Discussion of Establishing Metallic Mineral Processing Courses in the Major of Coal Preparation

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Abstract. The major of mineral processing mainly includes coal preparation and metallic mineral processing. Commonly, colleges only study in one direction instead of both. In order to broaden the students’ scope of knowledge and gain their opportunities for jobs, adjustments are needed for courses setting and training mode. Therefore, this paper analyses the necessity to set courses of metallic mineral processing for a college majoring in coal preparation and makes some particular suggestions for course reform.

Introduction

In the early days of new China, China’s industry lag behind other countries greatly. The output of raw coal in the whole country in 1949 was merely 32.84 million tons. For this reason, in the early 1950s, a number of geology and mining colleges were established and have now been a significant power for cultivation of high-level talents [1,2]. The major of mineral processing was also one of the first established major among mining colleges after the founding of new China. At the end of the 1980s, with the development in new material, biotechnology, information technology and economics, cultivation of high-level talents and scientific research in mining colleges were affected. At the beginning of the twenty-first century, coal and mining industry, including major of mineral processing, bloomed fast with the requirements for environment protection and highly resource utilization. In recent years, as the economy growth in China continues slowing down, development of coal industry comes to a rather low speed. High-talents of mineral processing in coal industry tend to be saturated and demand for graduate descends. It’s clear that traditional single cultivation mode which training students for coal preparation disturbs the improvement of mineral processing. Thus, as coal preparation teaching remaining, exploring new method to train students who are more suitable for multiple requirements has been the tendency.

Employment Situation of the Graduates of Mineral Processing

At the planned economy times in 1980s, students were enrolled by plan for mineral processing major and assigned by state, which means little difficulty in obtaining jobs. As market economy develops, enrollment and assignment turn to marketization, which is a two-way choice for both employers and graduates.

In recent years, relation between supply and demand has changed as economic growth slows down. Coal industry is under great pressure because of the effect of buyer’s market. While coal enterprises are likely to produce based on sale and stable growth policy shows its effect, supply and demand will come to a balance [3, 4]. Also with the fierce competition among coal enterprises, capital and technology will gather at those with technical advantage and multiple industries, which mean more chance for inter-disciplinary talents.

That the development of coal industry, the saturation of mineral processing talents and single training mode makes graduates feel confused when finding a job based on coal preparation only. Consequently, the training mode and courses setting must be reformed. For example, add courses of
metallic and non-metallic separation as additions and teach chemical beneficiation to broaden students’ scope of knowledge, so that graduates can be engaged in mineral processing of all kind.

Suggestions on Establishing Metallic Mineral Processing Courses

In general, students of coal preparation major in physical separation, solid-liquid separation process, experimental design, engineering design of coal preparation plant, basis of mechanical designing, mathematical model for mineral processing, technology management of coal preparation plant and so forth. He similarity and difference of courses setting between coal preparation colleges and metallic mineral processing ones are shown in Table 1 and Table 2. Apparently, these courses mainly serve for coal preparation. Still the graduates feel extremely hard to participate in projects about metallic separation since there is a huge difference between coal preparation process and metallic mineral processing [5].

Table 1. Similarity of courses setting between typical coal preparation colleges and metallic mineral processing colleges.

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<thead>
<tr>
<th>item</th>
<th>Typical coal preparation colleges</th>
<th>Typical metallic mineral processing colleges</th>
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</thead>
<tbody>
<tr>
<td>Similarity of courses setting</td>
<td>Processing and application of non-metallic mineral</td>
<td>Deep processing of non-metallic mineral</td>
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<td></td>
<td>Mineral processing experiments</td>
<td>Research method for mineral processing</td>
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<td>Application of computer in mineral processing</td>
<td>Computer aided design</td>
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<td>Power surface modification</td>
<td>Surface and interface chemistry</td>
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Table 2. Difference of courses setting between typical coal preparation colleges and metallic mineral processing colleges.

<table>
<thead>
<tr>
<th>item</th>
<th>Typical coal preparation colleges</th>
<th>Typical metallic mineral processing colleges</th>
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<tbody>
<tr>
<td>difference of courses setting</td>
<td>Clean coal technology</td>
<td>Pelletizing</td>
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<td></td>
<td>Coal chemistry and coal quality analysis</td>
<td>Mineral processing for precious metal</td>
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<td></td>
<td>Coal slime water treatment</td>
<td>Crushing and grinding</td>
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<td></td>
<td>Technology management of coal preparation plant</td>
<td>Concise course of metallurgy</td>
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<tr>
<td></td>
<td>Engineering design of coal preparation plant</td>
<td>Design for mineral processing plant</td>
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Curriculum Refining and Diversity Construction

Entering the 21st century, mineral processing techniques develop rapidly, new process and equipment are widely applied in commercial production. In order to make courses setting more reasonable to cover the shortage of inter-disciplinary talents, it is suggested that traditional courses setting should be reformed. For example, teach mineral processing technologies about metallic mineral such as hydrometallurgy and situ leaching, set more teaching periods for physical separation and add courses like crushing and grinding, pelletizing and modern testing technique.
Also textbooks should be rewritten to match with new courses.

**Improve Lecture Ability and Quality of Graduation Design**

Improving lecture ability requires that teachers adequately guide students to compare metallic mineral processing and coal preparation, meanwhile bring new and advanced process and equipment at home and broad into the class. New examination method should be established in which characteristics of metallic mineral processing and comparison of theories and processes between coal preparation and metallic mineral processing are to be emphasized.

Graduation design that is the most important part of mineral processing teaching is a combination of four year’s learning with practice and training for engineering quality and creativity. It reflects undergraduate teaching quality. Thus, according to personal interest and opinions, students can choose design topics related to metallic mineral processing by their will. During design period, it is necessary to invite experts and engineers to deliver some lectures to inspire positivity and creativity.

**Increase Metallic Practice Bases**

One of the characteristics of mineral processing major is that it is based on practice and closed related to production. With coal preparation plants to be foundations, adjustments are to be made for practice bases construction. More metallic processing plants for should be added as practice bases to guarantee the stability and flexibility, adjusted to newly set courses.

**Construction of Laboratory and Scientific Research**

By practicing and exploring in the laboratories, undergraduates absorb what they learn from class and turn it into innovation. Setting more scientific research projects and establishing new experimental platform for metallic mineral result in the improvement of research capacity, motivation and creativity of undergraduates.

**Summary**

Colleges in the major of coal preparation, in order to follow the development of economy and society and train inter-disciplinary talents with creativity and practical ability, are necessary to add metallic mineral processing courses, adjust training mode and courses setting while coal preparation courses remain. Improvement of lecture ability and increase of metallic practice bases also contribute to broadening the students’ scope of knowledge and gaining their opportunities for jobs.

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**References**


