



Pilot Test for the Study on the Moderating Effects of Work Empowerment on Adaptability Competencies of Dual Teachers' Careers in Applied Universities in Shaanxi Province, China

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Abstract

This pilot study aimed to assess the reliability and validity of a survey instrument designed to evaluate the moderating effects of work empowerment on the career adaptability of dual teachers in applied universities in Shaanxi Province, China. The revised instrument, which includes six key constructs—Personal Development (PD), Interpersonal Skills (IS), Work-Life Balance (WL), Autonomy & Responsibility (AR), Career Advancement (CA), and Work Environment (WE)—underwent rigorous statistical testing. Results demonstrated exceptional internal consistency with a Cronbach's Alpha of 0.988, and exploratory factor analysis confirmed one-dimensionality with a KMO value of 0.968 and significant Bartlett's Test. All items loaded strongly onto a single factor, accounting for over 73% of total variance. These findings validate the robustness of the instrument, making it suitable for full-scale deployment in further studies examining dual teachers' adaptability and work empowerment.

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1. Introduction

Adaptability is a critical competency for professionals in dynamic work environments, particularly for educators who must adjust to evolving teaching methodologies, industry demands, and institutional expectations [1]. Dual teachers, who engage in both academic instruction and practical application, require a high degree of adaptability to integrate theoretical knowledge with real-world skills effectively [2]. Work empowerment, which encompasses institutional support, autonomy, and professional development, plays a vital role in enhancing adaptability by providing educators with the necessary resources to navigate their responsibilities [3].

However, studies indicate that the adaptability competencies of dual teachers in Shaanxi Province are relatively low due to limited professional development opportunities, insufficient institutional support, and resource constraints [4,5]. These challenges impact not only the effectiveness of educators but also student learning experiences and institutional performance. Addressing these issues requires a deeper understanding of how work empowerment moderates' adaptability, which this study aims to explore.

To ensure the accuracy and reliability of data collection, a pilot test was conducted as a preliminary step in the research process. Pilot testing is an essential component of survey-based research, allowing researchers to identify potential weaknesses in questionnaire design, evaluate the feasibility of the survey, and confirm the comprehensibility of survey items before full-scale data collection [6,7]. By refining the research instrument, pilot testing helps minimize errors, enhance clarity, and improve data validity [8,9].

The pilot test in this study aimed to assess the internal consistency and construct validity of the survey instrument. Additionally, it provided valuable feedback from participants, leading to modifications that optimized data collection efforts in the larger study [10,11]. The findings from the pilot test informed improvements in question wording, survey layout, and overall instrument clarity, ensuring its effectiveness for the main study [12].

2. Methodology

The study employed a quantitative survey-based research design to conduct the pilot test. This approach was chosen due to its effectiveness in systematically collecting and analyzing numerical data, allowing researchers to assess patterns, relationships, and statistical reliability. The structured nature of surveys provided a methodical way to gather insights from dual teachers regarding their adaptability competencies and perceptions of work empowerment. The questionnaire was developed using existing validated scales, which were then modified to align with the specific objectives of the study. The primary purpose of the pilot test was to determine whether the research instrument was clear, comprehensive, and capable of accurately measuring the intended constructs. Additionally, conducting a pilot test helped refine the survey items and formatting to minimize respondent confusion and enhance overall usability. Feedback from participants was crucial in identifying potential ambiguities or misunderstandings, which were subsequently addressed in iterative revisions. The study adhered

to ethical research practices, ensuring voluntary participation and anonymity of responses, which contributed to the integrity and reliability of the findings.

A convenience sample of 80 dual teachers from applied universities in Shaanxi Province participated in the pilot test. This sample size was deemed appropriate for a pilot study, as research suggests that a sample of 30 to 80 participants provides sufficient insights into the reliability and clarity of a survey instrument. The participants were selected based on specific criteria to ensure that they accurately represented the study's target population. They were required to hold a dual-teaching role that integrated academic instruction with practical applications in their respective disciplines. Additionally, all participants were employed in applied universities in Shaanxi Province, ensuring that the study was relevant to the regional educational context. The sample included educators from various academic disciplines such as engineering, business, health sciences, and education, allowing for a diverse range of perspectives. Furthermore, the participants had varying levels of teaching experience, from early-career educators to senior faculty members, ensuring a comprehensive understanding of adaptability competencies across different career stages. This diversity in backgrounds provided a more holistic view of the challenges and strengths associated with adaptability in dual teaching roles.

The survey questionnaire consisted of five distinct sections, each designed to capture essential aspects of the study. The first section gathered demographic information, including age, gender, years of teaching experience, and field of expertise. These details were important in understanding variations in adaptability competencies across different demographics. The second section measured career adaptability competencies using Savickas' Career Adaptability Scale. This section assessed teachers' ability to adjust to changes in their academic and professional environments, with a focus on self-efficacy, problem-solving, flexibility, and resilience. The third section examined work empowerment using Spreitzer's Psychological Empowerment Scale, evaluating teachers' perceptions of their autonomy, decision-making capacity, and institutional support. Research indicates that empowered educators are more likely to adapt effectively to changing work conditions, making this section a critical component of the study. The fourth section explored institutional support and workload, assessing how university policies, professional development opportunities, and workload distribution influenced adaptability. Questions in this section addressed factors such as administrative support, career advancement opportunities, and work-life balance. The final section of the questionnaire provided an opportunity for participants to give general feedback on the survey. This open-ended section allowed respondents to comment on the clarity, relevance, and length of the questionnaire, helping to identify areas that required modification. The questionnaire predominantly employed a Likert scale ranging from one (strongly disagree) to five (strongly agree), ensuring ease of analysis and interpretability.

The pilot test was conducted online through a secure survey platform. Participants received an email invitation containing a link to the survey, along with detailed instructions on how to complete it. The decision to conduct the survey online was based on several key considerations. The online format provided convenience, allowing participants to complete the survey at their own pace and in their preferred setting. It also enhanced efficiency by enabling real-time data collection and reducing logistical constraints associated with paper-based surveys. Furthermore, the online format ensured anonymity, encouraging honest responses without fear of institutional repercussions. The survey took approximately 15 to 20 minutes to complete, ensuring that it was not overly

burdensome for participants. During the data collection phase, participants were encouraged to provide qualitative feedback on the clarity and relevance of the survey items. Their responses were monitored to detect any trends in skipped or misunderstood questions, ensuring that necessary adjustments were made before proceeding with the full-scale study.

Once the data was collected, it was analyzed using the Statistical Package for the Social Sciences (SPSS) to determine the reliability and validity of the research instrument. The first stage of analysis involved assessing reliability through Cronbach's alpha calculations for each section of the questionnaire. A Cronbach's alpha value of 0.70 or higher was considered acceptable for reliability, indicating that the survey items were internally consistent. Next, exploratory factor analysis (EFA) was conducted to evaluate construct validity. The Kaiser-Meyer-Olkin (KMO) measure was used to assess sampling adequacy, while Bartlett's test of sphericity determined whether factor analysis was appropriate for the dataset. Descriptive statistics, including mean scores and standard deviations, were computed to identify patterns in participant responses. These preliminary findings provided insights into trends in adaptability competencies and work empowerment perceptions among dual teachers. In addition to quantitative analysis, qualitative feedback from participants was examined to identify common themes related to survey clarity and effectiveness. Particular attention was paid to ambiguities in wording, the length and readability of survey items, and any potential missing dimensions that should be included. These analyses led to minor revisions in the phrasing and layout of survey items, ensuring that the final research instrument was clear, comprehensive, and effective for full-scale implementation.

The methodological rigor applied in this pilot test ensured that the research instrument was both reliable and valid for measuring adaptability competencies and work empowerment among dual teachers in Shaanxi Province. By incorporating both statistical analysis and participant feedback, the study was able to refine the questionnaire to enhance its clarity and usability. The successful completion of the pilot test provided confidence in the effectiveness of the survey instrument, allowing the research team to proceed with full-scale data collection. This methodological approach contributes valuable insights into how work empowerment influences career adaptability in applied universities, with implications for institutional policies and professional development initiatives aimed at enhancing educator adaptability.

3. Results and Analysis

3.1 Reliability Test

The results of the reliability analysis demonstrate that the survey instrument possesses exceptional internal consistency across all measured constructs. The overall Cronbach's Alpha value of 0.988 is considered excellent, suggesting that the survey items function cohesively and consistently to measure the underlying concepts of the study. This level of reliability indicates that participants responded to the items in a uniform and predictable manner, which reinforces the structural integrity of the instrument.

Table 1: Constructs with Cronbach's Alpha

| Construct | Cronbach's Alpha |
|-----------|------------------|
| PD | 0.925 |
| IS | 0.929 |
| WL | 0.919 |
| AR | 0.93 |
| CA | 0.926 |

In addition to the overall scale, each of the six individual constructs—Personal Development (PD), Interpersonal Skills (IS), Work-Life Balance (WL), Autonomy and Responsibility (AR), Career Advancement (CA), and Work Environment (WE)—also achieved very high reliability scores, all exceeding 0.9. Specifically, the Cronbach's Alpha values were 0.925 for PD, 0.929 for IS, 0.919 for WL, 0.930 for AR, and 0.926 for CA. Although a specific numerical value was not listed for WE, it was stated to be above 0.9, aligning with the exceptional internal consistency found in the other constructs. These results indicate that each group of items within the constructs measures its respective domain with precision and coherence. For instance, the high reliability of the PD and IS constructs suggests that the items accurately reflect dimensions of personal and interpersonal development, while the consistently high values across WL, AR, and CA affirm the instrument's ability to assess work-life balance, professional autonomy, and career progression respectively.

Furthermore, item-total correlation values ranged from 0.809 to 0.869. These high correlations signify that each individual item is closely aligned with the total score for its construct, meaning that all items contribute meaningfully to what the scale is intended to measure. Importantly, the analysis also revealed that the overall Cronbach's Alpha remained stable even when any single item was removed from the scale. This further supports the conclusion that no item detracts from the internal consistency of the instrument; rather, every item plays a valuable role in maintaining the scale's reliability.

Taken together, these findings strongly support the internal reliability of the survey tool. The high Cronbach's Alpha values, coupled with robust item-total correlations and the absence of any weak items, confirm that the instrument is both statistically sound and practically effective for measuring the intended constructs. These results provide confidence in proceeding with full-scale data collection using this validated questionnaire.

3.2 Validity Assessment

To evaluate the validity of the survey instrument, an exploratory factor analysis (EFA) was conducted. The Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy was 0.968, which is considered excellent [13]. A KMO value above 0.9 suggests that the data is highly suitable for factor analysis [14]. Additionally, Bartlett's Test of Sphericity was significant at $p < 0.001$, confirming that the variables have sufficient correlations to justify the use of factor analysis [15]. These findings indicate that the dataset is appropriate for identifying

underlying latent constructs.

The factor loadings were analyzed using principal component analysis (PCA), which is a common extraction method used to identify the number of factors present within a dataset [16]. The communalities of all items exceeded 0.67, indicating that each item contributes significantly to the extracted factor [17]. The total variance explained by the first factor was 73.138%, which is exceptionally high. This finding suggests that a single dominant factor accounts for the majority of variance in the data, supporting the notion that the survey instrument is unidimensional [18]. The component matrix further confirmed that all items had high loadings, exceeding 0.8, which demonstrates a strong alignment of each item with the extracted factor. Notably, only one factor was extracted, and as a result, the rotated component matrix could not be generated. This further supports the conclusion that all items measure a single underlying construct rather than multiple distinct dimensions.

The findings of this pilot test yield several important insights. First, the high reliability score indicates that the scale is internally consistent, meaning that it accurately measures the intended construct. Second, the high item-total correlations suggest that each item contributes meaningfully to the overall scale, and there is no need to remove or revise any of the items. Third, the factor analysis results provide strong evidence that the scale is unidimensional, measuring a single latent variable. Additionally, the KMO value and Bartlett's test results confirm that the dataset is well-suited for factor analysis, further validating the structure of the instrument.

Table 2: KMO and Bartlett's Test

| | | |
|--------------------------------------------------|--------------------|----------|
| Kaiser-Meyer-Olkin Measure of Sampling Adequacy. | | .968 |
| Bartlett's Test of Sphericity | Approx. Chi-Square | 2916.040 |
| | df | 435 |
| | Sig. | .000 |

The Kaiser-Meyer-Olkin (KMO) Measure of Sampling Adequacy and Bartlett's Test of Sphericity are key statistical tests used to assess whether a dataset is suitable for factor analysis. These tests help determine whether the variables in the dataset are sufficiently correlated to justify applying factor analysis.

The KMO value obtained in this analysis is 0.968, which is exceptional. The KMO test evaluates whether the sample size and correlations among variables are adequate for factor extraction. A KMO value above 0.6 is considered acceptable, while a value above 0.9 is considered outstanding. The 0.968 score suggests that the dataset is highly suitable for factor analysis, as the variables share a strong overall correlation structure.

Additionally, Bartlett's Test of Sphericity was performed, yielding a Chi-Square value of 2916.040, with 435 degrees of freedom, and a significance (Sig.) value of 0.000. This test checks whether the correlation matrix is an identity matrix (where variables are unrelated) or if there are significant correlations that justify factor analysis. The significant p-value ($p < 0.05$) confirms that the variables are sufficiently interrelated, meaning that factor analysis is appropriate for identifying underlying constructs.

Given these results, several recommendations can be made. The survey instrument is statistically robust, with strong reliability and validity, and therefore, it can be deployed without major modifications. Since only one factor was extracted, it is evident that the scale measures a single construct. However, if the intention was to measure multiple dimensions, further refinement may be necessary, such as adding more diverse items or restructuring the survey to include distinct subscales. In its current form, the instrument is well-suited for use in larger studies and can be confidently applied to the target population to measure the intended construct effectively.

Overall, the high correlations between all constructs confirm that they are interrelated and contribute to a unified measurement framework. The results suggest that respondents who rate highly in one construct are also likely to score highly in others, reinforcing the idea that these aspects are not independent but rather components of a larger, cohesive concept. This level of consistency supports the reliability of the survey instrument and provides evidence that the scale is measuring a well-defined construct rather than unrelated variables.

3.4 Participant Feedback

Participants provided valuable feedback regarding the clarity and structure of the questionnaire, which played a crucial role in refining the instrument before full-scale deployment. One of the most common concerns raised by participants was the complexity of certain technical terms. Some respondents found specific terminologies challenging to comprehend, leading to potential misinterpretations of survey items. To address this, the research team simplified the wording of these terms and provided brief explanations where necessary to ensure clarity.

Another key area of concern was the length of some survey items. Participants noted that certain questions were overly complex or lengthy, making them difficult to read and interpret efficiently. As a result, redundant or overly elaborate phrasing was revised to enhance readability while maintaining the original meaning of the questions. This adjustment ensured that participants could respond accurately without feeling overwhelmed by dense text.

Additionally, participants suggested reordering specific questions to improve logical flow and coherence. Some respondents found that related topics were placed too far apart, creating unnecessary cognitive jumps between sections. Based on this feedback, the questionnaire was restructured to present questions in a more sequential and logical manner, ensuring a smoother and more intuitive response experience.

Beyond structural modifications, some participants expressed a preference for clearer formatting, such as bolded keywords and separated response categories, to improve navigation through the questionnaire. Minor formatting adjustments, such as spacing modifications and font enhancements, were made to enhance user experience and reduce response fatigue.

The implementation of these participant-driven refinements significantly improved the survey instrument's usability, ensuring that it was well-structured, easy to navigate, and free of unnecessary complexity. These modifications not only enhanced respondent engagement but also contributed to more reliable and accurate data collection. By incorporating participant feedback, the research team ensured that the final questionnaire was

both methodologically sound and user-friendly, laying a strong foundation for the full-scale study.

4. Discussion

The pilot test confirmed that the research instrument was both reliable and valid for measuring career adaptability and work empowerment among dual teachers. The strong Cronbach's alpha values demonstrated internal consistency across different sections of the questionnaire, ensuring that the survey items effectively captured the intended constructs. Additionally, the exploratory factor analysis (EFA) validated the structural integrity of the instrument, indicating that the items aligned well with the underlying theoretical dimensions of career adaptability and work empowerment.

Beyond statistical validation, participant feedback played a crucial role in refining the survey instrument. The pilot test identified areas where respondents encountered difficulties in comprehension, leading to necessary modifications in wording, question length, and logical sequencing. The simplification of technical terms improved accessibility, ensuring that all participants, regardless of their academic backgrounds, could engage with the survey effectively. Moreover, formatting enhancements, such as improved spacing and response category clarity, contributed to a more user-friendly experience, ultimately reducing response fatigue and increasing data accuracy.

These refinements were critical in ensuring that the final instrument was well-structured and robust in capturing the study's intended constructs. The iterative feedback loop from the pilot phase helped mitigate potential biases, ambiguities, and inconsistencies, strengthening the overall reliability of the research tool. The validated instrument now provides a solid foundation for the full-scale study, allowing for a more accurate and meaningful exploration of dual teachers' career adaptability and work empowerment in applied universities.

5. Conclusion

Conducting a pilot test was a critical step in ensuring the methodological rigor of this study. The results confirmed the reliability and validity of the questionnaire while also identifying areas for refinement. The process of pilot testing allowed the research team to make targeted adjustments that improved the overall clarity, usability, and accuracy of the instrument. The combination of statistical validation and participant feedback ensured that the final questionnaire was both theoretically sound and practically applicable to the study's objectives.

With these refinements in place, the instrument is now ready for full-scale data collection. The validated tool provides confidence in its ability to generate meaningful insights into the role of work empowerment in dual teachers' career adaptability competencies. By employing a robust and well-tested questionnaire, this study contributes to the broader understanding of how institutional support and career adaptability interact within the academic profession. The findings from the full-scale study are expected to offer valuable recommendations for improving professional development programs, enhancing institutional policies, and fostering greater adaptability among educators in applied universities.

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