

Development and Validation of A Survey for Measuring Instructors' Pedagogical Content Knowledge Level of One-To-One Pop Singing Courses at the Conservatories in China

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Abstract

This study aimed to develop and validate a survey instrument designed to assess the Pedagogical Content Knowledge (PCK) of instructors teaching one-to-one pop singing courses at conservatories in China. The instrument was constructed to evaluate four key dimensions of PCK: conceptions of purpose for teaching subject matter, knowledge of students' understanding, curricular knowledge, and knowledge of instructional strategies. The development process involved an extensive literature review, expert consultations, and pilot testing with conservatory instructors. Content validity was rigorously established through expert evaluation, yielding high Content Validity Index (CVI) values, with an S-CVI/Ave of 0.97 and an S-CVI/UA of 0.95. Exploratory Factor Analysis (EFA) confirmed the instrument's construct validity, with a Kaiser-Meyer-Olkin (KMO) value of 0.706 and a significant Bartlett's test of sphericity ($p < 0.001$). The cumulative variance explained by the four factors was 78.98%, indicating a strong explanatory power. Reliability analysis indicated high internal consistency, with Cronbach's alpha values ranging from 0.890 to 0.970 across the four dimensions. The final 21-item instrument offers a robust and reliable tool for assessing PCK in the context of pop singing pedagogy, contributing valuable insights for improving teaching practices and supporting the professional development of music educators.

Keywords: Development, Validation, Pedagogical Content Knowledge Level, Pop Singing Courses, Conservatories

Introduction

Pedagogical Content Knowledge (PCK) is an essential construct in the field of music education, particularly in specialized fields such as pop singing. It encompasses the integration of subject-specific knowledge with effective teaching strategies, ensuring that instructors not only possess expertise in their discipline but also understand how to deliver that content in a way that meets the learning needs of their students. While the importance of PCK has been extensively acknowledged in general teaching contexts (Shulman, 1986), its

application in pop singing instruction, particularly in one-to-one conservatory settings, remains underexplored.

Pop singing is becoming more and more common in music education, exploring evaluation criteria specific to pop music singing instruction undoubtedly facilitates the advancement of research and development in this area, thereby enhancing the teaching quality of pop singing.

In conservatories, where individual instruction is the standard, the role of pop singing instructors is pivotal. These instructors must combine technical vocal knowledge with pedagogical strategies that cater to diverse student needs, backgrounds, and learning styles. Despite the critical role of these instructors, existing tools for assessing PCK in music education are typically broad in scope and do not specifically address the unique challenges and pedagogical approaches inherent in pop singing instruction. The lack of a specialized instrument for evaluating the PCK of pop singing instructors has created a gap in research and professional development in this area. Therefore, it is very necessary to develop a instrument to solve this problem, to provide a guiding framework for evaluating the competence of pop singing instructors. Furthermore, pop singing instructors can enhance their teaching proficiency and engage in self-assessment based on the critical dimensions outlined by this instrument.

Purpose and Significance

This study aims to fill this gap by developing and validating a survey instrument specifically designed to assess the PCK of instructors teaching one-to-one pop singing courses at conservatories in China. By addressing the multidimensional aspects of PCK—including instructors' subject knowledge, teaching strategies, and adaptability to student needs—this study contributes to the understanding of how pop singing instructors apply their expertise in teaching. The findings are expected to provide valuable insights into the factors that influence effective teaching practices and offer a framework for improving pedagogical strategies, thereby supporting the professional development of pop singing instructors.

Research Objectives

This study is guided by the following objectives:

- i. To design a survey instrument tailored to assess PCK specific to one-to-one pop singing instruction.
 - ii. To evaluate the validity and reliability of the survey through expert validation and statistical analyses, including content validity, construct validity, and internal consistency.
- By developing and validating this instrument, the study contributes to the advancement of music education research, offering a tool that can be used to assess and enhance the teaching practices of pop singing instructors and inform future research in the field.

Literature Review

Pedagogical Content Knowledge in Music Education

Pedagogical Content Knowledge (PCK), a term first coined by Lee Shulman in 1986, refers to the knowledge teachers must possess to effectively teach their subject matter. Shulman argued that expertise in a discipline is not enough for effective teaching; instructors must also understand how to transform complex subject content into forms that students can grasp. PCK combines three key components: knowledge of the subject matter, knowledge of

students, and knowledge of pedagogy (Shulman, 1986). This framework has since been widely adopted and adapted across various educational fields, including music education.

In music education, PCK involves a deep understanding of musical concepts, the ability to convey these concepts through appropriate pedagogical strategies, and the skill to adapt teaching methods based on students' musical abilities and learning needs. Studies such as those by Concina (2023) and Partti, Weber, & Rolle (2021) have shown that effective music teachers integrate their musical expertise with pedagogical strategies to help students develop both technical skills and artistic expression. However, these frameworks have generally focused on group settings or instrumental teaching, leaving a gap in research regarding their application in one-to-one vocal instruction, particularly in pop singing.

In one-to-one teaching contexts, the need for individualized pedagogical strategies is even more pronounced. In one-to-one teaching contexts, the need for individualized pedagogical strategies is even more pronounced. Research by Schiavio, Biasutti, van der Schyff, and Parncutt (2020) emphasizes that personalized instruction allows teachers to respond to students' specific strengths and challenges. For pop singing, this becomes particularly important, as instructors need to balance vocal technique with stylistic flexibility. Recent studies on PCK in vocal music, such as those by Sear (2024) and Cox (2024), have highlighted the challenges faced by vocal instructors in tailoring their teaching to individual students, especially when considering both classical and popular singing techniques. These studies point to the need for a more nuanced understanding of PCK in pop singing instruction, which this study aims to address.

Importance of Pop Singing Instruction

Pop singing presents a unique set of challenges for vocal instructors. Unlike classical voice training, which often focuses on a standardized vocal technique, pop singing requires a combination of technical vocal skills and expressive freedom that caters to diverse musical styles and cultural influences. The stylistic flexibility inherent in pop music presents challenges for instructors, as they must teach techniques that allow students to maintain vocal health while achieving the stylistic nuances required in pop performances (Davids & LaTour, 2020).

Pop singing instruction requires instructors to balance technical rigor—such as breath control, pitch accuracy, and vocal tone—with the more subjective and stylistically varied aspects of performance, such as phrasing, emotional expression, and improvisation. This blend of technical and artistic competencies is not only critical for singers' vocal development but also for their performance skills. As noted by Bartlett (2020) and Smith, Kleinerman, and Cohen (2022), the need for instructors to adapt their teaching to the unique vocal characteristics and musical preferences of individual students is a central challenge in pop singing instruction. This dynamic and personalized teaching environment highlights the importance of understanding how pop singing instructors' approach Pedagogical Content Knowledge (PCK) in a one-to-one setting, where flexibility and responsiveness to students' specific needs are paramount.

Although there has been extensive research on vocal pedagogy, few studies have focused specifically on the unique challenges and approaches of pop singing instructors. Existing tools for assessing music teaching competencies are often broad, covering general music teaching or classical vocal instruction. These instruments fail to capture the specific

competencies needed for teaching pop singing, which requires specialized tools that can assess both technical and artistic teaching approaches.

Survey Validation Techniques

The development of reliable and valid instruments to assess PCK has become an essential step in educational research. In the context of this study, the process of validating a survey tool involves ensuring its content validity, construct validity, and reliability. One of the most common methods for establishing content validity is the Content Validity Index (CVI), which is used to determine whether survey items are relevant to the construct being measured (Polit & Beck, 2006; Polit et al., 2007). In this study, expert evaluations through the CVI will ensure that the instrument accurately captures the multidimensional aspects of PCK specific to pop singing instruction.

In addition to content validity, exploratory and confirmatory factor analyses are essential for assessing construct validity. Factor analysis helps identify the underlying dimensions of a survey, ensuring that the instrument measures the intended constructs. Factor analysis is particularly useful in determining whether items in a survey correlate highly with each other, indicating that they are measuring a single construct (Schreiber, 2021). For this study, exploratory factor analysis (EFA) will help reveal the key dimensions of PCK in pop singing instruction.

Pilot testing is another crucial step in survey development, allowing researchers to refine survey items based on feedback from initial respondents. This phase helps to ensure that the survey items are clear, relevant, and appropriately phrased for the target audience. The combination of expert validation, factor analysis, and pilot testing provides a robust methodology for developing and validating surveys in educational research, ensuring that the final instrument is both reliable and valid for assessing PCK in pop singing instructors.

The review of the literature indicates that while PCK is an essential concept in music education, there remains a lack of specific tools to assess the PCK of pop singing instructors, particularly in one-to-one teaching settings. This study aims to address this gap by developing and validating a survey instrument tailored to assess PCK in pop singing instruction. The validation techniques, including expert validation, factor analysis, and pilot testing, ensure the reliability and validity of the instrument, offering a useful tool for enhancing teaching practices and supporting the professional development of pop singing instructors.

Methodology

This study employed a quantitative approach to develop and validate a survey instrument designed to assess the pedagogical content knowledge (PCK) of instructors teaching one-to-one pop singing courses at conservatories in China. The methodology comprised four key stages: instrument development, content validation, reliability testing, and exploratory factor analysis (EFA).

Instrument Development

The survey instrument was developed based on existing PCK frameworks in music education, particularly focusing on vocal pedagogy and pop singing instruction. The development process began with a comprehensive literature review to identify key

dimensions of PCK relevant to pop singing. Based on this review, a draft questionnaire was created, comprising 22 items across four domains:

- i. Conceptions of Purpose for Teaching Pop Singing (4 items)
- ii. Knowledge of Students' Understanding (5 items)
- iii. Curricular Knowledge (6 items)
- iv. Knowledge of Instructional Strategies (7 items)

Each item was designed to assess specific aspects of an instructor's knowledge and teaching ability. The survey aimed to measure how instructors conceptualize and apply pedagogical knowledge within these four dimensions.

Content Validation

To ensure the relevance and appropriateness of the items, the survey was subjected to expert validation. Six experts in music education, all specializing in pop music education at conservatories, were invited to evaluate the content validity of the instrument. The expert panel consisted of two professors, two associate professors, one head of the pop singing department, and one pop music scientific researcher, all of whom have extensive experience in the field of pop music education. These experts were selected based on their expertise in teaching and researching pop singing at conservatories in China.

A non-face-to-face approach was used for the content validation process. The experts were sent an online content validation form, accompanied by clear instructions on evaluating the relevance of each item to the measured domains. Each expert rated the degree of relevance of each item on a scale from 1 to 4, with 1 indicating "not relevant" and 4 indicating "highly relevant." Following the methodology outlined by Xu et al. (2024), items with a Content Validity Index (CVI) score below 0.4 were excluded from the final instrument to ensure the validity and robustness of the survey items.

Reliability Testing

Reliability testing was conducted using Cronbach's alpha to evaluate the internal consistency of the instrument. Cronbach's alpha was calculated for the entire instrument, as well as for each of the four subscales. The reliability coefficients were examined to determine the consistency of the survey items in measuring the intended dimensions of PCK. Consistent with the methodology described by Jiang and Yu (2024), a minimum threshold of 0.7 was deemed acceptable for each subscale and the overall instrument, ensuring that the instrument met the required standards for internal consistency.

Exploratory Factor Analysis (EFA) and Confirmatory Factor Analysis (CFA)

Factor analysis was employed to evaluate the construct validity of the survey instrument. An exploratory factor analysis (EFA) was conducted using principal axis factoring with oblimin rotation to uncover the underlying factor structure. The Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy and Bartlett's test of sphericity confirmed the suitability of the data for factor analysis. According to Zainudin et al. (2017) and Chik & Abdullah (2018), an acceptable KMO index is above 0.6. EFA was used to group the survey items into factors that align with the intended dimensions of PCK, ensuring the instrument's construct validity.

Data Collection

The survey was administered to 50 pop singing instructors from conservatories in China. The instructors were selected using a purposive sampling method, based on their experience teaching one-to-one pop singing courses. Data were collected through an online survey platform, ensuring accessibility and ease of completion for participants. The collected data were then analyzed using SPSS for reliability testing, and EFA.

Ethical Considerations

Ethical approval for the study was obtained from the research ethics board of the institution. Participants were informed about the purpose of the study, and their participation was voluntary. Informed consent was obtained prior to data collection, and confidentiality of responses was maintained throughout the study.

Results*Content Validation*

Content validation was performed using ratings provided by six experts in pop music education. The Content Validity Index (CVI) was calculated for each item and for the entire survey instrument. Most items demonstrated strong content validity, with the item-level CVI (I-CVI) exceeding 0.9 for the majority of items, except for Item 8, which scored only 0.3. This low score for Item 8 did not meet the acceptable threshold of 0.78, leading to its removal from the instrument. Consequently, the final number of items was reduced from 22 to 21.

The overall scale CVI/Average (S-CVI/Ave) was 0.97, and the universal agreement index (S-CVI/UA) was 0.95, indicating a high degree of agreement among the experts. These indices suggest that the scale items were highly relevant to the measured domains. The results confirm that the revised 21-item instrument demonstrates excellent content validity, ensuring that the items are well-aligned with the theoretical framework of Pedagogical Content Knowledge (PCK).

Reliability Analysis

The internal consistency of the survey instrument was assessed using Cronbach's alpha. The overall Cronbach's alpha for the instrument was 0.792, indicating good reliability. Each of the four subscales also demonstrated strong internal consistency:

Table 1

Cronbach's Alpha Results

Subscale	Items	Cronbach's Alpha (α)
Total Questionnaire	1–21	0.792
Conceptions of purpose for teaching	1–4	0.917
Knowledge of student understanding	5–9	0.970
Curricular knowledge	10–15	0.944
Knowledge of instructional strategies	16–21	0.890

These results confirm the reliability of the instrument for measuring the intended dimensions of Pedagogical Content Knowledge (PCK).

Factor Analysis

An EFA was conducted to identify the underlying factor structure of the survey instrument. The results of EFA confirmed the construct validity of the survey:

Table 2

KMO and Bartlett's Test Results

Indicator	Value
Kaiser-Meyer-Olkin (KMO)	0.706
Bartlett's Test (p-value)	< 0.001

Table 3

Total Variance Explained

Factor	Initial Eigenvalues (%)	Cumulative Variance (%)
1	30.45	30.45
2	22.61	53.06
3	15.67	68.73
4	10.25	78.98

An EFA was conducted to identify the underlying factor structure of the survey instrument. The Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy was 0.706, and Bartlett's test of sphericity was significant ($p < 0.001$), confirming that the data were suitable for factor analysis. Four factors were extracted, corresponding to the original dimensions of PCK, with a total variance explained of 78.98%. EFA revealed that the 21 items in the survey could be grouped into four distinct factors, corresponding to the intended dimensions of PCK: conceptions of purpose for teaching, knowledge of student understanding, curricular knowledge, and knowledge of instructional strategies. Table 4 presents the rotated component matrix, showing the factor loadings for each item, with values ranging from 0.749 to 0.960.

Table 4

Rotated Component Matrix

Dimension	Items	Items Factor Loadings (Min)	Factor Loadings (Max)
Conceptions of purpose for teaching	1, 2, 3, 4	0.749	0.960
Knowledge of student understanding	5, 6, 7, 9	0.752	0.930
Curricular knowledge	10, 11, 12, 13	0.763	0.945
Knowledge of instructional strategies	16, 17, 19, 21	0.784	0.920

The survey instrument demonstrated strong content validity, internal consistency, and construct validity. These findings validate its use as a reliable tool for assessing PCK among pop singing instructors, specifically in one-to-one teaching contexts at conservatories.

Discussion

This study aimed to develop and validate a survey instrument designed to assess the Pedagogical Content Knowledge (PCK) of instructors teaching one-to-one pop singing courses at conservatories in China. The results of the validation process support the instrument's relevance, reliability, and construct validity, making it a valuable tool for assessing PCK in the context of pop music education. The findings of the present study are discussed in relation to the theoretical framework of PCK, previous research in music education, and the practical implications for pop singing instruction.

Relevance and Content Validity

The expert validation process provided strong evidence for the content validity of the instrument. Six music education experts specializing in pop music education were consulted to assess the relevance and clarity of each survey item. The Content Validity Index (CVI) results confirmed the inclusion of items that were highly relevant to the dimensions of PCK, reflecting the complexity of teaching pop singing. Items with low CVI scores were excluded, ensuring that the final instrument only contained those that accurately measured the key constructs of PCK. This aligns with findings from previous studies (e.g., Xu et al., 2024), which emphasize the importance of expert validation in developing reliable and relevant instruments for assessing educational constructs.

The inclusion of items covering the four core dimensions of PCK—conceptions of teaching purpose, knowledge of student understanding, curricular knowledge, and knowledge of instructional strategies—addresses the multifaceted nature of pop singing instruction. As suggested by Jiang and Yu (2024), comprehensive assessment tools that measure multiple dimensions of teaching expertise are crucial for understanding the effectiveness of educators in complex instructional contexts such as music.

Factor Structure and Construct Validity

Exploratory Factor Analysis (EFA) were conducted to assess the construct validity of the instrument. EFA revealed that the survey items were well-aligned with the intended dimensions of PCK, with four factors explaining nearly 79% of the variance in the data. These results support the theoretical framework, indicating that the instrument is effective in capturing the key aspects of PCK as it pertains to pop singing instruction.

The factor structure identified in this study is consistent with the findings of Schreiber (2021), who emphasized the importance of aligning factor analysis results with theoretical constructs. The four factors—conceptions of teaching purpose, knowledge of student understanding, curricular knowledge, and instructional strategies—are all critical elements of PCK as applied to pop singing instruction. This confirms that the instrument is measuring the intended constructs accurately and provides strong support for its construct validity.

Moreover, the high factor loadings for each item further substantiate the appropriateness of the items for their respective constructs. The KMO measure of sampling adequacy (0.706) and Bartlett's test of sphericity indicated that the data were suitable for factor analysis, reinforcing the robustness of the instrument's psychometric properties.

Reliability of the Instrument

The reliability analysis, conducted using Cronbach's alpha, revealed high internal consistency across all subscales, with Cronbach's alpha values ranging from 0.890 to 0.970. These findings are consistent with the recommendations of Jiang and Yu (2024), who suggest that a minimum alpha value of 0.7 is acceptable for establishing reliability. The high alpha values indicate that the items within each subscale are consistently measuring the same underlying construct, further supporting the reliability of the instrument.

The instrument's strong reliability ensures that it can be used in future research to assess PCK among pop singing instructors, as well as in professional development settings where instructors' teaching practices and PCK can be monitored and improved over time.

Implications for Pop Singing Instruction and Music Education

This study contributes to the growing body of research on Pedagogical Content Knowledge (PCK) in music education, particularly in the context of pop singing instruction. While much of the existing literature has focused on classical music or group-based teaching, this research highlights the unique challenges and skills required for one-to-one pop singing instruction. Pop music, with its emphasis on stylistic flexibility and vocal health, demands specialized teaching strategies that balance technical training with artistic expression. The validated survey provides a reliable tool for assessing PCK in pop singing instruction, enabling instructors and institutions to refine teaching methods and enhance student learning outcomes. By identifying key areas of strength and potential improvement in instructors' pedagogical practices, the instrument can support professional development efforts, thereby improving the overall quality of pop singing education at conservatories.

Additionally, the instrument can be used by music educators and institutions to assess the effectiveness of existing pop music curricula and instructional practices. By identifying areas where instructors may need further support, the instrument can help guide professional development efforts and improve the quality of pop singing instruction at conservatories. The survey instrument developed in this study provides a framework for assessing these competencies among pop singing instructors and can inform the design of training programs aimed at enhancing the PCK of music educators. By focusing on dimensions such as conceptions of teaching purpose, knowledge of student understanding, curricular knowledge, and knowledge of instructional strategies, the instrument ensures that pop singing educators are equipped with the essential PCK necessary to meet the diverse needs of their students.

Limitations and Future Research

Despite the promising results of this study, there are several limitations that should be addressed in future research. The geographic focus on China limits the generalizability of the findings, as the sample was drawn from a single region. As such, future studies could involve a more diverse sample of music educators from different conservatories or countries to assess the cross-cultural applicability and broader relevance of the instrument. Additionally, while the instrument was validated by a group of experts in pop music education, the content validation process relied on expert evaluations, which, while rigorous, may introduce a level of subjectivity. The selection of experts from pop music education may have influenced the results, and future studies could consider incorporating a broader range

of perspectives, including those of students or practitioners with different levels of experience.

Furthermore, although the instrument demonstrated strong reliability and construct validity, further testing with a larger sample of pop singing instructors is necessary to confirm its robustness and explore potential variations in teaching practices based on different contexts or student populations. Lastly, the instrument focuses on measuring PCK in relation to pop singing instruction, but future research could expand its scope to include other aspects of music education, such as group singing or instrumental instruction, to provide a more comprehensive assessment of music educators' pedagogical knowledge.

Conclusion

This study successfully developed and validated a survey instrument to assess the PCK of pop singing instructors. The instrument demonstrated strong content validity, reliability, and construct validity, making it a valuable tool for assessing and improving teaching practices in pop music education. The findings underscore the importance of specialized teaching strategies in one-to-one pop singing instruction and contribute to the broader field of music education by providing a means to measure and enhance educators' pedagogical content knowledge. Further research is needed to refine and expand the instrument, ensuring its applicability across different educational contexts.

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