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Exploration on the Matching Degree of Intelligent Digital Education in the Demand for Skilled Talents and the Training of Talents in Vocational Colleges

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Abstract: China has established the world's largest vocational education system, and has a huge ability to cultivate skilled personnel. Skilled talents and vocational college talents are precious resources of the country and need to be highly valued by the country. However, due to insufficient total talents, filling the shortage of talents is a top priority in the critical period of the development of socialism with Chinese characteristics. This paper analyzed the matching degree of intelligent digital education in the demand for skilled talents and the training of talents in vocational colleges, which aimed to explore how the use of intelligent digital education can improve the skill level of skilled talents and talents in vocational colleges. In this experiment, five students from the College of Mechanical and Electrical Engineering were selected as the experimental objects, and their operation scores before and after receiving intelligent digital education were compared. The experimental results showed that the average score of each operation of the first selected student after receiving intelligent digital education increased by 9 points, and the average score of each operation of the second selected student after receiving intelligent digital education increased by 15 points; the average score of each operation of the third selected student after receiving intelligent digital education increased by 12 points, and the average score of each operation of the fourth selected student after receiving intelligent digital education increased by 9 points. It can be seen that intelligent digital education is really helpful for the training of skilled talents and vocational colleges.

1. Introduction

Vocational education is of great significance to the ideological and political education and professional ethics education of the educated. Teachers teach professional knowledge and exercise students' professional skills. Teachers guide the career development of the educatees and improve their quality, so as to cultivate the educatees to become talents with ideals, ambitions, responsibilities, civility and politeness. How to make students grow up healthily, and turn them into talents who need the society, so as to provide better services for the society has become the focus of attention.

Plutenko A D pointed out that the vocational training of engineering skilled talents in high-tech enterprises should be carried out according to professional requirements, which should highlight professional level, ability, skills and qualifications, and ensure smooth and efficient work [1]. Yilong Y believed that in the process of talent training in vocational colleges, it is necessary to ensure the quality of education and enhance students' innovation ability, so as to cultivate high-quality talents. The training of talents in vocational colleges can improve students' basic knowledge level, and can cultivate and stimulate students' leadership, humanistic spirit and creativity [2]. Zhibin T believed that the development of modern vocational college education needs the joint participation of many departments and subjects, and the cooperation between industry and school is the basic requirement. In the context of the third industrial revolution, the training of skilled people and innovative graduates and the transformation of industrial technology innovation model need to build a new collaborative linkage model between higher vocational education and industrial development. From the perspective of open science, the synergy between higher vocational education and industrial development is the basic internal logic based on the heterogeneous innovation capability of entities. On the basis of theoretical research and case studies, the synergy between higher vocational education and industrial development must focus on establishing diversified education, and take the common vision and the micro main body of schools and enterprises as the basis of common interests, so as to establish a long-term mechanism for the coordination, value integration, interest integration and resource integration of multiple school and enterprise main bodies, as well as the implementation plan [3]. In order to actively adapt to the needs of software industry development in southern Zhejiang, Zhang S cooperated with leading enterprises in the field of software technology. Through the joint development of training programs for skilled professionals by schools and enterprises, the reform of undergraduate level vocational education talent training mode and curriculum system has been promoted. It has built a talent training quality assurance system, and explored the path and law of high-level technical talents training with deep integration of industry and education, so as to strive to achieve the coordinated development of talent training, scientific research and academic team building. By creating a training highland for high-quality software technology application high-level technical talents, it has served the economic transformation and upgrading of southern Zhejiang and led the training of demonstration software technology professionals [4].

Crawford R believed that with the popularization of intelligent devices, the global curriculum documents and education policies are full of expectations for information and communication technologies and their high standards of appreciation, and it is very recognized for the use of intelligent digitization in education, which is understandable. There is no dispute about the existence of technology or that technology should be embedded in education [5]. Hiim H believed that there are great challenges in vocational education and training courses. He thought that the relationship between the current educational content and the students' demand for qualification in the actual occupation is not enough [6]. Syauqi K believed that vocational education emphasizes not only the mastery of knowledge, but also the mastery of skills. In the learning process, students can improve their learning quality by enhancing their skills learning [7]. De Visser E J believed that the interaction between the era and intelligent digital technology is gradually shifting from simple human use of computers as tools to establishing the relationship between humans and autonomous entities, which represent the implementation of actions [8].

Contemporary skilled personnel are very valuable, and the country is developing very rapidly. When the growth rate of talents can not keep up with the national development, it would result in talent vacancies, slowing down the national development and other situations. If intelligent digital technology is combined with the cultivation of professional talents, the skill level of talents would be higher, which also means that the value brought to the enterprise after entering the enterprise would be higher. Intelligent digital education is in line with the national conditions, and has a great help to the national development of talent training.

2. Use of Genetic Algorithm in Intelligent Education

2.1 Demand for Skilled Personnel and Problems in Personnel Training in Vocational Colleges

Nowadays, the number of college graduates is increasing, which shows that many students have problems in their skills. For this problem, the experts suggested increasing the role and share of the private sector in vocational and technical education. By strengthening the skills that support the long-term employment of vocational and technical education graduates, and giving up specific majors, the ability of vocational education is reorganized to establish a more realistic supply and demand relationship [9]. It can also start from strengthening management, improving the comprehensive quality of vocational college students, clarifying the direction of vocational college reform and development, exploring new paths for vocational college reform and development, transforming vocational education investment, and innovating the direction of vocational education system [10]. Due to the lack of ICT (communication technology) resources and support, vocational college education restricts their teaching to the whole class activities, which rely on limited ICT resources. The availability and reliability of teachers in vocational colleges are not enough, so their lack of professional development opportunities would directly affect the confidence of teachers. The use of intelligent digital ICT can change this situation [11].

2.2 Specific Application of Genetic Algorithm in Intelligent Education

Genetic algorithm (GA) has become one of the most popular accurate solutions to many challenging optimization problems [12]. Genetic algorithms can evolve neural networks so that neural networks perform best in the applications people are interested in [13]. This paper used the intelligent test paper of intelligent digital education based on genetic algorithm to generate test papers for technical talents and vocational college talents. The test paper with multiple constraints was generated through a large number of test question databases and good test paper generation strategies, and then the synchronous test was conducted on the terminal device. The advantages of this method were that it can reduce the workload of the teacher's test paper, and the work of marking can be achieved by both manual marking and machine marking. The evaluation of the test paper was determined according to various parameters and the final test scores of students. This test mode can fully realize online examination. Automatic test paper generation is a combination of objective functions and many constraints. The attributes included in automatic test paper generation are described as follows:

The calculation method of the probability of students' losing points on a certain question in the exam is:

$$P= \frac{s}{i} \tag{1}$$

In Formula (1), i is the total number of people answering the question, s is the number of people doing the wrong question

If x is the knowledge points included in the test paper and y is the total number of knowledge points required to be included in the test paper, then the representation method of coverage is:

$$G = \frac{x}{y} \tag{2}$$

The scores of the students in the exam are arranged from high to low, and the scores of some students in the front and back are averaged. If the highest average score is recorded as *c* and the lowest score is recorded as *b*, the formula is:

$$a= \frac{c-b}{m} \tag{3}$$

The value of *a* ranges from 0 to 1, and the value of *m* is the actual score of the test paper.

In order to test the reliability of test paper results, the ratio of true variance and performance variance is used to define the reliability of test paper results. The calculation formula is:

$$E = \frac{H_n \times \sum_{i=1}^{n} \frac{J_i^2}{J^2}}{H_n} \tag{4}$$

In Formula (4), H_n is the total number of questions in the test paper; J_i^2 is the variance of question i, and J^2 is the variance of the test paper. If E<0.6, it proves that the reliability of the test paper score is not enough.

After each test question is selected, it cannot be used again for a period of time. The calculation method for the frequency of the selected test questions is:

$$O = \frac{Z_h}{H} \tag{5}$$

H is the number of selected questions, and Z_h is the number of selected questions. In practice, the examination questions with low frequency would be preferred.

The ratio of sum of the product of the score and difficulty of each test question and the total score represents the difficulty of the test paper. The difficulty of the test paper is calculated as:

$$K = \frac{\sum_{i=1}^{n} P_i \times m_i}{m} \tag{6}$$

In Formula (6), P_i is the difficulty of question *i* of the test paper, and m_i is the score. *n* refers to the total number of questions, and *m* refers to the total score.

Each test question of the test paper needs to be distinguished, and the calculation of the discrimination of the test paper is:

$$R = \frac{\sum_{i=1}^{n} o_i \times m_i}{m} \tag{7}$$

Among them, o_i is the probability that the *i*-th question would be selected.

3. Intelligent Digital Education Experiment and Evaluation

3.1 Introduction to Intelligent Digital Education

Intelligent digital education is an education mode in which teachers and students are in the digital education environment, and they comply with modern education theories and use intelligent digital education resources, so as to cultivate modern skilled talents with innovative thinking by using digital teaching methods. Generally speaking, intelligent digital education is to use modern equipment such as multimedia classrooms and computers to teach students. Intelligent digital education can establish the collection of scientific research management, technical services and other information for computer and network technology, which makes full use of educational resources, thus realizing intelligent digitalization of environment, resources and applications. Intelligent digital education researchers need more kinds of problems and methods to rapidly participate in the changing digital education field. The goal of researchers is not only to determine “what is effective”, but also to participate in “intelligent problem solving” [14]. In modern clinical practice, intelligent digital pathology plays a crucial role and is increasingly becoming a technical requirement in the scientific laboratory environment. The emergence of intelligent digital full slide imaging technology, faster networks and cheaper storage solutions makes it easier for pathologists to manage digital slide images and share them for clinical use [15].

3.2 Preparation for Intelligent Digital Education Experiment

The experimental object of this paper was the Mechanical and Electrical Engineering College of a vocational college, which has a national CNC (Computerised Numerical Control) training base and many CNC machine tools. This paper explored the changes in the performance of vocational college students for the operation of CNC machine tools before and after using intelligent digital education. The operation of CNC machine tools includes program programming, workpiece alignment, workpiece tool setting, program output, etc. In this paper, the operations of these five operations mentioned above were taken as the evaluation standard for students to learn electromechanical skills. The teachers of five students in the first class of the college were randomly selected to give their operation scores. After that, the five students were arranged to study in a school with intelligent digital education for one month, and then the teacher was asked again to evaluate their operation performance [16].

3.3 Education Experiment and Analysis

The experiments in this paper collected the operation results of program writing, workpiece alignment, workpiece tool setting, program output, and part inspection operations of CNC machine tools from these five students respectively. After putting these five students through a month of intelligent digital education, the operational results of these five students were collected again for operations such as program writing, workpiece alignment, workpiece tool setting, program output, and part inspection. This paper compared the operation performance of these five students before and after using intelligent digital education. The comparison chart of program programming and writing operation before and after using intelligent digital education is shown in Figure 1.

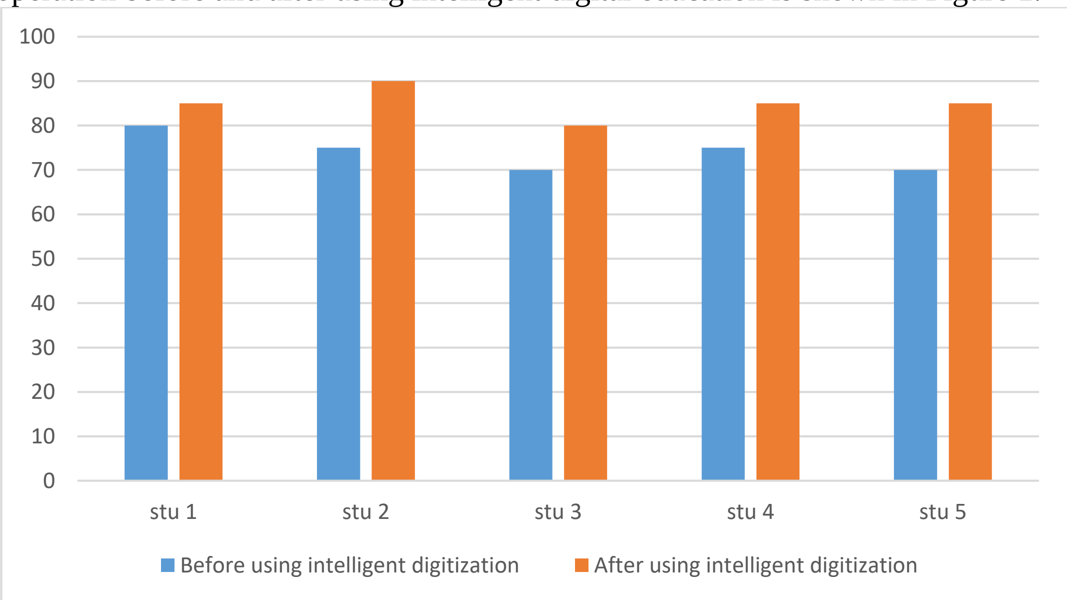

Figure 1: Program programming writing operation results comparison

It can be seen from Figure 1 that the first selected student scored 80 points in programming writing before using intelligent digital education; after using intelligent digital education, the score of programming writing became 85 points, and the score of programming writing increased by 5 points. Before using intelligent digital education, the second selected student scored 75 points in programming writing; after using intelligent digital education, the score of programming writing became 90 points, and the score of programming writing increased by 15 points. Before the use of intelligent digital education, the third selected student scored 70 points in programming writing; after the use of intelligent digital education, the score of programming writing became 80 points, and the score of programming writing increased by 10 points. Before the use of intelligent digital education, the fourth selected student scored 75 points in programming writing; after the use of intelligent digital education, the score of programming writing became 85 points, and the score of programming writing increased by 10 points. Before the use of intelligent digital education, the fifth selected student scored 70 points in programming writing; after the use of intelligent digital education, the score of programming writing became 85 points, and the score of programming writing increased by 15 points.

The comparison of the results of workpiece alignment before and after intelligent digital education is shown in Figure 2.

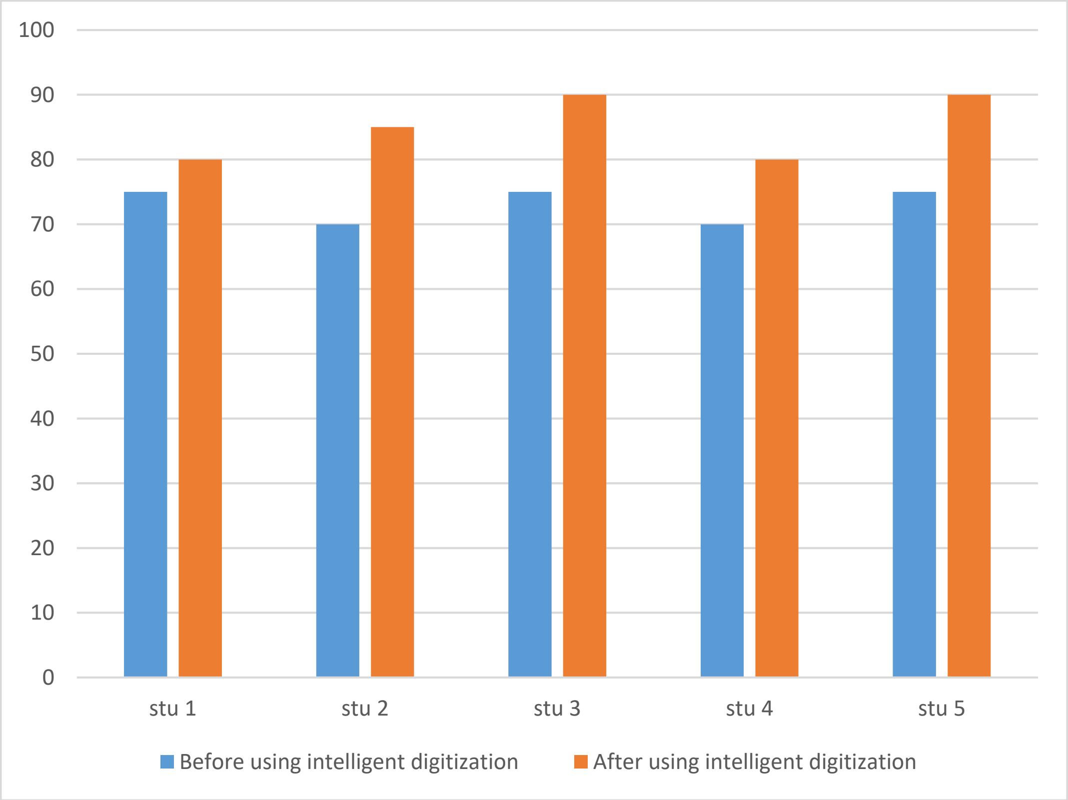

Figure 2: Comparison of workpiece alignment operation results

It can be seen from the experimental results in Figure 2 that the work piece alignment operation of the first selected student was 75 points before using intelligent digital education; after using intelligent digital education, the result of workpiece alignment was 80 points, and the result of workpiece alignment operation was improved by 5 points. The work piece alignment operation of the second selected student was scored 70 points before using intelligent digital education; after using intelligent digital education, the result of workpiece alignment was 85 points, and the result of workpiece alignment operation was improved by 15 points. The work piece alignment operation of the third student was 75 points before using intelligent digital education; after using intelligent digital education, the result of workpiece alignment was 90 points, and the result of workpiece alignment operation was improved by 15 points. The work piece alignment operation of the fourth student selected before using intelligent digital education had a score of 70 points; after using intelligent digital education, the result of workpiece alignment was 80 points, and the result of workpiece alignment operation was improved by 10 points. The work piece alignment operation of the fifth student was 75 points before using intelligent digital education; after using intelligent digital education, the result of workpiece alignment was 90 points, and the result of workpiece alignment operation was improved by 15 points.

The comparison of workpiece tool setting operation results before and after intelligent digital education is shown in Figure 3.

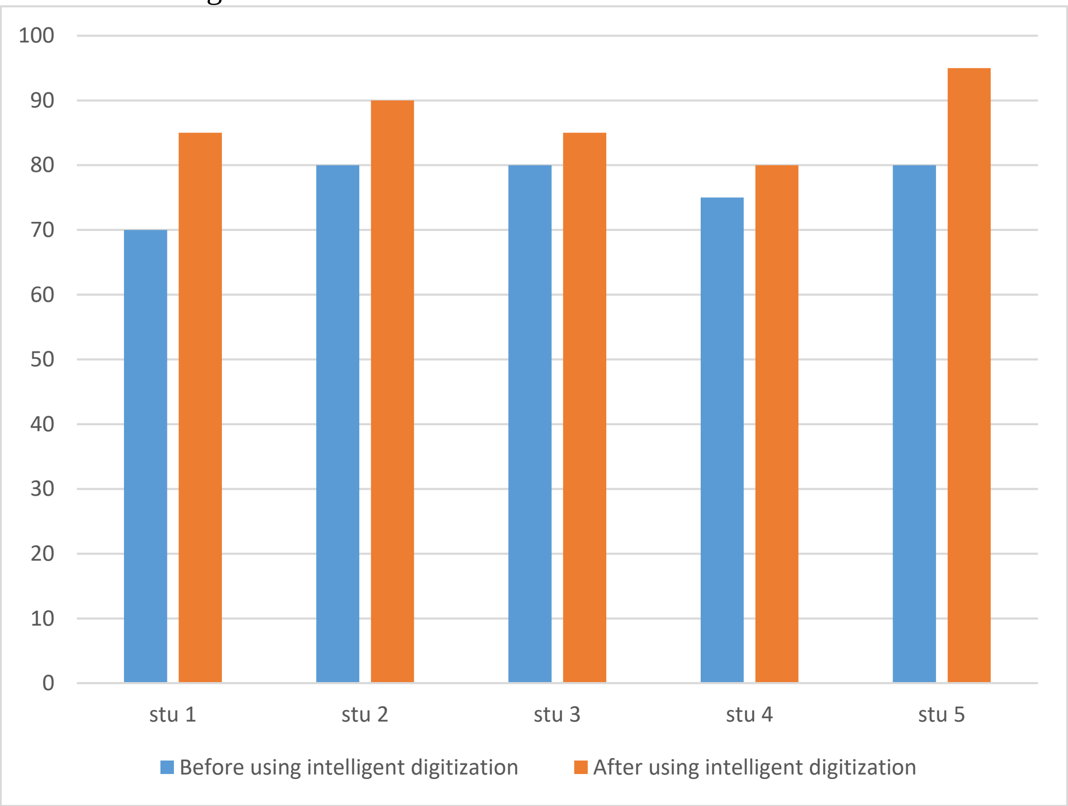

Figure 3: Comparison of workpiece tool operation results

It can be seen from the experimental results in Figure 3 that the score of the first selected student before using intelligent digital education for tool setting operation of workpieces was 70 points; after using intelligent digital education, the score of workpiece tool setting operation was 85 points, and the score of workpiece tool setting operation was increased by 15 points. The score of the second student before using intelligent digital education was 80; after using intelligent digital education, the score of workpiece tool setting operation was 90 points, and the score of workpiece tool setting operation was increased by 10 points. The score of the third student selected before using intelligent digital education was 80; after using intelligent digital education, the score of workpiece tool setting operation was 85 points, and the score of workpiece tool setting operation was increased by 5 points. The fourth student selected scored 75 points in workpiece tool setting before using intelligent digital education; after using intelligent digital education, the score of workpiece tool setting operation was 80 points, and the score of workpiece tool setting operation was increased by 5 points. The score of the fifth student before using intelligent digital education was 80; after using intelligent digital education, the score of workpiece tool setting operation was 95 points, and the score of workpiece tool setting operation was increased by 15 points.

The comparison of program output operation scores before and after using intelligent digital education is shown in Figure 4.

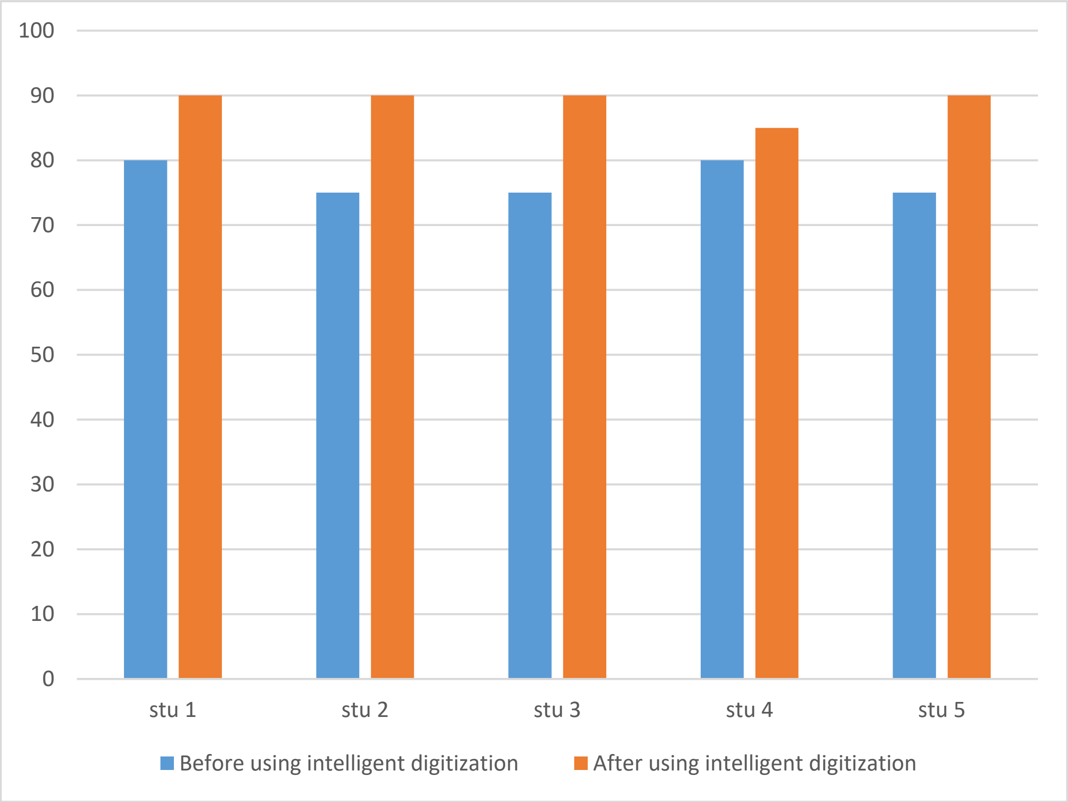

Figure 4: Procedure output operation result comparison

It can be seen from the experimental results in Figure 4 that the operation score of the first selected student before using intelligent digital education for program output operation was 80, and that after using intelligent digital education for program output operation was 90; the score of program output operation increased by 10 points. The second student's operation score of program output operation before using intelligent digital education was 75, and that after using intelligent digital education was 90; the score of program output operation increased by 15 points. The third student scored 75 points in the operation of program output before using intelligent digital education, and 90 points in the operation of program output after using intelligent digital education; the score of program output operation increased by 15 points. The fourth student scored 80 points in the operation of program output before using intelligent digital education, and 85 points in the operation of program output after using intelligent digital education; the score of program output operation increased by 5 points. The fifth student scored 75 points in the operation of program output before using intelligent digital education, and 90 points in the operation of program output after using intelligent digital education; the score of program output operation increased by 15 points.

The comparison of part inspection results before and after intelligent digital education is shown in Figure 5.

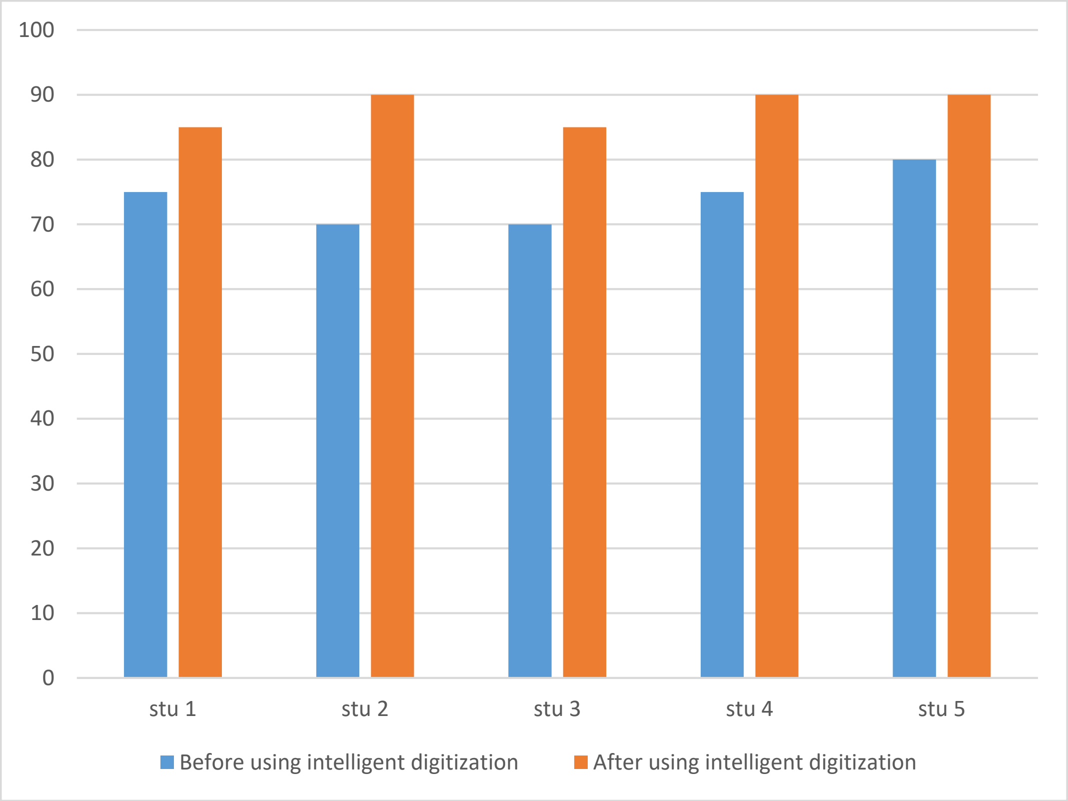

Figure 5: Part inspection operation result comparison

It can be seen from the experimental results in Figure 5 that the first student scored 75 points in program output operation before using intelligent digital education, and 85 points in part detection operation after using intelligent digital education; the student's part inspection score had improved by 10 points. The second student scored 70 points in part inspection before using intelligent digital education, and 90 points in part inspection after using intelligent digital education; the student's part inspection score had improved by 20 points. The third student scored 70 points in part inspection before using intelligent digital education, and 85 points in part inspection after using intelligent digital education; the student's part inspection score had improved by 15 points. The fourth student scored 75 points in part inspection before using intelligent digital education, and 90 points in part inspection after using intelligent digital education; the student's part inspection score had improved by 15 points. The fifth student scored 80 points in part inspection before using intelligent digital education, and 90 points in part inspection after using intelligent digital education; the student's part inspection score has improved by 10 points.

This paper summarized the comparison of the average scores of five operations before and after the use of intelligent digital education. The comparison diagram is shown in Figure 6.

It can be seen from the results in Figure 6 that the average score of the first student before using intelligent digital education was 76 points, and the average score of each operation after using intelligent digital education was 85 points, an increase of 9 points. The average score of the second student before using intelligent digital education was 74 points, and after using intelligent digital education, the average score of each operation was 89 points, an increase of 15 points. The average score of the third student before using intelligent digital education was 74 points, and the average score of each operation after using intelligent digital education was 86 points, an increase of 12 points. The average score of the fourth student before using intelligent digital education was 75 points, and the average score of each operation after using intelligent digital education was 84 points, an increase of 9 points. The average score of the fifth student before using intelligent digital education was 76 points, and after using intelligent digital education, the average score of each operation was 90 points, an increase of 14 points.

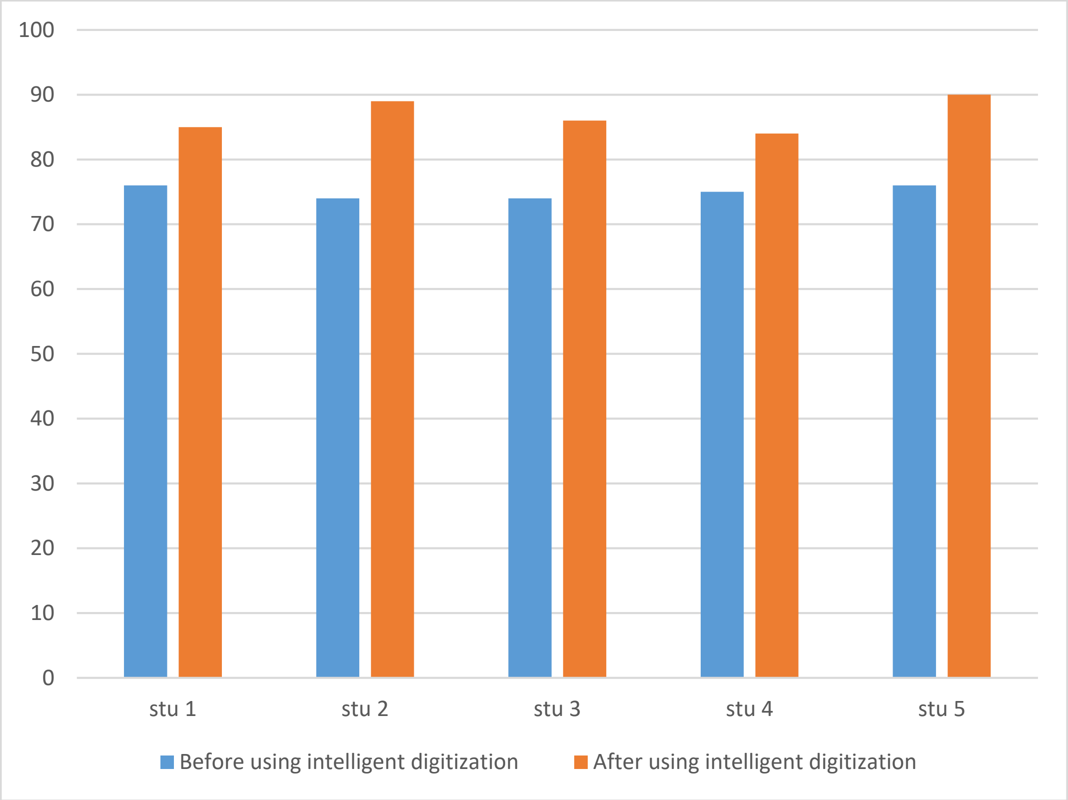

Figure 6: Operation average score comparison

These experimental data proved that intelligent digital education has indeed improved students' skill level, and it also proved that intelligent digital education has indeed helped vocational colleges to cultivate talents.

4. Conclusions

In today's world, it is very popular for enterprises to have excellent professional skills, so cultivating and educating students' skill level is also a major issue that needs to be paid attention to in this era. The use of intelligent digital education can provide strong support for vocational education, so the use of intelligent digital education is the trend of the times. It can also be seen intuitively from the experiment in this paper that intelligent digital education has indeed improved students' skill level. The amount of experimental data in this paper is insufficient due to various reasons, and would be more committed to the research of intelligent digital education in the future. It is hoped that in the future, more and more skilled talents in the country and vocational colleges would be available.

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