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Item Preparation and Design of Teaching Psychological Quality Assessment Scale for Vocational School Teachers

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Abstract: Given the unique nature and critical importance of vocational college faculty, it is essential to conduct scientific research on their teaching psychological qualities and develop an assessment scale with systematic application methods for educational evaluation. This study employed vocational college teachers as subjects, and through preliminary research interviews and predictive analysis, developed a teaching psychological quality assessment scale for vocational educators. The teacher teaching psychological quality assessment scale, developed using the University Teacher Teaching Psychological Quality Assessment (DTPA) and Middle School Teacher Professional Identity (MTCA) as criterion-referenced questionnaires, serves as a measurement tool for vocational college faculty's teaching psychological qualities. The scale comprises six factors: expressive communication, innovation, hands-on demonstration, stability, wisdom, and professional identity.

Keywords: Psychological Quality Assessment Scale; Vocational Technology; Factor Analysis

1. Introduction

From the perspective of vocational college teachers, we have developed a teaching psychological quality assessment scale. This instrument should reflect the essential educational psychological qualities required for vocational instructors. The scale comprehensively incorporates both the characteristic psychological traits demonstrated in vocational instruction and indirect attributes such as professional identity and intellectual competence [1].

2. Research Objects and Methods

Based on the comprehensive review of existing literature and interview results, the initial scale was revised based on the theoretical conception dimension through the collection of questionnaire items. The basic structure of teaching psychological quality of vocational college teachers is as Table 1 following:

Table 1. Constitute of Teaching Psychological Quality of Vocational College Teachers

Teaching psychological quality of vocational college teachers	Professional personality	Communicative and expressive
		innovativeness
		Wisdom
	Adaptability to teaching	Operational demonstration
		toughness
		emotional stability
	Career awareness	A sense of professional identity

After finalizing the questionnaire, a team of vocational education experts and experienced teachers from vocational colleges was formed to verify the universality and significance of each item. This process ensured that the selected items were both prevalent and crucial within the actual "structure of teaching psychological qualities for vocational college instructors". The finalized pilot version of the "structure of teaching psychological qualities for vocational college instructors" questionnaire contained 62 items [2].

The pilot sample was conveniently drawn from several vocational colleges to ensure a sufficient number of teachers. The questionnaire had a 90% valid response rate. Through item analysis, 50 items with significant Cronbach's alpha ($a<0.01$) were retained, as all items effectively differentiated participants' response levels. Consequently, all items were kept intact. The research results were processed using SPSS statistical software for item analysis, reliability, and validity assessments of the entire dataset [3].

3. Structure Analysis and Validity Test of the

Scale

The correlation coefficient method was used to screen and analyze the correlation between items and the total score of the initial scale. Items with a correlation coefficient less than 0.4 were deleted through screening. The remaining items showed a correlation coefficient between 0.416 and 0.725, all reaching the significant level ($P<0.01$).

After conducting item analysis, principal component analysis was applied to extract factors from the teacher participant sample. Initial factors were rotated using variance-maximizing orthogonal rotation. Factors with eigenvalues greater than 1 and factor loadings above 0.4 were retained, while items showing similar loading across multiple factors were excluded. Subsequently, items underwent careful selection and categorization based on practical needs and expert input, ultimately yielding 32 items (including 8 reverse-scored items) distributed across six factors (as shown in Figure 1). These factors collectively contributed 55.540% of total variance. The six factors are named: Communication & Expressiveness, Innovation, Hands-on Demonstrations, Stability, Wisdom, and Teacher Professional Identity [4]. Specifically: Factor 1 is termed Communication & Expressiveness; Factor 2 Innovation; Factor 3 Hands-on Demonstrations; Factor 4 Stability; Factor 5 Wisdom; and Factor 6 Professional Identity. (Exploratory factor analysis results are presented in Table 2.

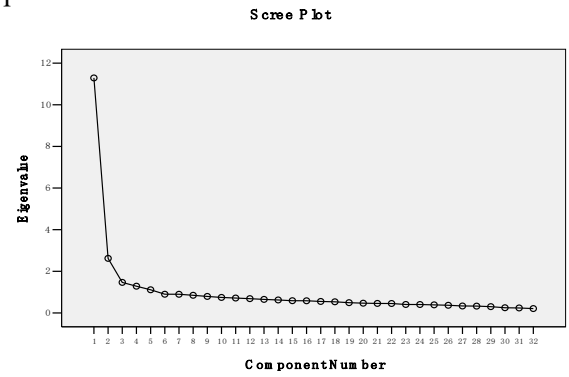

Figure 1. Scree Plot Components Plot

Table 2. Results of Exploratory Factor Analysis

Items	1 communication and expression	2 innovation	3 operating demonstration	4stability	5 intelligence	6 sense of professional identity
X56	0.766					
X55	0.764					
X50	0.761					
X28	0.649					
X58	0.646					
X8	0.597					
X3		0.677				
X45		0.674				
X52		0.546				
X60			0.688			
X54			0.628			
X46			0.581			
X37			0.57			
X20				0.648		
X61				0.617		
X34				0.562		
X43				0.541		
X24					0.695	
X49					0.683	
X30					0.615	
X21						0.684
X22						0.673
X12						0.592
X11						0.551
X5						0.544
X10						0.501

The correlation between each factor was 0.432 ~ 0.668, and the correlation between each factor and the total score was 0.723 ~ 0.851, both of which reached the significant level.

The content validity ratio (CVR) was used to evaluate the content validity of the scale in this study. The results showed that 17 items out of 32 had a CVR=1, 12 items had a CVR=0.6, 3 items had a CVR=0.2, and 90.6% of the items had a CVR above 0.6 (see Table 3).

Table 3. Content Validity Ratio of Each Item in the Scale

CVR	clauses and subclauses
1	21, 22, 28, 37, 30, 43, 45, 50, 54, 58, 60
0.6	3, 5, 8, 11, 12, 20, 24, 34, 49, 55, 56, 61
0.2	10, 46, 52

This study adopted the University Teacher Psychological Quality Scale (DTPA) and Middle School Teacher Professional Identity (MTCA) as criterion-referenced questionnaires, conducting validity testing using a sample. Statistical analysis revealed that the total scores and factor scores of the vocational college teachers' teaching quality assessment scale showed positive correlations with both DTPA and MTCA. Except for the operational demonstration dimension where no significant correlation was observed, all other dimensions demonstrated statistically significant correlations [5-6].

4. Items and Examples of Teaching Quality Assessment Scale for Teachers in Vocational Colleges

Test Instructions: Hello! This questionnaire contains 62 questions focusing on educational and teaching-related content. Each participant will have different perspectives and responses, as there are no right or wrong answers – they simply reflect your understanding of these issues. Please express your opinions based on your personal experiences. Each question offers five options: Completely Disagree, Disagree, Uncertain, Agree, and Completely Agree. Mark the corresponding option with an "X" according to how well it matches your situation regarding each item. You may only select one answer per question. Please complete all items without missing any questions. Avoid selecting the "Uncertain" option whenever possible.

1). When facing difficulties or making major decisions in life and work, I usually deal with them alone, take responsibility and try not to bother others.

Nothing is perfect, and I never ask myself to be.

3). I often talk to my family and friends about my choice of teaching profession and work, and show pride.

I yearn for a challenging job.

5). In my spare time, I often only know the theoretical operation process of handicrafts that I am interested in, and seldom try to do it by hand.

I've never lied.

7). When my friends are in trouble, they are willing to ask me for help and talk to me.

8). I prefer to do some repair and assembly work than reading technology books and periodicals.

I feel proud when I face the devout eyes of a group of students.

10). Usually I can arrange and manage my time reasonably to achieve the expected goals.

11). I understand and yearn for the "double teacher" role that teachers in vocational education undertake.

I would be very happy to master a trade and make a living from it.

I like to participate in all kinds of parties and activities, and I am very active in them.

When I argue with others, I often get nervous all over.

I prefer a free and easy life and don't want to be constrained.

When traveling, I like to choose some undeveloped new attractions and new routes, rather than those famous and well-managed scenic spots.

17). No matter how difficult the work is, I will set a predetermined goal, then implement it in stages and check it regularly.

I often make things myself and get a lot of pleasure from them.

19). In a team, I am willing to express my ideas if I disagree with other members.

I like being a vocational school teacher because I can show my skills to students.

I am satisfied with the current treatment and status of teachers in vocational colleges.

22). In problem solving, I can tolerate vague intermediate states.

I would like to engage in some work that requires long-term training to acquire superb skills.

24). I am also interested in major breakthroughs in industries outside my own specialty.

25). In some public places, I prefer to take the initiative to communicate with strangers.
If I don't finish the work assigned to me on time, I will feel guilty.
I feel a great sense of accomplishment in helping students master a survival skill.
28). I think spending a lot of time reading books or magazines outside your major shows that you are not professional.
It takes a lot of effort to explore the principles behind a common sense of life.
I'd rather go to a photo exhibition than a debate.
I don't like to get along with people who follow the rules in my daily life.
To prove a new theory, I think the derivation of digital formula is the most concise and concise method, and it is not necessary to design experiments and make models.
33). If an individual is assigned to do a job he does not want to do, it will inevitably affect the quality or efficiency of the work.
34). If students praise me for my good teaching, I will feel calm rather than happy.
Occasionally I push things I don't do today to tomorrow.
It makes me happier and more relaxed to play games with my children than to read alone in my spare time.
When I was a child, I used to take apart my toys and see what was inside.
38). Vocational school teachers have more room for future development than ordinary high school teachers.
39). Under the same treatment, I would rather do administrative work than financial work.
40). I can adapt quickly and get into work no matter what the circumstances are.
I like to use an experiment or a product to prove a scientific principle.
I don't think there is a sense of achievement in being a vocational school teacher.
43). I think it is important to speak clearly and not to add emotional expressions.
44). When I travel to a place I'm not familiar with, I usually check the map to confirm my location rather than asking a passer-by.
I am easily troubled by some trivial things in my daily life.
46). Whenever I have time, I spend it with my students.
47). Listen to words with your ears Although it sounds ridiculous, I will try to explain how it works.
48). I will ask someone to repair the furniture or electrical appliances at home, and seldom do it by myself.
I have never had any trouble in my daily life.
I think everything has right and wrong.
I often set and change my goals for action.
52). It is obviously a way to reduce the efficiency of doing things by asking colleagues for their opinions before deciding how to carry out the tasks received.
When I introduce something, I usually have a lot of logic but not enough humor.
I'm not nervous to see a wild animal in an iron cage.
When I'm talking to someone, if there's someone else talking about something, I get annoyed.
I seldom hurt people's feelings with embarrassing words.
I like to do some work that requires precision technology and operation.
58). The bad weather doesn't affect my mood.
If teachers' lesson plans are revised every year, it will affect students to better grasp the knowledge.
Generally I can achieve the expected goals in what I do.
Self-discipline, prudence and restraint have always been my style.
62). Under the influence of some negative emotions, I have to temporarily put down my work often.

5. Scale Structure and Item Analysis

The exploratory factor analysis revealed that the teaching competency assessment scale for vocational college instructors comprises six dimensions. The first dimension, termed "Communication and Expressiveness", reflects educators' enthusiasm for interacting with others and articulating ideas. The second dimension, "Innovativeness", indicates their willingness to challenge existing theories through practical evaluations. The third dimension, "Operational Demonstration", highlights their preference for hands-on activities and mastery of technical

skills. The fourth dimension, "Stability", demonstrates their ability to handle diverse situations calmly while maintaining team cohesion [7]. The fifth dimension, "Cognitive Agility", showcases quick thinking and educational expertise [3]. The sixth dimension, "Professional Identity", captures individual interest, recognition, and confidence in teaching careers. Contrary to the initial theoretical framework, the seventh dimension was identified as resilience. However, upon closer examination of items under this dimension, it became evident that elements originally attributed to resilience had been redistributed across other dimensions [8].

Regarding teaching competencies, it is widely recognized that effective communication forms the cornerstone of educators 'professional qualities. We have established communication and expressiveness as the first dimension in our assessment framework. Given the dynamic nature of vocational education, where knowledge evolves rapidly across industries, we incorporate Teaching Innovation (Factor 2) and Wisdom (Factor 5) to evaluate teachers' ability to adapt to and drive knowledge innovation while organizing instruction with flexible wisdom. Beyond emphasizing communicative competence, we introduce Teaching Stability (Factor 4) – a quality reflecting educators 'capacity to maintain systematic instruction despite student distractions or environmental challenges. This competency demonstrates innate traits and personal preferences, which naturally leads to professional identity. Consequently, Practical Competence (Factor 3) and Professional Identity (Factor 6) specifically characterize vocational educators' self-perception and recognition of their teaching practices. These six dimensions ultimately form the core structure of the psychological competency assessment scale for vocational college instructors [9].

Item analysis serves as a crucial step in developing standardized assessment tools, aiming to identify suitable items that ensure the scale's reliability and validity. This scale employs three primary methods for item selection: 1) correlation between individual items and total scores, 2) discriminant validity of items across high/low score groups, and 3) factor analysis. When items show significant correlation with total scores, it indicates they can effectively reflect teachers' psychological qualities and help differentiate levels of psychological competence [10].

6. Conclusion

This study evaluates the reliability of the scale through two dimensions: test-retest reliability and homogeneity reliability. A well-designed assessment tool should demonstrate a test-retest reliability greater than 0.8 for the total scale and over 0.6 for individual items. Test-retest reliability, also known as the stability coefficient, primarily assesses the scale's temporal consistency. Based on post-test results from teachers two weeks after administration, the test-retest reliability reached 0.654, indicating strong temporal stability and satisfactory reliability. Homogeneity reliability reflects the correlation between items, which should represent different aspects of the same independent concept.

The theoretical framework, item development, and selection process of the assessment scale underwent rigorous evaluation and approval by relevant experts. Through continuous refinement of item content and phrasing, the scale achieved robust content validity. The Content Validity Ratio (CVR) analysis demonstrated that 90.6% of items scored above 0.6, confirming the scale's strong content validity. Efficacy validity tests revealed that the total score and factor scores of the Vocational College Teacher Teaching Competency Assessment Scale showed strongest correlations with the "Theoretical Framework and Scale Development for Psychological Qualities of Outstanding University Teachers", while demonstrating relatively lower correlations with the Secondary School Teacher Psychological Quality Assessment Scale.

In conclusion, the selection and compilation of items in this scale can be used as a reference for the evaluation of teaching psychological quality in vocational and technical colleges, and has a positive reference significance for the selection and evaluation of human resources of teachers in vocational and technical colleges.

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