

Quality Analysis on the Engineering Master of Biotechnology Specialty from Enterprise

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In order to express the engineering master's culture status of biotechnology from some enterprises, by questionnaire, 27 engineering masters from some enterprises and 22 academic masters from two universities, were investigated on the graduate students' origin, their tutors' title, the enterprise size and classify, their dissertation theme emphasis and classify, and the experiment condition for their dissertations. The results indicated that, the engineering masters were better than the academic masters on the practice condition and the practice chances, whereas, the academic masters markedly excelled the engineering masters on the tutors' level, the test condition, and the innovation environment of science and technology.

Keywords: Engineering Master; Enterprise Culture; Biotechnology Specialty; Comparison

Introduction

Since 1984, the engineering master culture has performed for over 20 years, many engineering masters are cultured into the practical talents of engineering[1-3]. The engineering masters' culture is a type of all graduate students' education as the academic masters, but the former emphasize particularly on culturing the practical and composite talents for some enterprises [1, 4-6], therefore, comparison with the academic masters, it is very different at the students' types, culturing approach, and knowledge frame [7, 8]. But there are many questions during culturing of the engineering masters, they mainly are shown that, its' culturing approach lacks diversity, the culture object isn't clear, moreover, the teaching teams of the tutors from some enterprises need to be enhanced, and so on [6, 8-10].

Biotechnology, an engineering master specialty, is bringing into very important role at food, medicine, and so on. But its' engineering master culture status from the enterprises was scarcely reported. So this paper aim is to try to research the fact by questionnaire.

Investigation Methods

By questionnaire, 27 engineering masters from some enterprises and 22 academic masters from Tianjin University of Science and Technology and Tianjin University of Commerce, were investigated on the graduate students' origin, their tutors' title, the enterprise size and classify, their dissertation theme emphasis and classify, and the experiment condition for their dissertations. The engineering masters study on the biotechnology specialty at the enterprises, while the academic masters mainly study on ferment engineering specialty.

Results and Discussion

The Graduate Students' Origin and Their Tutors' Title

There were difference between the engineering masters and

the academic masters at the graduate students' origin (**Table 1**). The in-service staffs and the equal educational background students of the engineer masters were more than those of the academic masters.

The educational background and the positional title of the research supervisors were listed in **Table 2**. The research supervisors from the schools excelled the research supervisors from the enterprises on the educational background and the positional title, so the latter should be improved.

Table 1.
The graduate students' origin.

	Fresh graduates	Former year's graduates	Equal educational background students	In-service staffs
<i>Engineering masters</i>	59.3%	18.5%	22.2%	18.2%
<i>Non-engineering masters</i>	77.3%	22.7%	0%	0%

Table 2.
The educational background and the positional title of the research supervisors.

Educational background	College diploma	University diploma	Postgraduate diploma
<i>Research supervisors from the enterprise</i>	18.5%	66.7%	14.8%
<i>Research supervisors from the university</i>	0%	9.1%	90.1%
Positional title	Junior	Intermediate	Senior
<i>Research supervisors from the enterprise</i>	11.1%	29.6%	59.3%
<i>Research supervisors from the university</i>	0%	0%	100%

The Enterprise Size and Classify

The investigation from the enterprise size and the enterprise classify was shown at **Table 3**. Many enterprises were of moderate size, and most of them were pharmacy and food corporations. On technique level, many enterprises were denominated at High and New Tech. Corporation, but the enterprises of possessing postdoctoral scientific research workstation were only 18.5%.

The Dissertation Theme Emphasis and Classify

The dissertation theme emphasis and classify were listed at **Tables 4** and **5**. The dissertation theme from the engineering masters focused on the research of middle reaches (such as technology optimization) and the research of down stream (such as component purification), whereas the dissertation theme from the academic masters focused on the research of up stream (such as screening gene engineering culture) and the research of middle reaches. The dissertation from the engineering masters mainly reflected technology breakthrough and researches, whereas the dissertation theme from the academic masters mainly reflected application foundation researches.

The Experiment Skills as Needed for the Students

The experiment skill as needed for the masters was divided into five types by biotechnology specialty: asepsis operation, cell culture, component determining, nucleic acid analysis and protein analysis (**Table 6**). Two types of the masters mostly needed to grasp the experiment skill of asepsis operation, cell culture and component determining, otherwise, the academic masters must grasp the experiment skill of nucleic acid analysis and protein analysis.

The Equipment Condition for Students

The main equipments and the experiment condition evaluation were listed in **Table 7** and **Table 8**. By their research project, the experiment condition must meet the masters to grasp the skill on asepsis operation, cell culture, component determining, nucleic acid analysis and protein analysis for accomplishing tests. **Table 7** showed that the enterprises were markedly inferior to the universities.

Table 7.
The main equipments used as accomplishing tests.

		Asepsis operation	Cell culture	Component Determineng	Nucleic acid or protein analysis
<i>Engineering masters</i>	<i>Number of person</i>	66.7%	59.3%	88.9%	48.1%
	<i>Equipment in common use</i>	Sterilizeng retort, Asepsis operation desk	Fermentation equipment, oscillator	Photometer, chromatogram	PCR apparatus, electrophoresis equipment
<i>Academic masters</i>	<i>Number of person</i>	100%	100%	100%	72.7%
	<i>Equipment in common use</i>	sterilizing retort, Asepsis operation desk	Oscillator, Fermentation equipment	Photometer, chromatogram	PCR apparatus, electrophoresis equipment

Table 8.
The experiment condition evaluation at the institutes.

	Number of person accomplishing all tests at an enterprises	Number of person accomplishing all tests at two or more institutions	Number of person accomplishing all tests at a school
<i>Engineering masters</i>	59.3%	37.0%	3.7%
<i>Academic masters</i>	0%	27.3%	72.7%

Table 3.
The enterprise size and classify.

Enterprise size	1-10 person	11-50 person	50-100 person	Over 100 person
	22.2%	40.7%	18.5%	18.5%
Enterprise classify 1	Pharmacy	Food	Research and exploitation	Others
	40.7%	25.9%	14.8%	18.5%
Enterprise classify 2	High and New Tech. Corporation	Non-High and New Tech Corporation	Possessing postdoctoral scientific research workstation	Non-possessing postdoctoral scientific research workstation
	88.9%	11.1%	18.5%	81.5%

Table 4.
The dissertation theme emphasis.

	Research of up stream	Research of middle reaches	Research of down stream	Others
<i>Engineering masters</i>	14.8%	63.0%	51.9%	11.1%
<i>Academic masters</i>	54.5%	59.1%	31.8%	0%

Table 5.
The dissertation classify.

	Application foundation	Technology breakthrough and research	Industry or technology design	Layout or management
<i>Engineer-ing masters</i>	7.4%	66.7%	22.2%	3.7%
<i>Academic masters</i>	77.3%	22.7%	0%	0%

Table 6.
The experiment skills as needed.

	Asepsis operation	Cell culture	Component Determining	Nucleic acid analysis	Protein analysis
<i>Engineering masters</i>	85.1%	95.6%	100%	14.8%	40.7%
<i>Academic masters</i>	100%	100%	100%	81.8%	77.3%

Table 9.

The masters' experiment time for their dissertation.

Experiment time per day/hours	Under 5	5-7	7-9	Over 9
<i>Engineering masters</i>	7.4%	3.7%	70.4%	18.5%
<i>Academic masters</i>	31.8%	40.9%	27.3%	0%
All experiment time of performing the dissertation /Months	Under 12	12-18	18-24	Over 24
<i>Engineering masters</i>	3.7%	14.8%	55.6%	25.9%
<i>Academic masters</i>	18.2%	40.9%	36.4%	4.5%

The Masters' Experiment Time for Their Dissertation

The masters' experiment time for their dissertation was divided into work time per day and all experiment time of performing the dissertation (shown as **Table 9**). The time the engineering masters sparing were markedly longer than that of the academic masters.

Conclusion

There are very different between the engineering masters and the academic masters on the practice condition and the practice chances, the former are better than the latter, whereas, the academic masters markedly excelled the engineering masters on the tutors' level, the test condition, and the innovation environment of science and technology.

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