

Investigation and research on the operation problems of 1+X system in the field of industrial robots in higher vocational colleges

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Abstract: The 1+X certificate system has faced many problems in practice since the pilot. Questionnaires were designed for 5 X certificate participating teachers and students in the field of industrial robots. The interview outline was developed for the 1+X affairs managers of the education administration department and the training and evaluation organization personnel of the 5 certificates. Through network questionnaire survey, telephone interview, face-to-face interview and other means, the survey answers of four types of participants on the face and spirit of the system were collected, and the preliminary summary results were provided to provide a basis for proposing countermeasures.

Key words: Industrial robot; 1+X system; Questionnaires; Interview outline

Introduction

The major of industrial robot technology in higher vocational colleges is a strategic emerging major to cope with the current shortage of skilled talents in the robot industry and improve the supply side of talents. To promote the 1+X system in higher vocational colleges is an important measure to improve the quality of talent training. At present, the implementation of 1+X system in higher vocational colleges has accumulated a lot of effective experience, but also faces many obstacles. Only through scientific and effective research can we explore the specific problems of the current operation of the system and analyze the various causes of the problems, so as to put forward effective coping strategies. Investigation and research method can collect a large amount of effective information at the same time, easy to use, high efficiency, is one of the important methods of pedagogy research. It is of great theoretical and practical significance to obtain effective information about the operation of 1+X system in the field of industrial robots in higher vocational colleges through investigation and research.

1. Overview of investigation and research

At present, the X certificates in the field of industrial robots are: the second batch of industrial robot application programming, industrial robot operation and maintenance, the third batch of industrial robot installation, industrial robot integrated application, and the fourth batch of industrial robot product quality and safety testing. The above 5 certificates have been carried out in China, but the pilot provinces, the number of schools and the number of participants, the passing rate and other aspects are different, and the problems encountered in the pilot are also different.

The operation of the 1+X system mainly involves four aspects: educational administrative departments, training evaluation organizations, pilot colleges and certificate students. The above four types of subjects assume different roles, encounter different problems, and the number of participants is quite different, so the specific methods of investigation and research are different. The first two categories have a small number of participants and it is difficult to obtain information. Therefore, interview Outlines are designed and information is obtained through face-to-face interviews or telephone interviews. The latter two categories have a large number of participants and it is relatively easy to obtain information, so they carry out investigations through online questionnaires.

2. Design the survey and research scheme

2.1 Design of questionnaire for teachers of certificate pilot vocational colleges

The questionnaire for participating teachers includes four parts: title, introduction, instructions for filling in the form and survey questions. The preface explains the origin, purpose and significance of the questionnaire. The respondents are asked to give truthful and complete answers according to the actual situation. The questionnaire is filled in anonymously, which is only used to understand the operation status of the system, improve the work and perfect the policy, and is not used as the evaluation basis of the relevant work of each school. The questionnaire specifically emphasizes that the research group strictly abides by relevant laws and regulations, protects the privacy of the respondents, and does not use the survey data and results for commercial activities. Respondents should not have any concerns. Note: The questionnaire has a total of 26 questions, including 19 multiple choice questions, 3 combination single choice questions and 4 open question questions; It takes about 15 minutes to complete the answer sheet; All multiple-choice questions should be completed. Open questions are not required if there is no answer.

The survey questions are divided into four parts. The first part is the basic information survey, which has 9 single-choice questions, investigating the gender, age, professional title, teaching years, school type and professional level of the participating teachers. The second part is the investigation on the promotion of X certificate, including 6 single-choice questions, the name of the certificate carried out by the pilot school, the time of the first examination group, the number of certificate holders each year, the proportion of candidates in society,

and the professional distribution of certificate holders. The third part is the survey of certificate recognition and textual research training, including 4 single choice questions and 3 combined single choice questions, each of which contains 4-5 related single choice questions. This part investigates teachers' evaluation of certificate recognition, training methods before certificate verification, sources and prices of training and verification equipment, teachers' situation of relevant majors in our school, training conditions, teaching reform, professional development prospects and other contents. The fourth part is an open question to investigate the primary problems the participating teachers are currently facing, and their opinions and suggestions to the school, the education administration department and the training evaluation organization.

2.2 Questionnaire design for certificate students

The structure of the questionnaire for certificate students is similar to that for teachers. The title, preface and instructions for filling in the form are basically the same, and the target is changed to certificate students. Compared with teachers, students' ability to understand and focus on problems is lower than teachers', and the sample size of students is larger. Therefore, the survey questions are quite different from the teachers' version. The questionnaire consists of 12 questions in total, including 7 single choice questions, 3 combined single choice questions (each divided into 3-4 related single choice questions) and 2 open essay questions. The single-choice questions mainly investigate the gender, grade, major, recognition of certificates, evaluation of textual examination costs and training methods of the students. The combined single choice is mainly to investigate the students' evaluation of the school's training equipment, training teachers and majors. The open question asks students what they think is most in need of improvement in the system, as well as suggestions for the education administration and the school.

2.3 Interview outline design for educational administration department personnel

For the investigation of managers in charge of 1+X affairs in the administrative department of education, it is difficult to obtain samples and the number of sample cloth is small, so on-site interviews are adopted. 1+X affairs of higher vocational colleges are mainly managed by provincial education administrative departments, so the interview outline is clearly targeted at provincial education administrative departments 1+X affairs managers. The interview outline includes three parts: title, introduction and questions. In the preface, I first express my gratitude, then explain the background and purpose of the survey, the protection of privacy and the expected time of the interview. The questions of the interview include: the current situation of 5 pilot X certificates in the field of industrial robots in this province; The relationship between X certificate and vocational qualification certificate; The province's support policy for 1+X jobs; The involvement of institutions; The participation of training and evaluation organizations; The situation of training equipment market; The integration of national training with 1+X work; And the main difficulties in promoting the work in the province.

2.4 Interview outline for X certificate training evaluation organization

The training evaluation organization is the new force to promote the 1+X system, the planner of certificate and the maker of assessment standards and question bank. There are only 5 sample units involved in the survey, but the form and time of the survey are relatively free, so it can be carried out by on-site interview, telephone interview or on-site survey, and can be interviewed multiple times. The interview questions include: the certificate of the unit in the province and the national pilot situation; What highlights the unit has done in the pilot of the certificate; How much is the certificate cost; Whether the expenses have been carried out research and accounting; Whether to carry out the market recognition of the certificate research; Whether the unit has developed training and verification equipment by itself; How to evaluate the management of 1+X affairs in the province; The biggest problems facing the current pilot work, etc.

3 Investigate the research process and results

The research was conducted from April to August 2023. The questionnaire for teachers was carried out on the network platform, and the answer sheet link was sent out through wechat group, QQ group and other ways, and the results were viewed in the background. The survey lasted for 15 days, and finally collected 186 valid answers from teachers, mainly in higher vocational colleges in Hunan, including a small number of provinces and cities such as Hubei and Tianjin. According to the results of the survey, there were slightly more male teachers than female teachers. Most of them were under 45 years old; Primary and intermediate professional titles; Associate senior titles accounted for about 20%, and senior titles participated less; Full-time teachers accounted for 73.66%, the director of the teaching and research department or professional person in charge accounted for 19.35%, and a small number of secondary college managers participated. The distribution of institutions participating in the pilot is relatively average, and there is little difference in participation between key or demonstration colleges and ordinary colleges. Few pilot institutions carry out two certificates at the same time, and most of them have carried out one certificate pilot. Among the pilot certificates, the reference number of the second batch of two certificates is large, the third batch of two certificates is relatively small, and the development situation of the fourth batch has not been collected. At present, nearly 70% of the annual certificate scale of pilot colleges is concentrated between 50-200 people, the reference students are mainly students, the majority of the majors are concentrated in higher vocational automation, industrial robot technology accounted for more than half, mechanical and electrical integration, electrical automation and other majors accounted for more than 5%. The participating teachers are generally optimistic about the social recognition of the certificate, but a small number of teachers are not optimistic about the gold content of the certificate. A small number of the surveyed institutions have carried out the reform of integrating documents and certificates, and most of them have carried out special training and intensive training before the examination. The teachers surveyed generally believe that: the current faculty strength is weak, pilot work pay is not high; The price of textual research equipment is high; The cost of certificate is high, and the financial funds of

the school are insufficient when the pilot batch is large; Students cannot be charged for the certificate, and the sustainability of this system is worrying.

The questionnaire for certificate students is also carried out through the online platform. In order to avoid the error of the role of the respondents in the two questionnaires, the questionnaire for students will be sent one week later. The answering period also lasted 15 days, and 532 valid questionnaires were received, most of which came from higher vocational colleges in Hunan Province. The results of the survey show that: the proportion of male students was 85.90%, and the engineering characteristics of the certificate were obvious; Candidates are mainly in the sophomore and junior year, mainly in the major of industrial robot technology, and there are very few bachelor applicants across major categories; The recognition degree of the feedback certificate of the students is obviously less than that of the vocational qualification certificate; 77.63% of candidates think that the cost of training and certificate is high; The students' evaluation of the quality of school equipment is high, but the quantity is insufficient; They recognized the teaching level and effect of the training teachers, and were full of confidence in the professional development. In terms of open questions, the answer rate of students is low, and the proportion of unclear expressions or random filling is large. After finishing, the high-frequency suggestions are: no charge for make-up examination or reduce the cost, increase the number of equipment, certificate should be converted into credits, etc.

For the personnel in charge of 1+X affairs of provincial education administrative departments, face-to-face interviews were conducted with the relevant personnel of Hunan, Hubei and Guangdong provincial education departments, and the interview results have certain credibility. The content of the interview was adjusted according to the on-the-spot situation. After the interview records were sorted out and analyzed, the following results were summarized: Among the 5 certificates, the second and third batches were carried out more; X certificate and vocational qualification certificate do not conflict, students can choose freely; Some provincial governments have funding support for the pilot work in the early stage, and then decrease or cancel; There are obvious differences in the regional and industrial distribution of the pilot colleges, and the engineering colleges are more active in participating; There is little communication between training and evaluation organizations and provincial education administrative departments; At present, the market order of textual research equipment supply is standardized, the equipment of colleges and universities is openly purchased, and the provincial education administrative departments do not intervene. In recent years, there have been more national and provincial trainings in each province, reflecting the overall good effect. At present, the main problem of 1+X work is that it cannot charge students, and the problem of long-term funding security needs to be solved urgently.

In the end, the relevant research for X certificate training and evaluation organizations in the application field of industrial robots was carried out, which was carried out by on-site interviews, telephone interviews or field surveys. The staff members of 4 certificate training and evaluation organizations or equipment suppliers responsible for the business in Hunan Province were interviewed. The interview results showed that: the second and third batch of certificates were carried out more, and the overall layout of test sites slowed down; The main work of the training and evaluation organization is the establishment of regulations, standard development, assessment organization, certificate promotion, etc. Some units are also responsible for equipment development, teaching resources development and teacher training. At present, no systematic research on certificate recognition has been carried out; 2 of the 4 training and evaluation institutions have developed their own research and verification equipment, and the other 2 have multiple equipment suppliers; None of the interviewees were willing to evaluate the business managers of the provincial education administration departments; As for the cost of textual research, the interviewees also admitted that it was high, but within the scope stipulated by national documents; The training cost is high, mainly due to the higher promotion cost of the certificate in the early stage, and the cost dilution takes a certain time. The training and evaluation organizations all think that the main problems of the current pilot work are: the training and evaluation organizations have a large workload and large investment; Lower state support; They suggested that governments at all levels keep the level of support unchanged.

4. Summary and outlook

This research has important theoretical and practical significance: First, based on the results of this research, it analyzes the obstacles to system operation, which can clearly promote the problems of pilot work and put forward accurate coping strategies; The second is to guide the pilot work practice through the research results and proposed strategies, provide reference for the pilot work of relevant colleges and universities, and provide decision-making consultation for education administrative departments to better manage this work.

There are also some shortcomings in this study, such as the small sample size of the interview, the limited region, and the lack of research on employers in the robot industry, which need to be further studied in the future.

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