STUDY ON THE INFLUENCE OF MENTORING RELATIONSHIP ON LEARNING EFFECT UNDER MODERN APPRENTICESHIP, TAKES THE ARTS AND CRAFTS MAJOR OF S CITY A VOCATIONAL COLLEGE AS AN EXAMPLE

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Abstract: As China's economy undergoes profound transformation and rapid upgrading, the demand for highly qualified technical and skilled personnel continues to show an upward trend. Facing the intensifying international competition, the modern apprenticeship system has become the most effective approach for China to advance the deep integration of vocational education with industry and to achieve the combination of work and study. In modern apprenticeship systems, the Mentor-Mentee relationship is the primary element in constructing a modern apprenticeship. However, domestic academic research on this micro-level aspect is not sufficiently in-depth. Current studies are mostly speculative or qualitative with a strong subjective bias, and there is a lack of empirical research based on scientific methodology. This study is based on the theory of mentoring relationships and tacit knowledge theory, and uses the cluster sampling method to select students majoring in Arts and Crafts at A Vocational College in City S as typical subjects for survey research. A quasi-experiment was designed and implemented, which involved teaching the "Comprehensive Training Course on Purple Clay Pottery" using both traditional classroom and modern apprenticeship teaching methods. Through data analysis of questionnaires and scale evaluations, the study found that the modern apprenticeship is more conducive to the positive development of mentor-mentee relationships among Arts and Crafts students compared to traditional classroom teaching; moreover, the mentor-mentee relationship has a positive impact on students' learning outcomes.

Keywords: Modern Apprenticeship, Mentor-Mentee Relationship, Learning Outcomes, Arts and Crafts Major

Introduction

In recent years, the modern apprenticeship system has developed into a key direction for global vocational education reform. After the Industrial Revolution, the implementation carrier for skill development gradually shifted towards vocational education in schools. However, with the further

development of vocational education, people have gradually realized that the ideal form of vocational education should be an organic combination of the school education system and the apprenticeship training model, that is, the modern apprenticeship system. After World War II, Germany relied on the modern apprenticeship system, known as the "Dual Education System," to cultivate skilled talent and develop its economy, rapidly rising from the post-war ruins. Later on, Australia, Spain, France, and the Netherlands also explored the development of apprenticeship systems, and the practical results have proven that the implementation of modern apprenticeships has promoted economic and social development in these countries. Currently, China is facing more intense international competition than before. In order to enhance the market competitiveness of industries and products, China's vocational education is rapidly advancing and perfecting the modern apprenticeship system that aligns with the development of the modern economy, with the aim of cultivating talents who can meet the demands of new technical and skilled positions. In 2014, the State Council of China issued the "Decision on Accelerating the Development of Modern Vocational Education", an important document that clearly set forth a specific strategic goal: to implement pilot projects for joint enrollment and joint training under school-enterprise cooperation, also known as the modern apprenticeship system. After the active exploration of the first batch of modern apprenticeship pilot units and industry leading units in 2015 and the second batch of modern apprenticeship pilot units in 2018, the Ministry of Education issued a document in 2019 to "summarize the successful cases and lessons of modern apprenticeship pilot projects, aiming at the key industrial modules involved in national economic development and industry strategic deployment. Guide more institutions to participate extensively and fully tap richer social resources. Additionally, the development of the modern apprenticeship system should leverage the advantages of enterprises in practical training and the strengths of school education (Ministry of Education of China, 2019). Currently, pilot reforms of the modern apprenticeship system have been widely implemented, with various regions striving to explore and practice modern apprenticeship models that suit their own regional characteristics and development needs.

Meanwhile, research related to the modern apprenticeship system has gradually become a hot topic in the field of vocational education research, especially for the craft art majors in vocational colleges, this research is particularly important. The cultivation of artistic talent has its particularities, and the modern apprenticeship system follows the talent demands of market development. It closely integrates the long-accumulated experience of enterprise masters with the teaching methods favored by teachers. This undoubtedly provides a more suitable teaching innovation model for the cultivation of arts and crafts professionals in vocational colleges in our country.

In constructing the practical model of the modern apprenticeship system, elements such as the teaching organization, teaching methods, mentor-mentee relationships, teaching environment, and evaluation methods are considered at the micro level, with the mentor-mentee relationship being the primary element. The modernity of the contemporary apprenticeship system is primarily reflected in

the modernity of the Mentor-Mentee relationship. Establishing a stable and positive development of this relationship is key to enhancing students' learning outcomes and cultivating high-quality technical and skilled talents, which is particularly true for the craft art majors in vocational colleges. This thesis is inspired by a review of existing research and is further informed by personal experiences teaching in the Arts and Crafts major at a vocational college, where I have directly observed the significant impact of the mentor-mentee relationship in modern apprenticeship systems on student learning outcomes. Therefore, this paper selects the Craft Art major at A Vocational College in City S as a typical subject for investigation, and designs and implements a quasi-experimental study comparing traditional classroom teaching with modern apprenticeship teaching methods. The study aims to provide empirical research on the impact of the mentor-mentee relationship in modern apprenticeships on the learning outcomes of students in the Craft Art major. It hopes to verify the importance of the mentor-mentee relationship in modern apprenticeships on student learning outcomes and to explore its mechanism of action. This research intends to offer suggestions for constructing new mentor-mentee relationships in the reform of modern apprenticeships in China's vocational colleges, thereby promoting the reform of modern apprenticeships in the country.

Research Objective (s)

By conducting a quasi-experimental comparison in teaching, a survey and data analysis of the mentor-mentee relationship and learning outcomes among students majoring in arts and crafts were carried out to explore the impact of the teacher-student relationship under the modern apprenticeship system on student learning outcomes. By identifying the shortcomings of the modern apprenticeship system in building good mentor-mentee relationships and proposing corresponding improvement measures, we aim to promote the construction of harmonious mentor-mentee relationships in teaching practice, and help advance the reform of the modern apprenticeship system in the field of arts and crafts, as well as the exploration of the overall modern apprenticeship practice.

Literature Review

Mentor-Mentee Guidance Relationship Theory

Since the 1980s, Kram (1985) has provided a conceptual explanation of mentoring relationships, emphasizing that they occur between experienced seniors and inexperienced juniors. The seniors guide the juniors in accumulating experience in various aspects, training in their work, and strengthening their skills throughout this process (Kram, 1985). Noe emphasized that the mentoring relationship occurs between the master and the apprentice. The master has accumulated a wealth of experience in practice and plans for the personal growth of the apprentice with a unique perspective. They are role models for the apprentice, providing them with guidance and feedback (Noe, 1988). Researchers of identity-based mentoring theory generally believe that the better the mentor-mentee

relationship is constructed, the more it can enhance students' learning outcomes.

Tacit Knowledge Theory

British scholar Michael Polanyi discussed the concepts of explicit knowledge and tacit knowledge, pointing out in "Personal Knowledge" that explicit knowledge refers to a type of knowledge expressed through mathematics, diagrams, and various written forms; the concept of tacit knowledge refers to knowledge that takes many forms and is not expressed through verbal means, specifically knowledge that cannot be easily articulated or explained in words (Chen & Liu, 2007). Tacit knowledge is a type of knowledge that can only be comprehended on a conscious level but cannot be explicitly articulated. It is often integrated with practical activities and is characterized by its uncertainty, specificity, contextuality, inexpressibility, and rich stratification. This theory is the foundation of the traditional apprenticeship system and an important reference for modern apprenticeships. During the practical teaching activities conducted by corporate masters, learners primarily focus on acquiring tacit knowledge, with explicit knowledge serving as a supplementary component. The learning of tacit knowledge relies on the influence of the corporate masters' own actions and words, and is acquired through a subtle and gradual process.

Research Review

The specific practices of modern apprenticeship systems vary across different countries, and researchers from each country also place different emphases on the discourse regarding the mentor-mentee relationships within their nation's modern apprenticeship systems. In recent years, foreign academic circles believe that modern apprenticeships can be made into a common paradigm for modern enterprises, companies or social organizations to cultivate talents and realize "intergenerational development". The influencing factors in the construction of the modern apprenticeship system are also one of the key issues of concern to foreign scholars. Currently, as the reform of vocational education in our country continues to deepen, the "modern apprenticeship" system has received a great deal of attention from various dimensions including macro policies and academic research. National policy research and implementation of the modern apprenticeship system reflect a clear encouragement orientation. As proposed in the "National Medium and Long-term Education Reform and Development Plan Outline (2010-2020)," it is necessary to "promote the institutionalization of school-enterprise cooperation, improve modern vocational education, and establish a modern apprenticeship system with Chinese characteristics." (Official Website of the Ministry of Education of the People's Republic of China, 2010). The affirmation of the positive significance of the modern apprenticeship system is also a general consensus in the domestic academic community. Based on the current focus of domestic scholars, the content can be roughly divided into six main themes: the historical development of the modern apprenticeship system, its meaning and importance, nature and structure, construction mechanisms, impact and effectiveness, and problems and solutions.

In the field of teacher-student relationship research, foreign scholars focus on the two core

subjects of teaching activities—the teacher and the student—leading to various interpretations and definitions of the nature of the teacher-student relationship. For example, Herbart proposed the "teacher-centered theory," emphasizing that the teacher occupies a central position and the students are passive. Dewey emphasizes in the "student-centered theory" that students are the main characters. In the context of vocational education, foreign scholars often define the teacher-student relationship as a "mentoring relationship." Kram (1985) provided a definition for this mentoring relationship, suggesting that it involves an experienced senior guiding an inexperienced junior, helping them to engage in various types of learning and to accumulate work experience. In the field of education in our country, the definition of teacher-student relationships that is relatively recognized comes from the collaborative work of twelve well-known domestic normal universities on "Fundamentals of Education" (2008). This includes various aspects such as the connotation of teacher-student relationships, their role, their multiple natures, and the multi-level relationship framework. The factors influencing the mentor-mentee relationship are also the focus of many scholars' attention. As He (2023) and others have pointed out, a master's personal social experience, expertise, personality traits, age, and job characteristics can all have a direct impact on the mentor-mentee relationship.

In the evaluation of the learning outcomes of students in the modern apprenticeship system of vocational education, scholars from different countries have their own emphases in their discussions. Professor Felix Rauner from the University of Bremen in Germany proposed eight key indicators for measuring learning outcomes, which are: intuitiveness, functionality, utility value orientation, cost-effectiveness, work process orientation, social responsibility, environmental friendliness, and innovativeness. However, the most widely applied training evaluation model in education and training across the world is the Kirkpatrick Four-Level Training Evaluation Model, which was proposed by the internationally renowned scholar Kirkpatrick (1959). The model is a four-level hierarchical structure that includes the reaction level, learning level, behavior level, and results level. Kirkpatrick's evaluation model provides researchers and practitioners with a precise framework for information gathering, facilitating a systematic and concrete approach to addressing research questions and processes at each stage. Chinese scholars Lu (2014) in "Exploration and Practice of a Diverse Student Evaluation System in Modern Apprenticeship", and Wang and Xu (2015) in "Construction of a Quality Evaluation System for Vocational Education under Modern Apprenticeship Based on the Kirkpatrick Model" both suggest that the Kirkpatrick evaluation model should be referenced. According to the current standards of educational quality in vocational education's apprenticeship system, a system of teaching quality evaluation indicators should be constructed.

Methodology

To study the impact of the mentor-mentee relationship on student learning outcomes when adopting the modern apprenticeship talent training model in Chinese vocational colleges, this research

conducted a quasi-experimental educational pretest-posttest with two groups, using the "Comprehensive Training of Purple Clay Pottery" course in the Arts and Crafts major at A Vocational College in City S as an example. The specific method is to take 30 students from the 2021 cohort of the Arts and Crafts major as the sample population, and randomly divide them into two groups: a traditional classroom teaching class and a modern apprenticeship pilot class, with 15 students in each group. The course lasts for 2 months, totaling 128 class hours. After the course ends, the impact and role of the mentor-mentee relationship on student learning outcomes under two different teaching models—traditional classroom and modern apprenticeship—are measured empirically. This is done by having students self-assess using the "Mentor-Mentee Relationship Scale" and by having the instructors evaluate the students' learning outcomes using the "Student Learning Outcome Assessment Scale." The results are then analyzed using descriptive and inferential statistics.

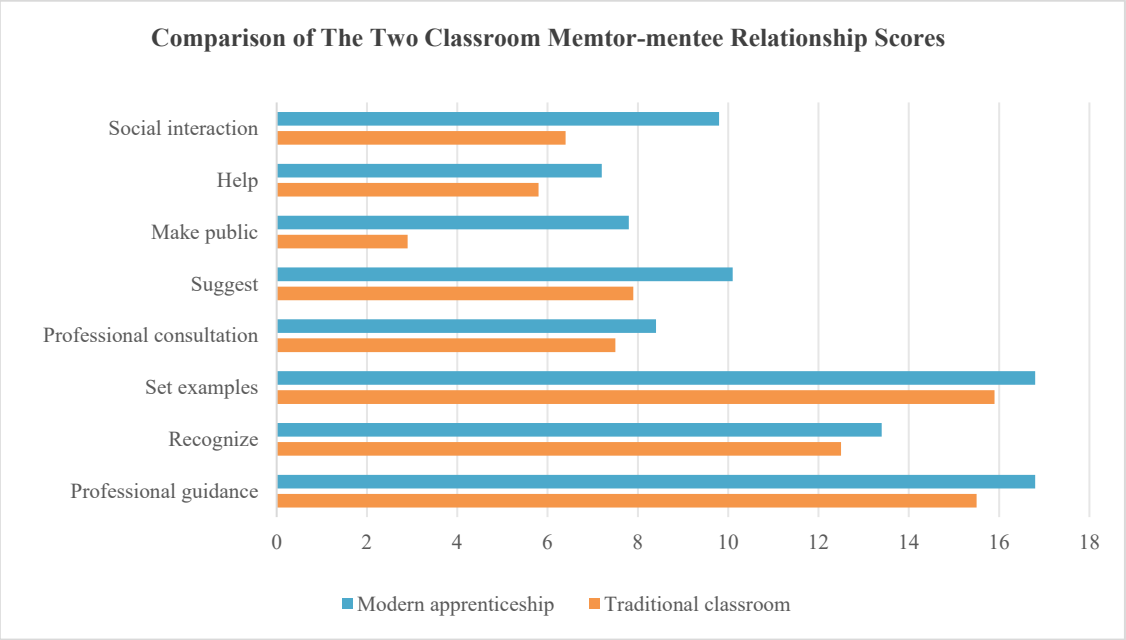
Results

The data obtained from student questionnaires and teacher evaluations of student learning outcomes were organized, and BM SPSS Statistics 20 was used for data entry and analysis. The final research results presented the relationship between the mentor-mentee relationship and student learning outcomes in the "Comprehensive Training of Purple Clay Pottery" course.

After summarizing the questionnaire scores for the mentor-mentee relationships in both the modern apprenticeship pilot classes and the traditional classroom-based teaching classes, as shown in Table 1, the average score for the mentor-mentee relationships in the modern apprenticeship was 58.52, while the average score for the traditional classroom-based teaching classes was 48.87. The mentor-mentee relationship score in the modern apprenticeship system was 9.65 points higher than that in the traditional classroom-based teaching classes. As shown in Picture 1, under the two main content dimensions of the mentor-mentee relationship scale, which are professional learning guidance and interactive communication assistance, the modern apprenticeship class scores higher than the traditional lecture class in each of the eight sub-dimensions: professional guidance, recognition, role modeling, professional consultation, advice, openness, help, and social interaction.

Table 1: Average Scores of Mentor-Mentee Relationship Questionnaires for Modern Apprenticeship Pilot Classes and Traditional Classroom-Based Teaching Classes

	Mean	N	Standard Deviation	Standard Error of Mean
Pair 1 Apprenticeship System Score	58.52	23	7.896	1.646
Traditional Classroom Score	48.8696	23	14.98880	3.12538



Picture 1: Comparison of Mentor-Mentee Relationship Scores between Modern Apprenticeship Pilot Classes and Traditional Classroom-Based Teaching Classes

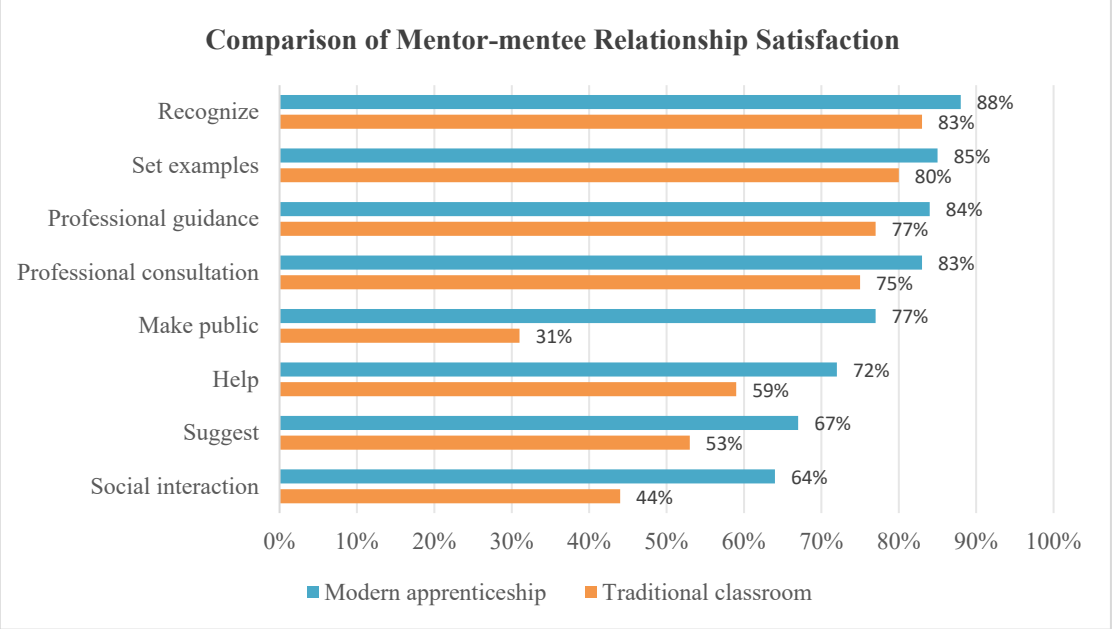
Table 2: Comparison of The Learning Outcomes of Students in Modern Apprenticeship Pilot Class and Traditional Classroom Class

Course	Knowledge Principle	Operational Skill	Professional Quality	Result	Total Score
Traditional Mean Value	13.53	17.87	26.80	17.53	75.93
N	15	15	15	15	15
Standard Deviation	3.482	3.563	2.808	3.044	11.323
Minimum Value	9	11	22	12	55
Maximum Value	18	23	31	23	89
Middle Value of Grouping	12.75	18.20	27.33	17.50	77.00
Modern Apprenticeship Mean Value	16.80	21.40	29.80	21.33	89.47
N	15	15	15	15	15
Standard Deviation	1.656	3.158	2.597	2.845	8.983
Minimum Value	13	16	26	17	76
Maximum Value	19	26	35	25	103
Middle Value of Grouping	16.75	21.60	29.25	22.00	88.00
Totaling Mean Value	15.17	19.63	28.30	19.43	82.70
N	30	30	30	30	30
Standard Deviation	3.152	3.764	3.064	3.481	12.174
Minimum Value	9	11	22	12	55
Maximum Value	19	26	35	25	103
Middle Value of Grouping	16.18	20.13	28.50	19.25	84.60

Comparison of the learning outcomes of traditional classroom type and modern apprenticeship students. From the overall score of the learning effect, as shown in Table 2, the average score of students in the pilot class of modern apprenticeship is 89.47, which is significantly higher than that of traditional

classroom (75.93). After dismantling the learning effect into four dimensions: knowledge principle level, operation skill level, professional accomplishment level and result level, the average value of modern apprenticeship in each dimension is higher than that of traditional classroom, which indicates that modern apprenticeship has a certain influence on the students' learning effect in the four dimensions.

The ratio of the average score of the Table 8 subdimension to the total score of the dimension was taken as the students' satisfaction with the mentoring relationship of the subdimension. As shown in Picture 2, in the arts and crafts major of S City A Vocational College, the student satisfaction of modern apprenticeship class is higher than that of traditional teaching class in all dimensions. For students of two classes, students have high satisfaction in the recognition of professional learning guidance function, role model, professional guidance and professional consultation, but low satisfaction in terms of making public, help, suggest and social interaction under the interaction help function.



Picture 1: Comparison of Student Satisfaction in Mentor-Mentee Relationships

With the total score as the dependent variable and the four dimensions of knowledge principle layer, operational skill layer, professional literacy layer and result layer as the four independent variables, the regression equation is established. As shown in Table 3, the standard coefficients of knowledge principle, operational skill, professional quality and result layer are 0.199, 0.321, 0.319 and 0.286 respectively. Therefore, the order of the influence of each dimension on the overall learning effect of students majoring in arts and crafts in vocational colleges is as follows: operational skill> professional quality> result > knowledge principle.

Table 3: Analysis of The Factors Influencing The Total Score of The Learning Effect

Model	R	R Square	Adjust R Square	Error of The Standard Estimates
	Course Number =2 (Selected)			
	.999[a]	.998	.997	.496

a. Predictor variables: (constant), result layer, knowledge principle layer, professional quality layer, and operational skill layer

Model	Quadratic Sum	Df	Mean Square	F	Sig.
Regression	1127.271	4	281.818	1144.544	.000[c]
Residual	2.462	10	.246		
Totaling	1129.733	14			

a. Indicated variable: total score
b. Select only those cases with their course number =2
c. Predictor variables: (constant), result layer, knowledge principle layer, professional literacy layer, operational skill layer.

Model	Non-Standardized Coefficients		Standardized Coefficients	T	Sig.	The 95.0% Confidence Interval in B	
	B	Standard Error	Trial Version			Lower Limit	Upper Limit
(Constant)	-.368	1.922		-.192	.852	-4.650	3.914
Knowledge Principle	1.078	.116	.199	9.277	.000	.819	1.337
Operational Skill	.913	.103	.321	8.839	.000	.683	1.144
Professional Quality	1.104	.087	.319	12.737	.000	.911	1.297
Result	.904	.140	.286	6.463	.000	.592	1.215

a. Indicated variable: total score
b. Selected those cases with their course number =2

Table 4: Analysis of the Correlation between Traditional Classroom and Modern Apprenticeship Mentor-Mentee Relationships and Learning Outcomes

Course	Teacher-Student Relationship			Course	Mentor-Mentee Relationship		
Traditional Classroom	Total Score	Pearson Correlation	.019	Modern Apprenticeship	Total Score	Pearson Correlation	.600*
		Significance (Two-Tailed)	.945			Significance (Two-Tailed)	.018
		N	15			N	15
	Knowledge Principle	Pearson Correlation	.066		Knowledge Principle	Pearson Correlation	.414
		Significance (Two-Tailed)	.816			Significance (Two-Tailed)	.125
		N	15			N	15
	Professional Quality	Pearson Correlation	.072		Professional Quality	Pearson Correlation	.479
		Significance (Two-Tailed)	.798			Significance (Two-Tailed)	.071
		N	15			N	15
	Operational Skill	Pearson Correlation	.008		Operational Skill	Pearson Correlation	.618*
		Significance (Two-Tailed)	.979			Significance (Two-Tailed)	.014
		N	15			N	15
	Result	Pearson Correlation	-.101		Result	Pearson Correlation	.500
		Significance (Two-Tailed)	.721			Significance (Two-Tailed)	.058
		N	15			N	15

The correlation analysis between the score of mentoring relationship and the total score of learning effect is conducted. As shown in Table 4, it is found that the correlation coefficient between the score of mentoring relationship and the total score of learning effect in traditional classroom is only 0.019, showing a weak correlation, while in the pilot class of modern apprenticeship, the correlation coefficient between the teacher-student relationship and the total score of learning effect is 0.6, and the test p value is 0.018. The correlation is significant. From the four dimensions of learning effect (knowledge principle, operational skill, professional quality and outcome level), the correlation coefficient between the score of operational skill level and mentoring relationship is the highest, reaching 0.618, and p value <0.05, indicating a significant correlation.

Discussion

The research conclusions were obtained through analysis using a combination of methods including questionnaire surveys, quasi-experimental teaching methods, and data analysis.

This study has found that in modern apprenticeship class teaching teams, the combination of college teachers and enterprise masters is strong and complementary. Based on the experimental data, the teacher-student relationships formed are generally better than those in traditional classroom-based teaching classes. Moreover, under the two main content dimensions of the mentor-mentee relationship scale, namely professional learning guidance and interactive assistance, the modern apprenticeship system outperforms traditional lecture classes in all eight sub-dimensions, which include professional guidance, recognition, role modeling, professional consultation, advice, openness, help, and social interaction.

The study has found that modern apprenticeship systems have a certain impact on student learning outcomes across four dimensions, and the average values for learning outcomes in all dimensions of modern apprenticeships are higher than those of traditional classrooms. The reason is that the modern apprenticeship teaching model selects a teaching team composed of both college faculty and educated corporate masters, combining their strengths to create a high-quality teaching staff, providing better assurance for the quality of education. Due to the tacit knowledge characteristic of traditional craftsmanship knowledge systems, the formation of many skills often stems from personal hands-on experience. Students can learn professional attitudes from their master's teaching by word and example, enhancing their professional quality, thereby better motivating themselves to achieve their learning goals.

When comparing the mentor-mentee relationship satisfaction between modern apprenticeship class and traditional classroom class, it is found that the student satisfaction of modern apprenticeship class is higher than that of traditional teaching class in all dimensions. For the students of the two classes, the students' satisfaction is higher in four aspects: the recognition of the professional learning guidance function, setting examples, the professional guidance and the professional consultation, while

the students' satisfaction is low in the aspects of making public, help, suggesting and social interaction under the communicative interaction help function. In the process of carrying out professional learning guidance, the apprenticeship system in contemporary China is inevitably branded with the traditional Chinese apprenticeship system. In fact, there is a relationship between the superior and the subordinate, and the authority and grade color of the mentor to the mentee is more obvious. The order of upper and lower levels between mentor and mentee is relatively significant, and the function of communication and interaction based on equal identity between mentor and mentee is not enough. Therefore, there is a general need for improvement in the relationship between mentor and mentee regarding equal communication and living.

From the analysis of factors affecting the overall score of learning outcomes, the impact of various dimensions of learning outcomes on the overall learning effectiveness of vocational college students majoring in arts and crafts is ranked as follows: operational skill > professional quality > result> knowledge principles. From the perspective of career development, the role of the modern apprenticeship system is studied. The participants in the modern apprenticeship system are front-line employees in companies, most of whom are engaged in technical operation-related positions. The modern apprenticeship system emphasizes technical skills that meet employability and social needs, rather than foundational academic knowledge. Therefore, the result that the importance of the operational skills layer exceeds that of the knowledge principles layer is also in line with the core concept of the modern apprenticeship system.

Correlation analysis between mentor-mentee relationship scores and overall learning outcome scores revealed that, in the modern apprenticeship pilot classes, there is a stronger correlation between the mentor-mentee relationship and student learning outcomes. A good mentor-mentee relationship can promote an overall improvement in student learning outcomes. Moreover, from the perspective of the four dimensions of learning outcomes, the mentor-mentee relationship has the strongest correlation with the operational skill level and the greatest impact. Therefore, the implementation of the modern apprenticeship system can effectively promote the improvement of all aspects of student learning outcomes, especially the enhancement of operational skills.

Conclusions

A substantial body of literature indicates that modern apprenticeship models featuring new, stable, and positive mentor-mentee relationships are beneficial for enhancing student learning outcomes. This study also empirically verified the important role of the mentor-mentee relationship, a key factor in modern apprenticeship, on the learning of students majoring in arts and crafts. Therefore, vocational colleges should reform the traditional education methods, innovate the talent training mode, summarize the successful experience and typical cases of the modern apprenticeship system, respond to the government's requirements, seek the common support of the whole industry and society, and

develop modern apprenticeship with modern Chinese characteristics, with schools and enterprises as dual subjects. It should also be noted that in the implementation process of the modern apprenticeship system, the interaction and mutual assistance function between mentors and apprentices based on equality and non-hierarchical status conditions results in lower student satisfaction. Therefore, when constructing the Mentor-Mentee relationship in the modern apprenticeship system, we should pay more attention to the equality of the mentor and apprentice identities. Mentors should actively engage in communication and interaction with students, establish a relationship of mutual trust, empathetically offer suggestions, and provide assistance. To build a harmonious and stable Mentor-Mentee relationship and to promote better development of the modern apprenticeship system, a process of time is required. It must involve multiple parties working in coordination to realize the beautiful vision of thriving development in vocational education.

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