

# Difficulties of Internship in Off-Campus Engineering and Research on Innovative Countermeasures

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*Abstract:* At present, China's higher education attaches importance to the imparting of knowledge and skills, but lacks the cultivation of creativity and creativity. Students trained in this way are available, but they are not innovative talents. The reason is that such students can only use the existing knowledge or skills to perform the tasks conservatively in accordance with the established process, without any innovative ideas in the completion of the task, and of course, it cannot produce innovative results. In order to change this situation, first of all, we should encourage the students' innovative consciousness and spirit of innovation. On this basis, we can strengthen the cultivation of innovation ability from the curriculum system, teaching methods and so on. Through the exploration of the training mode of innovative talents in the exploration engineering, the article hopes to provide reference for the professional construction of resources exploration engineering, especially the professional construction of petroleum and natural gas geological exploration direction, the training and evaluation of talents.

#### 1. Introduction

Innovative talent training is the core of a national and national education. The key to the competitiveness of a country, a nation, and a region is the size of innovation capability. Accelerating the ability to innovate and cultivating innovative talents is a very urgent and important strategic task facing China's modernization drive. Oil and natural gas belong to national strategic materials and occupy an extremely important position in the development of the national economy. As an important part of the exploration technology and engineering practice teaching system, off-campus internship is a comprehensive teaching link to strengthen students' professional knowledge and theory and practice. It is also an important way to cultivate comprehensive and innovative talents. In recent years, with the expansion of colleges and universities and the restructuring of oilfield enterprises, some new problems have appeared in the off-campus internship process of logging students, which has affected the quality of internships and the cultivation of talents. In order to better implement the "practical education" teaching concept, this paper combines

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the exploration technology and the engineering practice of the logging direction of the engineering profession to think about the problems existing in the off-campus internship process, analyze the reasons, and explore the better realization of the teaching objectives.

## 2. Characteristics and Development Status of the Survey Engineering Major

## 2.1. Wide Range of Fields Involved

This major is based on the original application of geophysics, hydrogeology and engineering geology, exploration engineering, remote sensing technology and other professional, according to the national new professional catalogue adjusted wide-caliber professional. Based on the differences in physical properties of the Earth's internal materials, this specialty uses sophisticated specialized instruments to observe the distribution of various natural or artificial geophysical fields on the surface, underground, air and ocean, using modern computer processing methods to obtain the signals and The information is processed to study the changing laws to find oil, natural gas, groundwater, geothermal and solid mineral resources, to conduct high-rise buildings, water conservancy hydropower stations, roads and bridges, airport construction and other engineering exploration, urban underground pipeline detection, environmental protection research, seismic monitoring Wait.

#### **2.2. Application Width**

After graduation, the students can work in the research, production, teaching and management of Geophysics in energy, geological, earthquake, transportation, railway, hydropower, coal, construction, non-ferrous metallurgy, environmental protection and other industries as well as troops, scientific research institutes and colleges and universities.

#### **2.3. The Shortcomings**

The professional characteristics are distinct, and the training objectives are clear. However, there are still some areas worthy of improvement for the training of outstanding engineers. (1) in the training target, the training of applied talents is emphasized, and the cultivation of innovative talents is ignored; (2) the curriculum system is overstaffed, the credits are up to 200 credits or more, the students are overburdened; (3) the combination of theory and practice is not enough, and many practice links are in the school and divorced from the actual production.

#### 3. The Current Problems in the Investigation Engineering Internship

#### **3.1. Enterprise Security and Production Efficiency Pressure**

At present, enterprises are reluctant to accept student internships in terms of safety and production efficiency. First, oilfield work involves drilling, oil and gas, and underground tooling operations. These areas are generally remote and the surrounding environment is relatively harsh. There are often large-scale heavy machinery and the operation process is dangerous. For college students, the possibility of accidental injury Bigger. Second, due to the high cost of drilling operations, if students are involved in production, the production process will be delayed to some extent. Third, due to the limited number of wells drilled team's own camping room, students enter

the on-site training, accommodation is a big problem. Therefore, the current production internships of resource exploration majors are mostly based on internships, and there is basically no opportunity for hands-on operation.

#### **3.2. The Internship is Insufficient**

The faculty is the core part of the teaching process. Establishing a reasonable faculty echelon is the cornerstone of professional development and inheritance. In recent years, the college has introduced a large number of highly educated talents. Many young teachers who have just entered the school have not experienced the on-the-spot practical system training, and they are directly involved in the production internship teaching. Therefore, young teachers have insufficient experience in scientific research and production practice. The vividness, image and depth of the course will affect the quality and effectiveness of the teaching.

#### 3.3. Students do not Pay Enough Attention

There are two reasons for this: production internships are usually arranged from August to September each year. Some students are busy looking for work or postgraduate exams during production internships. The weather is hot and hot, and some students in the field are difficult to concentrate on learning. Second, now Students have more extensive employment channels, and some students do not pay attention to production internships.

# **3.4.** The Internship Time, Location and On-Site Production Arrangements are Inconsistent, Resulting in Some Internships not Being Completed

When selecting the internship location and the internship unit, they are constrained by insufficient funds. In order to save transportation expenses, they can only adopt the principle of proximity; on the other hand, the time of student internship is fixed, and the on-site process production is based on production needs. The progress may not coincide with the student's internship time, which may result in a certain gap with the requirements of the teaching plan.

# **3.5.** The On-Site Environment and Students' Lack of Understanding of the Internship Content Cannot Guarantee the On-Site Explanation

The purpose of the resource exploration undergraduate production internship is to enable students to have a more comprehensive understanding of common equipment and downhole tools in the well site, master the relevant technology of oil and gas drilling, and lay the foundation for the study of professional courses. The safety pressures and funds of the company make it possible for students to conduct in a visit-oriented manner, so it is difficult for students to understand the tools and equipment they see on the spot.

#### 4. The Investigation of Engineering Internship Difficulties, Innovative Solutions

#### 4.1. Emphasis on Practical Teaching and Reform of Teaching System

To change the status quo of practice teaching in exploration technology and engineering, we must strengthen the emphasis on practical teaching. We will change the concept of stressing theory and light practice, and put the concept of "practical education" into teaching, promote the reform of

the teaching system, increase capital and talent investment, and ensure that practical teaching is implemented. Specific measures include: the school increased investment in practical teaching bases and talent teams, tried to develop new practice bases, gave birth control base development management, maintained more financial support, and cultivated high-quality enterprise guidance teachers; It is necessary to formulate talent training objectives and training models so that students can quickly enter jobs and meet business needs after graduation; increase the requirements of student internship courses and credits, and formulate reasonable teaching content and teaching methods according to practical teaching objectives, and effectively strengthen students. Cultivation of innovative consciousness, innovative ability and practical ability.

# **4.2. Build** A "School-Enterprise Win-Win" Cooperation Mechanism and Strengthen the Construction of the Practice Base

Strengthen the construction of off-campus practice bases, build a cooperative mechanism for oilfield enterprises and schools to achieve a win-win situation, and ensure that the practice bases continue to play a role in teaching. At present, the number of internship bases is reduced, the participation of enterprises and their employees is not high, and the resources for internships are limited. The reason is that colleges and universities do not use the internship bases, and the enterprises pay higher costs and bear more risks in the internship process. The real benefits are small. While the university puts forward the role and importance of practical teaching to personnel training and scientific research, it must solve the problem that "the school-enterprise joint construction base can bring benefits to enterprises", and must comprehensively and scientifically understand students, enterprises and The school has a win-win relationship. Schools should strengthen the construction of internship facilities, give appropriate guidance and training opportunities to business instructors, pay attention to the needs of enterprises and problems encountered, and give full play to the advantages of scientific research and technology in universities, so that enterprises can see benefits. Expanding the function of the off-campus practice base from the traditional student practice training mode to include high-level applied talent training, teacher training, corporate culture construction, production management problem research, employee training, training and assessment, technical service and development, application promotion, etc. Establish a long-term mechanism for cooperation between industry, universities and research institutes. By utilizing the complementary advantages of resources, we will carry out cooperation and exchange activities on a regular basis, and ultimately realize the construction of off-campus practice bases, which is beneficial to enterprises, schools and students.

#### 4.3. Strengthen Practice and Train Innovative Talents

The practice base of college students can not only improve students' practical ability, but also enable students to consolidate their theoretical knowledge through practical links and improve their ability to observe, analyze and solve problems in the background of real engineering training, and stimulate students' innovative consciousness. Before the internship, the instructors in the school should arrange suitable internship posts for each student's interest, characteristics and future work direction. For example, the students of well logging direction are divided into several groups, such as logging instrument development, field operation, logging interpretation, logging method research, rock physics experiment and so on. The students of each group are arranged to the corresponding branch, and then one enterprise instructor is assigned to each student. Let the students use as little time as possible to complete the unified prescribed practice content, and put more time into the content that they like to learn, so as to avoid a large number of students to an internship at the same time, there is not enough enterprise guidance teachers and practice resources to affect the quality of teaching. In addition, students should be encouraged to consult and discuss more, learn to find out and find answers in and out of class books. After a failure to successfully solve the actual problems existing in the enterprise after a failure, it has aroused the students' strong desire for knowledge and interest in learning, so as to achieve the purpose of cultivating students' theory of practice and the courage to innovate.

#### 4.4. Emphasis on the Evaluation and Management of the Practice Base

The comprehensive evaluation of the outside school practice base is helpful to promote the improvement of the quality of the teaching practice outside school, to evaluate the construction, to make the practice base outside the school more scientific and standardized, and to obtain the feedback information of the teaching links outside the school, and to find out the deficiencies in the construction of the foundation field outside school and the questions in the teaching. Summing up experience and combining evaluation and construction, so that the construction of off campus practice bases has been gradually improved and improved. In order to make the practice base meet the required basic conditions, a reasonable index system and a scientific evaluation method must be set up, and the evaluation results should be quantified as far as possible. First, we follow the principles of objectives, comprehensiveness, scientificity and operability, and select the evaluation indexes in detail; then, establish the evaluation index system and evaluation criteria by classification, and determine the weight of each evaluation target for the purpose of practice; finally, establish a scientific and reasonable evaluation method. Through the objective and fair evaluation of the practice base, it provides a decision-making basis for the further construction of off campus practice base and the improvement of teaching quality. Of course, the work should be sustained and institutionalized gradually, and the corresponding system and standard should be formulated to provide high quality and soft hardware conditions for the improvement of the quality of the teaching practice outside the school.

#### 5. Research on Questionnaire Survey of Exploration Engineering Practice Outside School

Through the exploration of innovative talent training mode of exploration engineering, this paper hopes to provide reference for the professional construction of resource exploration engineering, especially for the professional construction of oil and gas geological exploration. In order to understand the attitude of resource exploration engineering students towards the learning process of off campus internship arrangement, this paper uses the form of questionnaire survey to make a comprehensive, objective and fair evaluation on the off campus internship situation of resource exploration engineering students. This paper designs an evaluation template. The calculation basis of this scoring template is the weighted summary method, and the formula is as follows:

$$A = \sum_{i=1}^{l} \lambda_i \left[ \sum_{j=1}^{m} \lambda_{ij} \left( \sum_{k=1}^{n} \lambda_{ijk} a_{ijk} \right) \right]$$
(1)

At the same time, when the evaluation method is designed to collect and process the information, the weighted sum scoring method will be used to process the collected information, and the formula is as follows:

$$S = \sum_{i=1}^{n} Q_i S_i (i = 1, 2, ..., n)$$
<sup>(2)</sup>

Among them, a and s are the comprehensive scores, and the indexes are i, j, k. through the analysis and processing of the indexes, the evaluation information data is calculated, and the students' situation is evaluated, so as to understand the learning process attitude of the students majoring in resource exploration engineering to the arrangement of off campus internship. Through the establishment of exploration engineering personnel training objectives and training mode, exploration engineering students can quickly enter the work post after graduation to meet the business needs.

#### 6. Research and Analysis of Exploration Engineering Off Campus Practice

#### 6.1. Analysis of the Arrangement of Exploration Engineering Practice Outside School

At present, most of the production practice of resource exploration major is based on practice, and there is basically no opportunity for hands-on operation. Most of the students conduct exploration engineering practice by visiting, so it is difficult for students to understand the tools and equipment they see on the scene. In order to cultivate exploration engineering students' off campus practice, this paper attaches importance to off campus base practice. Through practice base practice, students' practical ability can be improved. Students can consolidate theoretical knowledge through practice, and improve their ability to observe, analyze and solve problems under the background of practical engineering training. The school arranges the schedule according to the content required for the off campus practice of exploration engineering specialty, and the content is shown in Table 1.

	Teaching time	Teaching methods
On site practice mobilization	0.5	field teaching
Understanding exploration tools	1.5	field teaching
Practical operation of geological exploration	2	field teaching
Foundation pit support theory	1	field teaching
Practical operation of foundation pit support	2	field teaching
Practical operation of foundation treatment	3	field teaching
Construction process observation	1	field teaching

Table 1. Exploration engineering internship schedule

It can be seen from table 1 that the school arranges the schedule according to the content required by the off campus practice of exploration engineering specialty, which is actually established according to the operation process of future students' employment construction. Students can establish the cognitive system of exploration engineering specialty process in the process of practice, and truly understand their future work content.

#### 6.2. Analysis on the Attitude of Exploration Engineering Students in Off Campus Practice

The off campus practice of exploration engineering is helpful for students to have a more comprehensive understanding of common well site equipment and downhole tools, master the related technology of oil and gas drilling, and lay a foundation for the study of professional courses.

This paper uses the form of questionnaire survey to investigate the attitude of exploration engineering students to practice outside school, and the data results are shown in Figure 1.



Figure 1. Analysis on the attitude of exploration engineering students in off campus practice

It can be seen from Figure 1 that the survey engineering students are satisfied with their attitude towards off campus practice. As high as 63.58% of the students think that off campus practice is very useful, 32.65% of the students also think that off campus practice is useful, and 3.77% of the students think that off campus practice is generally useful. No one refuses the effectiveness of off campus practice.

#### 7. Conclusion

With the development of technology and the updating of knowledge, this paper combines the off-campus internship work of university surveying technology and engineering professional logging direction, and pays attention to practical teaching, reforming teaching system and constructing school-enterprise in view of some shortcomings in the current internship process. The corresponding countermeasures and suggestions were put forward in the aspects of winning the cooperation mechanism, strengthening the practice and training of innovative talents, and attaching importance to the evaluation and management of the practice base. Only by effectively implementing off-campus internships and improving teaching effectiveness can we better implement the teaching philosophy of "practical education" and the organic combination of production, learning and research.

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## **Data Availability**

Data sharing is not applicable to this article as no new data were created or analysed in this study.

#### **Conflict of Interest**

The author states that this article has no conflict of interest.

#### References

- [1] Liu H, Zhu H, Liu X, et al. Exploration and practice on reform of engineering education based on collaborative innovation of school and enterprise. Experimental Technology & Management, 2013.
- [2] Wang S, Qin L, Wang G. Establishment and Innovation of PetroChina Exploration and Production Engineering Supervision Management System. Technology Supervision in Petroleum Industry, 2012, 9(5):689-98.
- [3] Jia J, Zuo X, Lei J, et al. Exploration on Application Technology Undergraduate Engineering Students' Practice and Innovation Training Mode. Guide of Science & Education, 2015.
- [4] Ye Q, Huang M. Exploration and practice on autonomy-learning innovation experiment for electronic information engineering. China Modern Educational Equipment, 2013.
- [5] Jia J, Zuo X, Lei J, et al. Exploration on Application Technology Undergraduate Engineering Students' Practice and Innovation Training Mode. Guide of Science & Education, 2015.
- [6] Cheng L, Jing-Yun Q I, Lan T, et al. Exploration on Automation Outstanding Engineer's Innovation Education System Based on Discipline Competition Group. Research & Exploration in Laboratory, 2016.
- [7] Yang L M. The Use of Technology Innovation in Geotechnical Engineering Investigation. Value Engineering, 2016.
- [8] Yu-Bei L U, Chen Y, Shen Y F. Strengthen the Ability of Science and Technology Innovation and Serve the Economic and Social Development—Retrospect and Expectation of the Innovation of Henan Engineering Research Center of Deep Exploration. Exploration Engineering, 2016.
- [9] Cai J, Yang H, University N N. Exploration and Thought of Training of Innovation Ability of Student of Engineering Incorporating Course Teaching. Science & Technology Innovation Herald, 2017.
- [10] Du Y, Gai L, Shi Q, et al. Exploration and Construction of Practice Teaching System in Local Engineering Colleges// International Conference on Information Technology in Medicine and Education. IEEE, 2017:544-548. https://doi.org/10.1109/ITME.2016.0129
- [11] Li X C. Practice and Exploration of Science and Technology Innovative Activities and Innovation Education of Science and Engineering Students in Universities// International Conference on Innovations in Economic Management and Social Science. 2017. https://doi.org/10.2991/iemss-17.2017.237
- [12] Liu X J, Luo Y S, Xue B, et al. Research and Exploration on Practical Teaching System Construction in the Electronic Information Engineering Specialty on Jiangsu University of Technology. Journal of Jiangsu University of Technology, 2016.
- [13] Yao M Y, Liu M H, Zhou H M, et al. Exploration in Improving the Ability of Agriculture Engineering Professional Master in Practice and Innovation Based on "Three in One". Education Teaching Forum, 2018.
- [14] Du C, Xu W, Wang H, et al. Teaching Reform and Exploration for the Training of Practice and Innovation Ability of Automotive Engineering Major. China Modern Educational Equipment, 2018.