students are trained with cases to cultivate the feelings of home and country and the sense of social responsibility. The basic building materials discussed in this chapter may have different construction results in the hands of different people. Two cases of super engineering - Hong Kong Zhuhai Macao Bridge and bean curd dregs project were introduced during the teaching. The builders of the Hong Kong Zhuhai Macao Bridge are faced with the complex seabed structure, harsh natural environment, super long sea crossing distance and other world problems. Researchers, designers, engineers and technical workers have worked together to overcome difficulties, and according to the high standard of construction, they have achieved the peak work in the history of bridge construction in the world. Through the case study, the students can feel the Chinese wisdom of innovation and multi-party cooperation and the construction achievements that the builders have shown in overcoming various difficulties in the design and construction of the bridge, so as to stimulate and cultivate their sense of national pride and patriotism, and sublimate their feelings of home and country.

### 2.2 Combining the effect of aircraft on pavement, carry out engineering problem analysis thinking training

The main contents of the knowledge module of the effect of aircraft on the pavement include: aircraft landing gear form, vertical static load, horizontal force, dynamic load acting on the pavement, tire contact area, transverse distribution of wheel tracks, operation times, load analysis of each section of the airport pavement, and the effect of aircraft airflow and aviation oil on the pavement. The loads acting on the airport pavement are also different under different motion states such as parking, taxiing, taking off, turning and braking. When parking, it will produce vertical pressure on the pavement; When taxiing, it will generate vertical pressure, horizontal force, impact force and lift force on the pavement; Braking and turning will generate vertical and horizontal forces. When an aircraft taxis normally on the runway, how will the interior of the pavement respond and how much stress will be generated? For this problem, we analyze the stress response inside the pavement by making assumptions, establishing mathematical models, and using the finite element method. By summarizing the

analysis process of such problems, help students form the general analysis idea of “physical phenomenon - essential problem - mathematical modeling - problem solving”, and cultivate students’ ability to master the thinking method of engineering problem analysis.

2.3 Combining the influence of natural factors on pavement structure system, cultivate students’ thinking methods of solving engineering problems

The knowledge module of the influence of natural factors on pavement structure system mainly includes the influence of temperature and humidity on pavement structure. Combined with the application of the knowledge in this chapter, the case of “pot cover effect” of airport runway caused by seasonal temperature change is introduced. In Shenyang Taoxian International Airport, uneven settlement occurred on the cement pavement of the airport. After the pavement was repaired with asphalt, pavement cracks appeared, especially in late spring and early summer. When looking for the cause, we found that although the groundwater level in the cold and dry northeast region is generally 28-35 meters underground, the gravel layer less than 1 meter below the airport runway has accumulated a lot of water. Why? According to the research of scientific researchers, when spring comes, the water vapor in the soil rises. When asphalt pavement is added with concrete, it is like encountering a “thick cover”, which condenses into water, leading to ponding under the runway. The cracks of Shenyang airport runway are caused by frost heave. So how to solve it? The airport adopts the method of “Dredging” and excavates blind ditches to solve this problem. Through case analysis, students can understand that to solve the problems encountered in the project, the idea of “problem investigation - cause analysis - proposing and demonstrating solutions - scheme implementation” can be generally adopted to cultivate students’ thinking method of solving engineering problems, and improve students’ ability to connect theory with practice and scientifically apply knowledge.

2.4 Combining with the design of airport cement concrete pavement, students can understand the thinking method of Engineering Innovation

The knowledge module of airport cement concrete pavement design mainly includes: pavement failure mode, pavement structure combination design, thickness calculation, block design, joint design and relevant pavement design technology. This chapter introduces the innovation case of Daxing airport project in combination with the teaching of pavement structure design. Beijing Daxing International Airport is the first airport in the world to build four cement concrete runways at the same time. By using the research results of the capital airport group’s science and technology project “Research on Key Technologies of new materials for high durability and high crack resistance cement concrete airport pavement”, the method of adding ultra-high strength modified synthetic fiber (FC fiber) is used to enhance the comprehensive performance of the pavement. This engineering innovation process has gone through three stages: laboratory experimental research, construction site experimental research and final engineering application. Through cases, students can understand that engineering innovation often requires the comprehensive use of multidisciplinary knowledge, so they should constantly accumulate knowledge in their career development to make their knowledge structure comprehensive and compound; Engineering innovation must control risks and ensure reliability, and the innovation process must be logical and complete. Finally, the teaching purpose of making students understand the thinking method of engineering innovation, cultivating students’ realistic and pragmatic scientific attitude and rigorous and realistic scientific spirit.

2.5 Combined with airport asphalt concrete pavement design, help students establish the concept of sustainable development

The main contents of the knowledge module of airport asphalt concrete pavement design include: the properties and design of asphalt concrete, the failure mode and thickness calculation method of asphalt pavement, and the related asphalt concrete pavement design technology. Few domestic large airport runway pavement structures use asphalt pavement design, Kunming airport is a prominent example. Taking the structural design of the runway asphalt pavement of “Kunming Changshui airport” as a case, this paper summarizes and analyzes the advantages and disadvantages of the flexible runway pavement adopted by airports at home and abroad and the experience gained, introduces the structural design and optimization technology of the asphalt pavement, and introduces the characteristics of the design of Kunming Changshui Airport - Green Airport Design. This paper systematically introduces the concept of sustainable development of UNESCO, China’s green development strategy, the concept of green airport and the green design of airport engineering, so that students can realize that in this era of intense human material activities, saving energy, saving resources, protecting the environment and implementing sustainable development have become the common responsibility and direction of efforts in the world. Meeting the needs of contemporary people does not harm the ability of future generations to meet the needs, and should become a universal development ethics. Help students establish the concept of sustainable development and abide by the principles of conservation, environmental protection and humanization in future engineering practice.

### **3 The implementation path design of Ideological and political education in the course of Airport Engineering Foundation**

3.1 Strengthen "Curriculum Education" through "scientific research education"

Qian Xuesen, the father of missiles, has set a great benchmark for scientific researchers by adhering to the aspiration and tradition of “building a heart for the world, making a life for the people, inheriting unique knowledge for the future, and opening up peace for all ages”. Every teacher should have similar feelings. The subtle influence of good teachers on students is the ideological and political education of curriculum. We should improve our scientific research level, carry out the organic combination of scientific research and teaching, increase the understanding depth and teaching level of teaching content, share personal scientific research experience and growth experience, share the key scientific research institutions and scientific and technological advantages at home and abroad in the field through scientific research lectures, and stimulate students’ exploration spirit and innovation enthusiasm, Cultivate students’ ability to think deeply and solve complex

problems.

### 3.2 Establish the course Ideological and political resources database and improve the online and offline resources of the teaching line

Establish a course Ideological and political case library, including videos, animations, pictures in engineering examples and academic achievements in cutting-edge projects, to help students establish perceptual knowledge, improve cognitive level and transfer ability of knowledge learning. Before the course teaching, the questionnaire survey method is used to understand the basis of students' relevant professional knowledge, analyze students' cognitive level, and establish teaching objectives according to the characteristics of the course and students' cognitive level; Online teaching such as MOOC, QQ, superstar learning link, etc. are used to provide students with micro videos, give discussion topics, stimulate students' interest, help students establish a "corpus" of professional terms of "airport engineering foundation", and improve the effect of offline teaching; In offline teaching, the integration of Ideological and political content such as observing discipline and creating good code of conduct can better stimulate creativity in the teaching process, get feedback on the teaching effect in time, make up for the shortcomings of online teaching, and better practice the teaching concept of "student-centered" in face-to-face communication.

### 3.3 Multiple forms and reasonable arrangement of Ideological and political teaching process

In teaching practice, the ideological and political teaching process of the course is reasonably arranged through teaching, extracurricular reading, practice, questioning, discussion and exchange and other forms. The ideological and political teaching of the knowledge module of road materials is carried out by watching online teaching cases after class, then doing exercises, group discussion and class communication. The effect of aircraft on pavement and the influence of natural factors on pavement structure system the ideological and political teaching of the two knowledge modules is mainly carried out by means of lectures and questions. The ideological and political teaching of the knowledge module of airport cement concrete pavement design is mainly carried out in the way of classroom teaching and practice. The ideological and political teaching of the knowledge module of airport asphalt concrete pavement design mainly adopts the methods of classroom teaching, extracurricular reading and practice. Through the comprehensive use of various forms, stimulate students' learning enthusiasm and cultivate students' autonomous learning ability.

### 3.4 Closely follow the design specifications and scientific and technological progress, and integrate into the course teaching

In real life, science and technology are developing rapidly, but the compilation of teaching materials needs time to polish, which often leads to the failure of many teaching materials to update and introduce the most advanced academic achievements in the process of writing. Therefore, the serious lag of the content of many course teaching materials is a common situation at present; In addition, many versions of textbooks generally have the defects of too much theory and insufficient practical skills training. In view of the above problems, in the teaching of this course, we should compile teaching handouts, integrate teaching cases, technical design specifications, industry development and cutting-edge technologies, understand the latest trends of national strategy and industry development, focus on the cutting-edge development of national science and technology and new design specifications, and try our best to guide students while learning textbook knowledge, Pay attention to the development status of key technologies and the urgent need for independent innovation of relevant national technologies. At the same time, in the teaching of this course, the teachers of the research group adhere to the combination of "go out, please come in", actively participate in production practice projects, invite industry experts to participate, expand teaching handouts and enrich teaching content, increase students' interest in learning, exercise and cultivate students' practical operation ability. Through the combination of the above two teaching methods, we can guide the growth of students' personal ability and the coordinated development of national and social needs.

### 3.5 Pay attention to the evaluation of the teaching effect of Ideological and political education and make continuous improvement

After the end of each teaching link, we should do a good job in analyzing and summarizing the learning effect, analyze the causes according to the problems, and adjust the teaching plan, in order to obtain better teaching effect.

## 4 Conclusion

The author combed the ideological and political construction process of the "airport engineering foundation" professional course, and determined the teaching objectives of the course. In the teaching process, through the combination of case analysis, professional knowledge points and ideological and political elements, students' professional knowledge literacy and practical engineering application ability were cultivated, leading students to establish sound values, To achieve the ultimate goal of training civil aviation transportation application-oriented talents for local economic development.

## References:

- [1] Zhaoming Gu Improve the implementation mechanism of moral education [j]China higher education, 2019, (Z3): 16-18
- [2] Jun Xie,Tuo Huang Thinking on the practice of subgrade and pavement engineering course under the background of new engineering [j]University education, 2021, (12): 64-66
- [3] Mingli Zhang,RuiLing Zhang,Degang Feng Research Progress on disease investigation and control of pot cover effect in cold regions [j]Science, technology and engineering, 2021, (19): 63-73
- [4] Wangchun Chen,Zhetai Han, Kan Bao Application of ultra high strength modified synthetic fiber concrete in Beijing Daxing International Airport [j] Journal of civil aviation, 2022, (01): 17-21
- [5] Xiaowei Gu,Xiaochuan Xu,Lei Sun, etcl Exploration and practice of Ideological and political teaching in engineering courses [j]China higher education,

2021, (Z3): 59-61

- [6] Yanyu Cui,Zhiwei Wu,Yuanyuan Chen, et al Reflections on the integration of engineering professional practice into “curriculum ideological and political” education [j]China extracurricular education, 2020 (9): 2
- [7] Yang Bai Application of intelligent system management in airport engineering [j]Jiangxi building materials, 2020 (11): 2
- [8] Jun Zhang Research on the teaching implementation path of “Ideological and political course” of airport operation management in Higher Vocational Colleges [j]Knowledge economy, 2021592 (024): 178-180
- [9] Huaxi Zhu,Xiaxin Xu,Zhuopeng Xiao Teaching reform based on the ideological and political course of airport operation major -- Taking airport ground service training as an example [j]China storage and transportation, 2022 (11): 2
- [10] Linhong Wei,Jingjing Lei,Huaichun Cao Exploration on the construction content and implementation path of “curriculum ideological and political” for graduate students in civil aviation colleges [j]Journal of China Civil Aviation Flight Academy, 2019,30 (6): 5
- [11] Xiaoying Gu,Zhiqiang Chen Exploration and practice of “curriculum ideological and political” construction in Higher Vocational Colleges -- Taking Zhangjiajie aviation industry vocational and Technical College as an example [j]Light industry technology, 2020 (7): 2
- [12] Jing Yu,Zhenjun Yue,Yongxing Jia Exploration on the path of Ideological and political construction of science and engineering courses in the new era [j]University: Ideological and political education and research, 2021 (5): 10-13
- [13] Song Li,Xiyu Zheng,Shengbo Jiao Practice of Ideological and political construction of aircraft flight mechanics course --- Taking takeoff control principle as an example [j]Heilongjiang science, 2022,13 (21): 3
- [14] Chunjin Gao,Yu Gong,Li Tao Exploration on the construction path of integrating the professional course of aircraft maintenance into the ideological and political education of the course [j].2021(32): 2
- [15] Guoye Jiang,Ming Pang,Liuhua Gao, etc Build the industry characteristic curriculum system of oil and gas storage and transportation engineering specialty with the concept of “four types of airports” [j].2020(36): 69
- [16] Xin Zhao Research on the ideological and political teaching path of professional courses in Higher Vocational Colleges under the background of “Internet +” [j]Love, marriage and family, 2022 (36): 2
- [17] Yan Li,Xianfeng Zhang,Caiyun Chen Exploration and practice of Ideological and political education in the course of aircraft structural strength analysis [j]Educational observation, 2022,11 (25): 4
- [18] Xiaoyu Chen,Zhiyong Wang Research on the dilemma and Countermeasures of Ideological and political education in Higher Vocational Colleges in the new era from the perspective of Ideological and political course [j]Knowledge economy, 2022 (34): 3
- [19] Xiaowen Xiong,Xiaoyin Xu Practical exploration on the integration of mechanical foundation into Ideological and political education in secondary vocational schools [j]Guangdong Education: vocational education, 2022 (12): 2
- [20] Zuyun Chen,Ziyi Zhou Ideological and political teaching practice of “safety ergonomics” course [j].2021(32): 3

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