

# The Establishment and Application of a Vocational Ability Evaluation System for Students Specializing in Intelligent Manufacturing Equipment Based on COMET Technology



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**Abstract:** With the development of vocational education in China, the comprehensive ability of students in higher vocational colleges and universities is widely concerned by society. Therefore, it is particularly important to establish a reasonable and scientific comprehensive vocational ability evaluation system. Aiming at the problems existing in the current comprehensive vocational ability assessment of students in higher vocational colleges and universities, the vocational ability evaluation system based on COMET technology is proposed, the core elements of vocational ability cultivation are analyzed, and it is implemented and applied in the specialty of intelligent manufacturing equipment in a higher vocational college or university. The results show that the evaluation mode effectively improves students' vocational ability and vocational literacy so that students can better cope with the challenges brought by new industries and new technology.

**Keywords:** COMET, vocational ability, evaluation system, intelligent manufacturing equipment technology

## Introduction

At present, vocational education is widely concern in society, especially with the revision and implementation of the Vocational Education Law of the Republic of China, vocational education as a type of education is more and more recognized by society, and for higher vocational students, vocational comprehensive ability enhancement is the purpose of academic training. Corresponding to the establishment of a reasonable and scientific comprehensive ability evaluation system is the key to testing the results of training. For this reason, this paper chooses KOMET assessment technology, establishes a scientific evaluation system to measure the comprehensive vocational ability of higher vocational students, and makes an objective evaluation, to keep up with the trend of the times for personnel training, and cultivating talents who meet the needs of enterprises and are technologically applied. This paper takes a higher vocational college

as the empirical research object, carries out the vocational ability assessment for the second-year students of the college majoring in intelligent manufacturing equipment technology, and makes a scientific judgment on their ability level and vocational ability level, to enable students to realize the correct orientation, better cope with the challenges of the new technology and new standards brought about by the industrial transformation, and to enhance the competitiveness of the students' employment. At the same time, it also provides a reference basis for teachers to carry out teaching mode reform and institutional assessment system reform.

## 1. Problems of Current Assessment

### 1.1 Measurement mode is not adapted to the talent cultivation requirements of higher vocational education in the new era.

Nowadays, the mainstream evaluation system for students in higher vocational colleges and universities is based on the traditional teaching

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evaluation system as a reference, and does not fully show the vocational characteristics and the degree of fit with the vocational workplace is not high, and the root can not meet the enterprise's demand for talents, the evaluation system does not comprehensively take into account the contents of vocational awareness, vocational spirit, vocational ethics, etc., which seriously weakened the cultivation of students' vocational ability. The new talent training model and the traditional curriculum system have many contradictions and impacts, under the new model, the talent training program and even the curriculum standards are jointly developed by the school and the enterprise, and the development of the curriculum, the content, and even the teaching methods have undergone subversive changes, the teaching content comprehensively involved in the new technology, new technologies, new norms and other aspects of the assessment of the students have also made important adjustments and changes. change.

### **1.2 Misalignment between the content of assessment and the competencies demanded by enterprises in the new mode of operation**

In terms of graduates' vocational core competence, modern enterprises have put forward higher requirements, while the vocational competence formed by higher vocational students in the process of learning has not reached the requirements of enterprises, and the professional skills they have mastered can not meet the requirements of the workplace at all. Some higher vocational graduates did not formulate a clear career goal during the school learning period, did not form a good professional quality, did not have due professional awareness, could not adapt to the new work and life, did not have a strong career development ability, on the whole, in the evaluation of the vocational ability of the higher vocational graduates, the evaluation given by the enterprise is not high. The traditional comprehensive quality assessment of higher vocational students has not developed suitable evaluation indexes for students' teamwork, communication, problem-solving, innovation, creativity, etc., nor has it included these contents in the scope of evaluation, while these abilities are the topics that cannot be bypassed in the process of daily operation of enterprises. Moreover, the existing evaluation system does not involve

students' abilities in task completion, self-management, innovation and creation, career planning, etc., which are the basic requirements of enterprises for the comprehensive quality of talents.

### **1.3 Measurement indexes do not reflect the all-round development of higher vocational students in the new era.**

As for the evaluation of "intellectual education", the evaluation standard chosen by the existing assessment system is too homogenized, and the weight of course scores is too large, which is more inclined to evaluate the students' learning of professional theoretical knowledge, and does not make an objective evaluation of their social and methodological abilities, and the evaluation does not involve the daily process of the students and their mastered vocational skills. As for the evaluation of "moral education", the evaluation indexes and contents are mostly based on legal provisions, which are difficult to implement and operate, with little differentiation, no scientific evaluation of students' socialist core values, and the evaluation contents do not comprehensively take into account the students' vocational qualities (such as vocational awareness, vocational ethics, etc.).

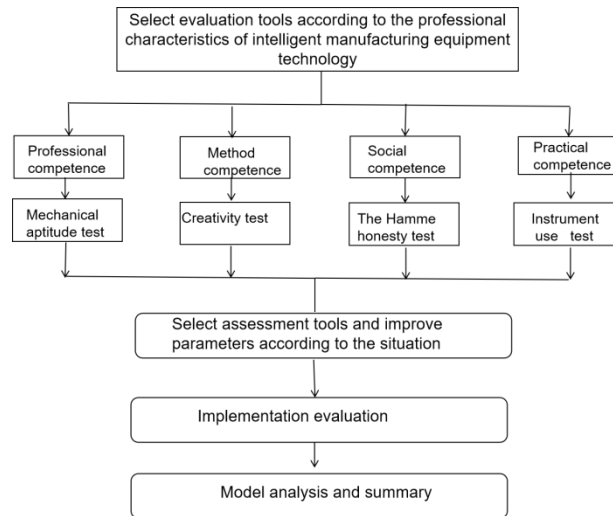
## **2. Establishment of the Vocational Ability Evaluation System**

### **2.1 Selection and establishment of evaluation model**

According to the characteristics of intelligent manufacturing equipment technology students' operating skills, practical training equipment, rich scenes, etc., the practical training field test method is chosen as the test model for this specialty. According to the intelligent manufacturing equipment professional (mechanical) characteristics, in terms of professional ability test, choose mechanical aptitude test as the model assessment tool, the assessment tool is the understanding of the principle of the equipment and the ability to think and coordinate in the process of loading and unloading. The assessment of methodological skills is especially suitable for the use of a creativity test assessment tool, this test can be on the one hand, the student's intellectual ability to make scientific measurements, but also effective measurement of will, interest, and other non-intellectual factors. In the social competence test,

the Hame Honesty Test is used, which can measure students' willfulness, emotions, and attitudes comprehensively. In terms of practical ability

assessment, it mainly measures students' ability to use tools and equipment. The specific modeling idea diagram is shown in **Figure 1**.



**Figure 1. Evaluation model diagram**

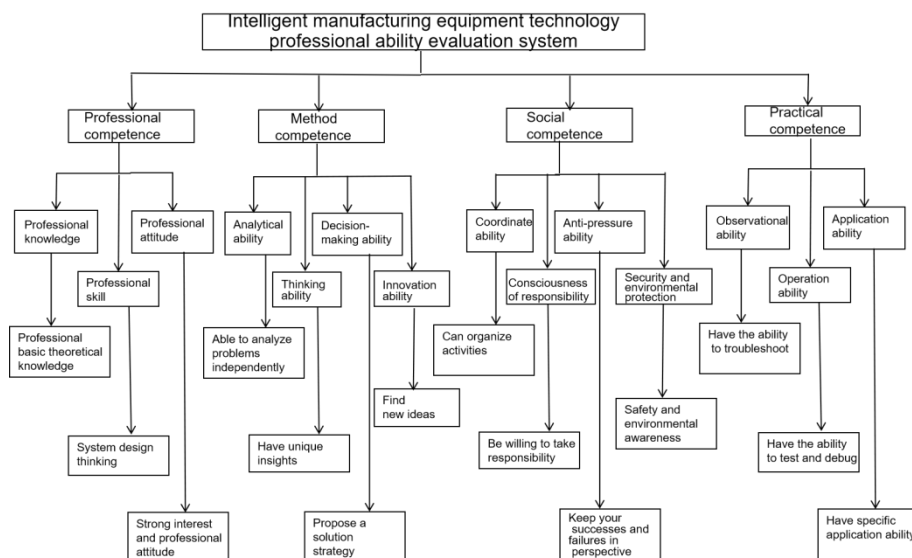
**2.2 Improvement of the evaluation model**

The disadvantage of the practical training field test method is that the model is open, and the tester is bound to mix his subjective views on the students' behavioral performance so that the evaluation results are highly subjective. This method is more inclined to evaluate the hands-on ability of the students, but cannot effectively measure the psychological traits of the students. If it can be used organically according to the characteristics of the two, and make reasonable adjustments and appropriate modifications, a more ideal evaluation model can be constructed on this basis. Considering the openness of the assessment model of the practical training field test method,

which leads to the existence of great subjectivity in the final evaluation results, corresponding evaluation standards and scales can be introduced to constrain the testers, to reduce the arbitrariness shown in the testing process. At the same time, it is also necessary to regulate the order of the evaluation site, so that the testers can be taken seriously.

**2.3 Establishment of evaluation index system**

This study further subdivided the assessment of vocational ability of higher vocational students majoring in intelligent manufacturing equipment technology into three different levels of indicators, and the contents of the indicators at all levels are shown in **Figure2**.



**Figure 2. Professional ability evaluation system of intelligent manufacturing equipment technology**

### 3. Implementation of Vocational Competence Evaluation

#### 3.1 Determination of evaluation index weights

This paper uses the multiple comparison normalization method to analyze the evaluation indexes, the so-called multiple comparison normalization method first analyzes a variety of elements, identifies one of the most unimportant indexes, and then compares and analyzes other evaluation indexes with it to find out how many times the other indexes are the indexes, and then seeks to find out the weight of the indexes through normalization calculation, and then determines the weights of the index system according to this method.

#### 3.2 Calculation of evaluation score

In this paper, the aforementioned 14 indicators as a scoring point, and the scorer as a reference to reasonably determine the status of the test subject's on-site task implementation, through the four components to score, respectively, fully compliant, basically compliant, basically non-compliant, fully compliant, of which, fully compliant with the full score assigned to the index point, basically compliant with the assignment of the score for the 2/3, basically not in line with the assignment of the score of the 1/3, completely non-compliant with the score of zero. The score is zero, which can distinguish the task fulfillment of the respondents finely. The specific content is shown in **Table 1**.

Serial number	Content	Completely	Basically	Basically out	Completely out
1	Professional knowledge	8.0	5.3	2.7	0
2	Professional skill	15.0	10.0	5.0	0
3	Professional attitude	7.0	4.7	2.3	0
4	Analytical ability	5.0	3.3	1.7	0
5	Thinking ability	5.0	3.3	1.7	0
6	Decision-making ability	5.0	3.3	1.7	0
7	Innovation ability	5.0	3.3	1.7	0
8	Coordinate ability	6.0	4.0	2.0	0
9	Consciousness of responsibility	5.0	3.3	1.7	0
10	Anti-pressure ability	6.0	4.0	2.0	0
11	Security and environmental protection	6.0	4.0	2.0	0
12	Observational ability	9.0	6.0	3.0	0
13	Operation ability	9.0	6.0	3.0	0
14	Application ability	9.0	6.0	3.0	0

**Table 1 Weight distribution table of indicator system**

### 3.3 Analysis of evaluation results

The test takes a vocational college as the research object, from which the students in the third year of the university majoring in intelligent manufacturing equipment technology are selected to be evaluated, and the lecturers of this major score them, and according to the results the students are Conduct ability grading. First of all, the score interval of each ability level is clarified, and in the actual test evaluation, if the score of a certain item reaches more than 10 points, this item will be judged to be up to standard. However, the model of vocational competence has two main characteristics: first, the level of competence increases step by step; second, there is independence and complementarity between the characteristics of competence. Therefore, students must meet the following conditions before they can be included in the corresponding competency level:

#### (1) Professional Competency Level Competency 1

For the testees whose score of professional competence is below 10 to the condition of competence 2, the competence level is judged to be 1. The testees whose score is  $\leq 10$  or  $\geq 5$  are compensated by the scores of the three items of practical competence, social competence, and methodological competence. The test takers with a score of  $\leq 5$  in professional competence cannot meet the conditions of Competency Level 1 in any way.

#### (2) Practical Ability Level 2

For the examinees whose scores of professional ability and practical ability are more than 10, but do not fulfill the conditions of competency level 3, their competency level is determined as 2. The examinees whose score of practical ability is  $\leq 10$  are compensated with the scores of social ability and methodological ability. Those whose practical ability score is  $\leq 5$  will not be able to meet the conditions of Competency Level 2 in any way.

#### (3) Social Competency Level 3

For the examinees whose scores of professional competence, practical competence, and social competence are above 10, but do not fulfill the

conditions of competence level 4, the competence level is judged as 3. The examinees whose score of social competence is  $\leq 10$  are compensated with the score of methodological competence. Those who have a social competence score of  $\leq 5$  will not be able to fulfill the conditions of Competence Level 3 in any way.

#### (4) Method Ability Level 4

For the testees whose scores of the above 3 competencies are all above 10, it is determined that their competency level is 4.

On the whole, 5 people's vocational ability level meets the standard, and 12 people have good practical ability, which is basically in line with the logical law of vocational ability development, beginners need to continue to work hard in the next study, and those at the expert level have met the standard in course learning. Those at the expert level have fully mastered the four competencies required for this specialty, with excellent professional knowledge and solid professional skills, and have formed a unique understanding of this specialty. The cultivation of expert-level talents is crucial to the upgrading and transformation of social industries, which is where the cultivation goal lies.

### Conclusion

The actual assessment results show that most of the students of this specialty have already possessed certain professional abilities, and their professional ability level has basically met the entry requirements of the corresponding industry, and only a few of them still fail to meet the requirements of the corresponding positions. For these students whose professional ability is not up to the standard, in-depth research and analysis should be carried out, and their learning status should be tracked and studied to find out the difficulties encountered in the learning process and to improve the teaching of the course. There are also a few students who have reached the expert level, and the school should give full play to their role model power and take them as learning benchmarks to motivate their neighboring students.

In conclusion, the rational application of advanced assessment technology to test the vocational ability of students in vocational colleges and universities is very necessary, and the assessment results can be used as the basis for the evaluation of the quality of students' employment, teaching quality, etc. These data also play an effective role in the diagnosis and improvement of the education and teaching of the institutions of higher vocational education and reference. We can clarify the personal factors of students and the objective factors of schools, fully explore the factors that have a corresponding influence on students' studies and employment, and make clear the weights of these factors, to provide an important basis for the reform of teaching and teaching materials. Enterprises and industries can also use this as a basis for testing graduates to determine whether they have reached the entry standards of industries and enterprises, which can help students better cope with the challenges of industrial transformation.

#### Conflict of Interest

The author declares that she has no conflicts of interest to this work.

#### References

- Ren, Y. (2020). The contingent transformation and development direction of china's vocational education reform in the new era--based on the background of the national vocational education reform implementation program. *Adult Education*, 40(10), 59–64.
- Qin, H., & Chen, G. (2019). Reform of "three teachings" in the context of the implementation of "double higher program." *China Vocational and Technical Education*, 2019(33), 35–38.
- Ji, C., & Zhao, Z. (2019). An empirical study on economic literacy of vocational education students - a survey based on six secondary vocational schools in three provinces. *Research on Vocational Education Development*, 2019(02), 36–41.
- He, X., Zhao, Z., & He, Z. (2016). Multifaceted rasch model analysis of german COMET rating scale application in china. *Vocational and Technical Education*, 37(25), 69–74.
- Zhao, Y. (2016). *Research on cultivation of vocational ability of students in higher vocational colleges and universities*. 2016, 36–41. Harbin Normal University.
- Tao, Y., Yang, L., & Cheng, Q. (2019). Assessment of the vocational ability of automotive graduates based on KOMET. *Internal Combustion Engine and Parts*, 2019(05), 241–242.
- Tang, X. (2017). Analysis of vocational ability assessment model for senior environmental protection students based on KOMET technology. *China Market*, 2019(05), 39–40, 44.
- Guo, X., Yang, Y., & Yu, C. (2018). Military vocational education curriculum development based on the KOMET model. *Journal of Military Transportation College*, 20(07), 73–76.
- Chen, D. (2019). Nalysis of vocational ability of higher vocational property management students based on komet-taking jiangsu urban and rural construction vocational college as an example. *Modern Property (Zhongdian Journal)*, 2019(08), 254–256.

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