

# Exploration and Practice of Ideological and Political Education in Engineering Graphics Digital Extracurricular Counseling Course

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**Abstract:** In the context of the deep integration of digitalization and innovation and entrepreneurship education, this study focuses on the characteristics of schools and courses, investigates students' expectations and needs for ideological and political elements, and deeply explores ideological and political cases such as the Beidahuang spirit, Daqing spirit, model worker spirit, and role models around them. It explores the integration practice of "curriculum ideological and political" in extracurricular tutoring teaching of engineering graphics, aiming to guide students to establish patriotism, love for schools, knowledge of agriculture, and love for agriculture, and effectively enhance the coordinated development of students' graphic skills and ideological and political literacy. Practice has shown that integrating ideological and political resources, incorporating ideological and political elements into curriculum content and practical activities, can effectively enhance the collaborative development of students' graphic skills and ideological and political literacy. At the same time, it provides new ideas and references for expanding ideological and political education to extracurricular tutoring courses.

**Keywords:** Engineering graphics; Course ideology and politics; Innovation and entrepreneurship education; Extracurricular tutoring courses; Integration path

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## 1. Introduction

In recent years, with the continuous promotion of the construction of "curriculum ideological and political education", colleges and universities have gradually built a curriculum system integrating knowledge transfer and value building<sup>[1-3]</sup>. As a basic course in the field of engineering technology, engineering graphics not only undertakes the task of cultivating students' spatial imagination ability, drawing ability, and engineering literacy<sup>[4-7]</sup>, but also carries the leading function of students' world outlook, outlook on life, and values. In order to better serve college students' innovation and entrepreneurship activities, the digital extracurricular counseling course of engineering graphics, which aims to improve students' innovation and design ability, takes 'apps.chaoxing.com' as the platform, and integrates and utilizes extracurricular teaching resources to meet students' extracurricular

self-study <sup>[8]</sup>. However, the use of a large number of extracurricular teaching resources and online platform teaching will inevitably lead to the problems of a lack of ideological and political education in varying degrees and insufficient attention to the improvement of Ideological and political literacy. Therefore, how to effectively integrate the concept of “curriculum ideological and political” into the digital extracurricular counseling course of engineering graphics on the basis of extracurricular teaching resources has become an urgent problem to be solved.

Based on the characteristics of the school and the curriculum, this study proposes to explore the integration practice of “curriculum ideological and political” in the extracurricular counseling teaching of engineering graphics by excavating the ideological and political cases such as Beidahuang spirit <sup>[9,10]</sup>, Daqing spirit <sup>[11]</sup>, model worker spirit <sup>[12,13]</sup>, and examples around, and verifies the teaching effect with practical cases. The research aims to guide students to establish the feelings of patriotism, love for school, knowledge of agriculture, and love for agriculture, and effectively improve the collaborative development of students’ graphics skills and ideological and political literacy. It also provides new ideas and references for the extracurricular expansion of ideological and political education.

## **2. The necessity of the integration of extracurricular teaching resources of engineering graphics and “curriculum ideological and political”**

### **2.1. Current situation of ideological and political resources for extracurricular teaching of Engineering Graphics**

At present, engineering graphics extracurricular teaching resources are rich and diverse, mainly including MOOC, platform online courses, micro courses and other digital resources, which play an important role in improving students’ drawing skills, spatial thinking ability and practical ability. According to the current situation of the integration of “curriculum ideological and political education” of the above resources, it can be divided into three categories: graphics curriculum resources with perfect curriculum ideological and political education, graphics curriculum resources with imperfect ideological and political education content, and graphics teaching and training resources with pure technology flow.

Class I: the graphics curriculum resources with perfect courses of ideological and political education are mainly MOOC and online courses on teaching platforms. The above courses are mainly recorded by teachers in Colleges and universities. They have relatively perfect ideological and political content and integrate nature. However, these courses are basically designed for online and offline mixed courses for students. The graphics knowledge is comprehensive and basic, and the skills training part is also relatively basic.

Class II: the graphics curriculum resources with ideological and political content but not perfect are mainly online courses and technical materials such as interpretation of national standards, which are congenital with ideological and political content. Interpretation of national standards is not only the teaching of technology, the implementation of standards, but also the publicity of national advanced technology.

Class III: Graphics teaching and training resources with pure technology flow are mainly software learning and training resources recorded by various technical experts, enthusiasts, or learners on various media platforms, such as Netease Open Class and BiliBili. Their main characteristics are that the technical explanations have their own characteristics, professional explanations, and no intention or special integration of ideological and political education content. Therefore, these courses are pure technology communication and training.

### **2.2. The necessity of the integration of extracurricular counseling in engineering graphics and “curriculum ideological and political”**

“Curriculum ideological and political education” means to realize the unity of knowledge imparting and value

guidance through curriculum teaching, integrate ideological and political education into various courses, and cultivate students' feelings of home and country, sense of social responsibility and innovative spirit <sup>[14]</sup>. The ideological and political goal of engineering graphics is to integrate the ideological and political elements such as the standardization and preciseness of drawing, Pillars of a Great Nation, Patriotic Sentiments, the spirit of craftsman and innovation into the curriculum, and guide students to establish the responsibility of knowing and loving agriculture.

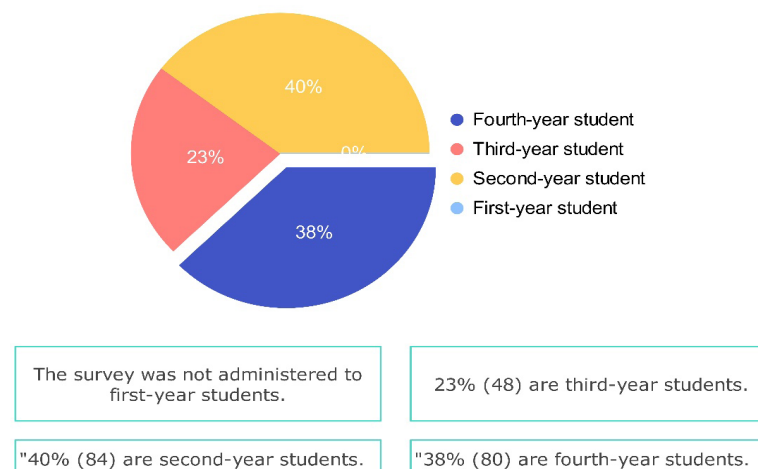
The extracurricular counseling course of engineering graphics, which serves the “mass entrepreneurship and innovation” activities of college students, contains rich ideological and political resources in the teaching process. Through the ideological and political transformation of extracurricular resources, it can not only make up for the limitation of classroom teaching time, but also enhance students' emotional identity with the help of flexible and diverse forms, so as to achieve the educational effect of “moistening things silently”.

### 2.3. Students' expectation of extracurricular counseling of engineering graphics in the course of “ideological and political education”

In order to improve the effect of Ideological and political education of engineering graphics digital extracurricular counseling course, make the content of ideological and political education closer to students, more in line with students' real ideas on the content of ideological and political education, and achieve better teaching and learning matching, an online questionnaire survey was carried out on “what kind of Ideological and political elements we need -- Questionnaire on students' needs for ideological and political education of engineering graphics digital extracurricular counseling course”.

#### 2.3.1. Questionnaire

The key of the questionnaire is to focus on the “needs” of students, understand students' real views, preferences, and expectations on Ideological and political content, forms, integration methods, etc., so as to design ideological and political content and elements more pertinently. The questionnaire was distributed online at the beginning of the study. The questionnaire consists of 22 questions, covering the survey object, the core theme (ideological and political elements), and the content, form, carrier, and other aspects of ideological and political education. Questionnaires were distributed to 220 sophomores to seniors. The grade distribution of the surveyed students is shown in **Figure 1**. 212 questionnaires were collected, and 212 were valid.



**Figure 1.** Grade distribution of surveyed students

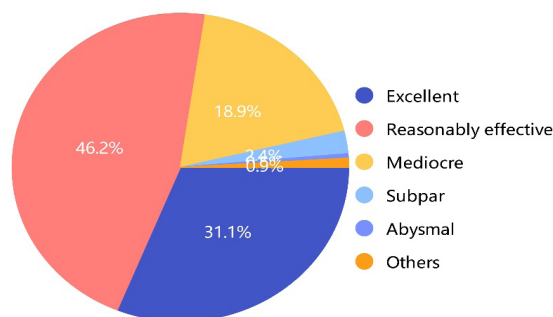
### 2.3.2. Analysis of survey results

#### (1) Students' cognition and basic attitude towards ideological and political education

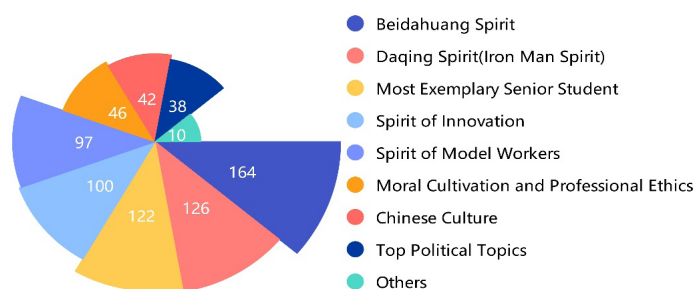
As most of the surveyed students are sophomores, juniors, and seniors from the school of engineering, the school of electrical and information engineering, and the school of food science, they all have a certain understanding of Ideological and political education and have their own understanding of the perception and evaluation of existing ideological and political elements. In this part, there are five survey contents, which are: 1) the importance of ideological and political education to personal growth; 2) Channels and ways to contact and understand ideological and political content; 3) The overall feeling of the ideological and political education content currently contacted; 4) At present, there are problems in the content of Ideological and political education; 5) The effect of Integrating Ideological and political elements into professional courses. From the survey results, it can be seen that students' understanding of the importance of Ideological and political education is generally positive, and there are many channels and ways to obtain ideological and political education. The survey results also reflect that the content and form of Ideological and political education that students are currently exposed to are mixed. There are excellent works worth learning from, but also shortcomings worth considering, as shown in **Figure 2**.

#### (2) Expectations of Ideological and political elements

From the survey results, we can see that the overall situation of the ideological and political content of the course that students are exposed to is good, and 57.1% of the students think it is more attractive and has some harvest; About 11% of them think that they are not very attractive and boring, as shown in **Figure 5**; In terms of content requirements, Beidahuang spirit, iron man spirit and excellent senior example have become the ideological and political elements most expected by students, accounting for 77.4%, 59.4% and 57.5% respectively, ranking in the top three. The spirit of innovation and the spirit of model worker have also been favored by many students, as shown in **Figure 3**.



**Figure 2.** Overall experience of ideological and political education content



**Figure 3.** Expectation statistics of ideological and political element requirements

### 3. Design of ideological and political resources for extracurricular counseling course of Engineering Graphics

#### 3.1. Integration of ideological and political resources

In order to effectively integrate the extracurricular counseling course of engineering graphics with the content of “Ideological and political education”, it is necessary to integrate the ideological and political resources based on the actual situation of the school and the local to form a systematic ideological and political education resource library, mainly from the following aspects, as shown in **Figure 4**.

(1) Clarify the purpose and significance of the integration of Ideological and political elements

The purpose of Integrating Ideological and political elements into Extracurricular counseling courses is to enrich the course content, better cultivate students’ patriotism and social responsibility, encourage students’ innovation and entrepreneurship, encourage students to learn from model workers and advanced workers, and guide students to establish the responsibility of knowing and loving farmers.

(2) Excavating the spirit of the Northern Wilderness of Ideological and political resources with school characteristics

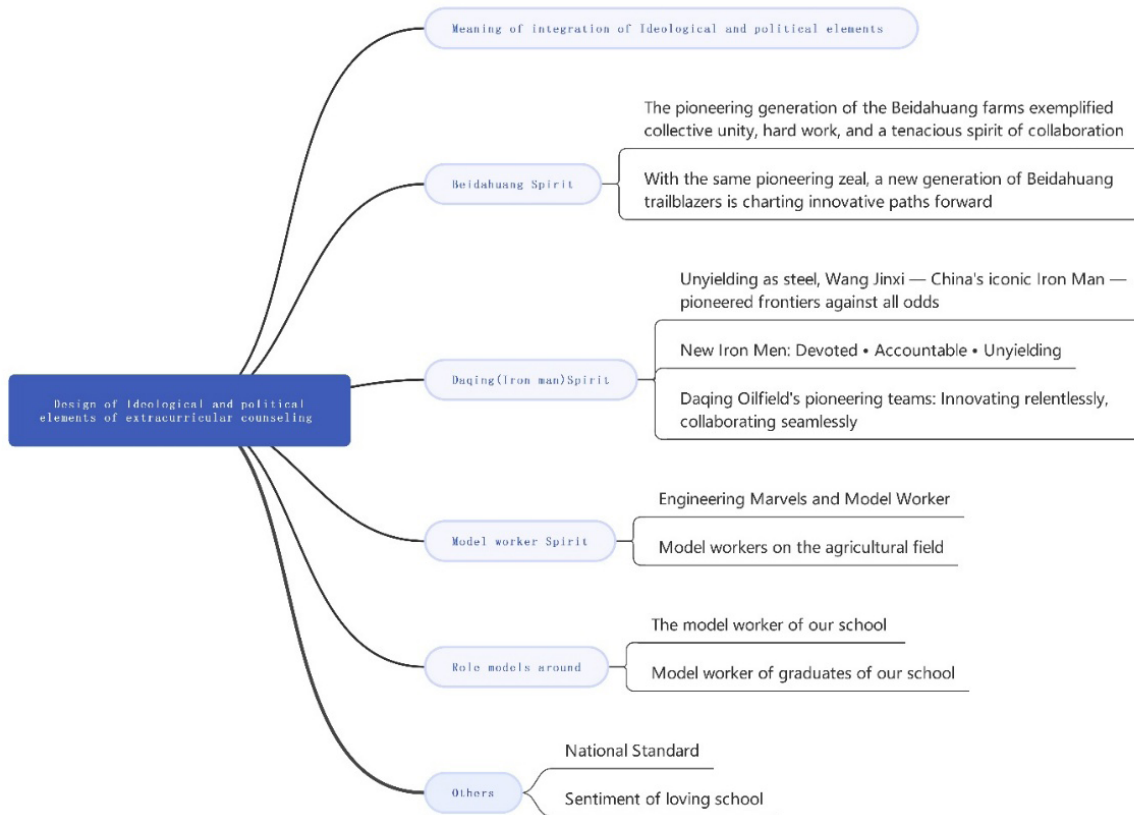
Heilongjiang Bayi Agricultural University, as the birthplace and inheritor of the Beidahuang Spirit, has inherited the red gene resources of the Beidahuang Spirit with its unique school running tradition and advantages. Its connotation mainly includes “self-reliance, hard work, courage to explore and dedication”<sup>[9]</sup>. Since 1947, in response to the call of the CPC Central Committee and Chairman Mao, the first batch of Beidahuang people, represented by Yang Qinghai, Zhou Guangya and Li Ziren, shoulder the responsibility and mission of building a “grain factory”, cultivating cadres, accumulating experience, creating models, demonstrating farmers and rural construction, and ignite the spark of development and entrepreneurship in Beidahuang<sup>[9]</sup>. In the new era and new journey, the spirit of the Beidahuang has been given the new mission of “science and technology leading, green development”. Integrating the school’s own history and the moving deeds of our ancestors into the extracurricular counseling course of engineering graphics will better motivate students’ patriotism, love for agriculture and dedication.

(3) Explore the ideological and political resources with regional characteristics Daqing Spirit (Iron Man Spirit)<sup>[11]</sup>. In 2003, Heilongjiang Bayi Agricultural University moved from Peide town in Mishan to Daqing across thousands of miles. Daqing is a heroic city. Daqing Spirit and Iron Man Spirit are the soul of Daqing city and Daqing people. The school is located in such a heroic city. We should tell the children, let them understand, let them know: the story of the iron man, the immortality of Daqing. We should integrate the stories of Daqing and the iron man, and the deeds of the new Daqing and the new iron man into the extracurricular counseling course of engineering graphics, so that students can experience, comprehend and inherit them. One day, they will also grow into the iron man Wang Jinxi.

(4) Mining the case resources of excellent teachers and graduates

Over the past 60 years since the founding of Heilongjiang Bayi Agricultural University, many excellent teachers, model workers and advanced workers at the national, provincial and university levels have emerged. There are professor Zheng Guiping, the “national excellent teacher”, Professor Zhang Yuxian, the winner of the “National May 1st Labor Medal”, and Professor Yi Shujuan, the “provincial excellent teacher”, and so on. Since its establishment, the school has provided more than 130000 agricultural talents for the country, including Chang Guoli, the winner of the “National May 1st Labor Medal”, Li Rui, the winner of the “National May 1st Labor Medal”, and Wang Dan, the most beautiful

worker in Heilongjiang. Their excellent quality of “hard work and taking root in the grass-roots” has been widely recognized by employers. The school’s valuable case resources are the best example for students at school and the direction of their future efforts. Through the course of Ideological and political education, let students know that through their unremitting efforts, they will also shine in their respective posts in the near future.



**Figure 4.** Design of ideological and political elements of extracurricular counseling

### 3.2. Integration and integration of extracurricular counseling courses and ideological and political elements

Based on the integration of Ideological and political resources, it is necessary to integrate the ideological and political elements into the extracurricular counseling course of engineering graphics to achieve the unity of knowledge transfer and value guidance. Due to the particularity of the extracurricular counseling course, the course is composed of three parts: basic part, advanced part, and high-level part. Therefore, in the process of Ideological and political integration and integration, we need to consider the differences of resources.

#### (1) Integration of Ideological and political elements in basic and advanced parts

The basic part is mainly composed of the engineering drawing course materials, and the ideological and political elements are integrated into the course according to the chapters, as shown in **Table 1**. The advanced part is mainly composed of the course materials of computer graphics. During the course recording and teaching, the ideological and political contents such as the Pillars of a Great Nation and the Patriotic Sentiments integrated. See **Table 2**.



**Table 1.** Summary of the fusion of ideological and political elements in the basic chapter

Course content	Ideological and political cases	Ideological and political elements
1 <sup>st</sup> Introduction, basic knowledge of drawing (I)	Lirui, a graduate of Agricultural University in 2006 and winner of the National May 1st Labor Medal	First knowledge of craftsman spirit
2 <sup>nd</sup> Projection foundation	China granary-Beidahuang	Beidahuang Spirit
3 <sup>rd</sup> Stereoscopic projection	The first generation of female tractor drivers in	
4 <sup>th</sup> Basic knowledge of drawing (II), combination	New China	National Soul
5 <sup>th</sup> Basic representation of drawings	National Standard	National Soul
7 <sup>th</sup> Special representation of drawings	Engineering Marvels	
	Iron man Wang Jinxi	Daqing Spirit
8 <sup>th</sup> Part drawing		
9 <sup>th</sup> Assembly drawing		Team Spirit

**Table 2.** Advanced level ideological and political elements fusion table

Course content	Ideological and political cases	Ideological and political elements
AutoCAD Project preparation	bottleneck	National Soul
Template settings	Interpretation of national standards	National Soul
Common commands and basic drawing	Class badge design	
Two dimensional drawing, dimensioning and information query	Drawing of national flag and railway Badge	National Soul
Three view and axonometric drawing		
Text input, blocks and tables		
Drawing of parts	Agricultural machinery parts drawing	Knowing and loving agriculture
Assembly drawing	Agricultural machinery assembly drawing	Knowing and loving agriculture
UG Project preparation		
Sketch	Creative design	Creative spirit
Modeling	Creative design	Creative spirit
Curve	School badge modeling	Sentiment of loving school
Assembly design	Assembly of agricultural machinery parts	Knowing and loving agriculture

## (2) The integration of Ideological and political elements in higher-level parts

The high-level parts course resources are mainly composed of modules such as UG NX advanced surface technology, assembly practical application and parametric modeling. The main teaching content is formed by integrating network high-quality training resources. In order to strengthen the ideological and political education function of the course, this course adopts the two-way integration path of “knowledge module reconstruction + ideological and political carrier innovation”: in the construction of teaching resources, a special question answering module is added on the basis of the original theory explanation video, and the parametric modeling case library of the award-winning projects of the National College Students’ innovation and entrepreneurship training program is embedded; In terms of the ideological and political integration of the course, the latest achievements of innovation and entrepreneurship in our school are displayed through cases, and the craftsman spirit education is infiltrated into the technical analysis. At the same time, we pay attention to example demonstration, share the deeds of outstanding graduates, carry forward the spirit of model workers, and establish a

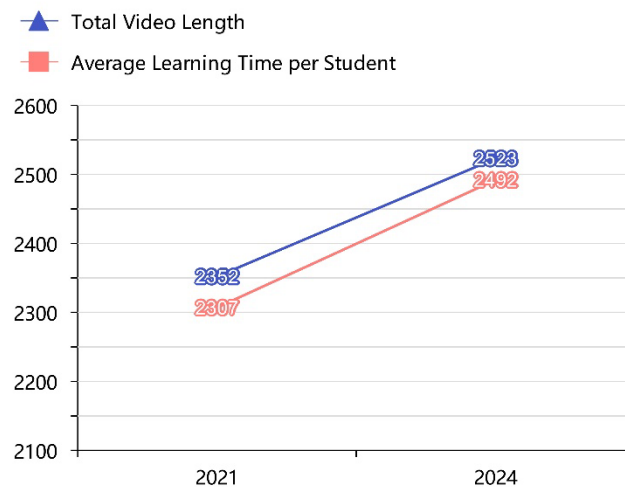
peer guidance mechanism.

## 4. Practice effect and analysis

Through the integration of extracurricular counseling course of engineering graphics and ideological and political elements, the internalization of students' values and learning effect has also achieved preliminary results.

### 4.1. Increase in learning duration

By comparing the video learning time of the 2021 and 2024 versions of the course, it can be seen that the video learning time of the 2021 version is 2352 minutes, and the average learning time of each student is 2307 minutes; The length of the 2024 version of the video is 2523 minutes (a total of 171 minutes of Ideological and political content has been added), and the average learning time of each student is 2492 minutes (the average learning time has been increased by 185 minutes). This shows that after adding ideological and political content, the average learning time is further increased by 14 minutes based on the increase of Ideological and political content, as shown in **Figure 5**. It can also be reflected from the side that the increase of Ideological and political content has not affected students' learning enthusiasm, but has improved.



**Figure 5.** Comparison of learning duration

### 4.2. More standardized drawing

By strengthening the explanation of mechanical drawing standards and map reading training, and strengthening the integration of craftsman spirit, model worker spirit, Northern Wilderness spirit, iron man spirit and other ideological and political elements, the internalization of values leads to the improvement of behavior,

The drawing works submitted by students and engineering drawings for product production are more standardized. It can also be seen that the mastery of skills is supplemented by the guidance of ideas, and students' expression in project product design is more standardized and accurate.

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## Disclosure statement

The authors declare no conflict of interest.

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