



Higher vocational piano teachers' professional competence and students' learning motivation and satisfaction: Evidence from a structural equation modeling study

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Abstract

This study investigates how higher vocational piano teachers' professional competence, as perceived by students, influences students' learning motivation and course satisfaction in the context of Chinese higher vocational colleges. Grounded in Self-Determination Theory (SDT) and contemporary frameworks of teacher professional competence, teacher competence was conceptualized as a three-dimensional construct comprising professional ability, professional knowledge, and professional sentiment. Students' learning motivation and course satisfaction were treated as key proximal outcomes of piano learning.

A cross-sectional survey was administered to 306 piano-major students from higher vocational colleges in Nanning, Guangxi, China. A structured questionnaire measured students' perceptions of teachers' professional ability, professional knowledge, professional sentiment, as well as students' own learning motivation and satisfaction with piano courses. Descriptive statistics, reliability and validity analyses, independent-samples t-tests, one-way ANOVA, and structural equation modeling (SEM) were used for data analysis. All five dimensions showed excellent internal consistency (Cronbach's $\alpha = 0.854\text{--}0.922$; overall $\alpha = 0.935$), while a Kaiser–Meyer–Olkin value of 0.929 and a significant Bartlett's test supported construct validity. No significant differences were found across gender or grade.

The SEM results indicated that perceived professional ability, professional knowledge, and professional sentiment all significantly and positively predicted learning motivation, whereas only professional ability and professional knowledge significantly predicted course satisfaction; the direct path from professional sentiment to satisfaction was positive but non-significant. The structural model demonstrated good fit ($\chi^2/df = 1.232$, RMSEA = 0.028, CFI = 0.968).

The findings suggest that students value not only their piano teachers' instructional skills and subject-matter expertise but also their emotional support. From an SDT perspective, professional ability and knowledge appear to support students' sense of competence and meaningful learning, while professional sentiment primarily nurtures relatedness and motivational resilience. The study offers domain-specific implications for piano teacher professional development in higher vocational education.

Keywords: Piano education, professional competence, learning motivation, course satisfaction, higher vocational colleges, Structural Equation Modeling, Self-Determination Theory

Introduction

Piano is a core subject in higher vocational music education, especially for students majoring in music performance, music education, or related cultural industries. In addition to technical mastery, piano-major students are expected to develop interpretive skills, independent practice habits, and professional identity. Within this context, the professional competence of piano teachers is widely regarded as a key determinant of students' learning quality, motivation, and satisfaction (Fauth *et al.*, 2019; Ventista & Brown, 2023) [7, 18]. In higher vocational colleges, where students often face both academic and employment pressures, the role of the piano teacher becomes particularly critical.

1. Teacher professional competence and student outcomes

Recent research conceptualizes teacher professional competence as a multidimensional construct, typically including professional knowledge (what teachers know), professional skills or ability (what teachers can do in instruction), and professional attitudes or emotions (how teachers relate to learners and to their work) (Fauth *et al.*, 2019) [7]. Empirical studies in general education show that higher levels of teacher competence are associated with improved student motivation, engagement, and achievement, often through the mediating role of teaching

quality and classroom processes (Fauth *et al.*, 2019; Wang *et al.*, 2024) [7, 19]. Meta-analytic and review evidence on teacher professional learning further indicates that sustained, collaborative professional development can positively influence both teaching practices and student learning outcomes (Ventista & Brown, 2023; Prakasha *et al.*, 2025) [13, 18].

In music and instrumental education, similar patterns have been observed. Students are more motivated and satisfied when their teachers demonstrate strong subject-matter knowledge, clear instruction, and supportive interpersonal behaviors (Evans & Bonneville-Roussy, 2016; Krause *et al.*, 2019) [6, 10]. For example, teachers who can explain technique and musical structure clearly, model expressive performance, and organize practice tasks effectively contribute to students' perceived competence and progress (Evans & Bonneville-Roussy, 2016) [6]. At the same time, teachers' emotional qualities—such as enthusiasm, patience, and warmth—shape students' affective experiences and relational bonds in the studio (Zhukov, 2013; MacIntyre *et al.*, 2017) [11, 22].

2. Self-Determination Theory and motivational outcomes

Self-Determination Theory (SDT) offers a powerful framework for understanding how teacher competence may

translate into student motivation and satisfaction. SDT posits that human motivation and well-being depend on the satisfaction of three basic psychological needs: autonomy, competence, and relatedness (Ryan & Deci, 2000; Ryan & Deci, 2020) [15, 16, 17]. In educational settings, teachers support these needs through their instructional practices, feedback, and interpersonal behavior. When students experience autonomy support, appropriate structure, and teacher involvement, they are more likely to internalize the value of learning, develop autonomous motivation, and experience satisfaction and well-being (Ryan & Deci, 2000; Wang *et al.*, 2024) [15, 16, 17, 19].

Within music education, SDT has been widely used to examine motivation for instrumental practice and musical participation (Evans, 2015; Evans & Bonneville-Roussy, 2016; Krause *et al.*, 2019) [5, 6, 10]. Studies show that when music students perceive their teachers as supporting autonomy (e.g., offering choice, acknowledging feelings), competence (e.g., providing clear goals and feedback), and relatedness (e.g., showing care and respect), they report more self-determined motivation, better practice quality, and greater well-being (Evans, 2015; Krause *et al.*, 2019; Bonneville-Roussy & Evans, 2024) [3, 5, 10]. In this perspective, piano teachers' professional ability and knowledge contribute primarily to competence support, whereas professional sentiment contributes to relatedness and often also to autonomy support.

3. Piano education in the Chinese higher vocational context

China has experienced rapid expansion in music and piano education, with increasing numbers of students pursuing music majors in universities and higher vocational colleges. However, previous research has pointed out that piano learning in China can become strongly exam-oriented, with heavy emphasis on technical skills and certificate examinations, sometimes at the expense of intrinsic interest and long-term engagement (Bai, 2025) [1]. Vocational college students often come from diverse training backgrounds and face significant pressure to obtain stable employment after graduation, making the motivational climate in piano lessons especially important (Qian, 2025; Xing, 2024) [14, 21].

Existing Chinese studies on piano education have focused mainly on curriculum reform, teaching strategies, or case studies in conservatories and universities, with relatively less attention paid to higher vocational institutions. Moreover, many studies either examine teacher competence or student motivation in isolation, without integrating them into a single analytical framework. Few have applied structural equation modeling (SEM) to model the relationships between different components of teacher competence and student outcomes such as motivation and satisfaction in piano learning.

4. The present study

To address these gaps, the present study focuses on higher vocational piano teachers' professional competence from the student perspective and examines how it relates to students' learning motivation and course satisfaction. Drawing on teacher competence research (Fauth *et al.*, 2019) [7] and SDT-based work in music education (Evans, 2015; Evans & Bonneville-Roussy, 2016; Krause *et al.*, 2019) [5, 6, 10], we conceptualize teacher professional competence as comprising three dimensions:

Professional ability – the perceived quality of instructional design, demonstration, feedback, and practice guidance in piano lessons;

Professional knowledge– the perceived depth and clarity of teachers' subject-matter and pedagogical knowledge (e.g., repertoire, technique, music theory);

Professional sentiment – perceived enthusiasm, care, patience, respect, and commitment to students.

Students' learning motivation and course satisfaction are treated as key proximal outcomes in piano learning. Learning motivation reflects students' interest, effort, and persistence, consistent with SDT's focus on autonomous motivation (Ryan & Deci, 2000; Evans & Bonneville-Roussy, 2016) [6, 15, 16, 17]. Course satisfaction reflects students' overall evaluation of the piano course quality, usefulness, and enjoyment (Filak & Sheldon, 2003) [8].

Using survey data from 306 piano-major students in higher vocational colleges in Nanning, Guangxi, and employing SEM, the study pursues three main objectives:

1. To describe students' perceptions of teachers' professional ability, professional knowledge, professional sentiment, learning motivation, and course satisfaction.
2. To examine whether these perceptions differ by gender or grade.
3. To test a structural model linking perceived teacher professional ability, knowledge, and sentiment to students' learning motivation and course satisfaction.

By integrating teacher competence and SDT perspectives in a domain-specific context, this study contributes to the literature in three ways. First, it provides empirical evidence from an under-researched sector—Chinese higher vocational piano education. Second, it unpacks professional competence into three distinct components and examines their differential relationships with motivation and satisfaction. Third, it offers data-informed implications for piano teacher professional development and institutional support in higher vocational colleges (Fauth *et al.*, 2019; Ventista & Brown, 2023) [7, 18].

Materials and Methods

1. Research design

This study employed a cross-sectional survey design as part of a broader mixed-methods project on piano teacher competence and student outcomes in higher vocational education. The quantitative strand focused on students' perceptions of teacher competence and their own motivation and satisfaction, and used structural equation modeling (SEM) to test hypothesized relationships among latent variables (Kline, 2016; Fauth *et al.*, 2019) [7, 9]. SEM is particularly suitable for this purpose because it allows simultaneous estimation of measurement and structural models and accounts for measurement error.

2. Participants

Participants were 306 piano-major students from higher vocational colleges in Nanning, Guangxi, China. The sample consisted of 157 male students (51.3%) and 149 female students (48.7%). In terms of grade, 91 students (29.7%) were in Year 1, 106 (34.6%) in Year 2, and 109 (35.6%) in Year 3. Regarding years of piano study at the current institution, 112 students (36.6%) had studied for less than one year, 109 (35.6%) for one to two years, and 85

(27.8%) for two to four years. Daily practice time varied from less than one hour to more than two hours per day. This distribution reflects the typical diversity of higher vocational piano cohorts in China, where students enter with different levels of prior training and practice habits (Qian, 2025; Xing, 2024) [14, 21].

3. Instrument

A structured questionnaire was designed to measure five latent constructs from the student perspective:

1. Perceived teacher professional ability (11 items) – e.g., “My piano teacher organizes the lesson content clearly,” “My teacher’s demonstrations help me understand how to practice.”
2. Perceived teacher professional knowledge (10 items) – e.g., “My piano teacher has a deep understanding of piano repertoire,” “My teacher explains musical and theoretical concepts clearly.”
3. Perceived teacher professional sentiment (9 items) – e.g., “My piano teacher is patient with me,” “My teacher cares about my progress and development.”
4. Student learning motivation (6 items) – e.g., “I am interested in learning piano,” “I am willing to put in effort to improve my piano playing,” reflecting SDT-based descriptions of autonomous motivation (Ryan & Deci, 2000; Evans, 2015) [5, 15, 16, 17].
5. Student course satisfaction (9 items) – e.g., “Overall, I am satisfied with my piano lessons,” “The piano course meets my expectations” (Filak & Sheldon, 2003) [8].

All items used a five-point Likert scale ranging from 1 (“strongly disagree”) to 5 (“strongly agree”). The item pool was developed based on previous research on teacher competence and SDT in education and music contexts (Ryan & Deci, 2000; Evans, 2015; Fauth *et al.*, 2019; Krause *et al.*, 2019) [5, 7, 10, 15, 16, 17] and refined through expert review by two music education specialists and one educational psychologist. A pilot test with a small group of higher vocational piano students was conducted to check clarity and appropriateness.

4. Data collection

Data were collected during regular teaching weeks. With support from program coordinators, the researcher explained the study purpose to students, emphasized voluntary participation and confidentiality, and obtained informed consent. Paper-based questionnaires were administered in classroom settings, usually at the end of a lesson or meeting, and required approximately 15–20 minutes to complete. Students returned completed questionnaires directly to the researcher or a designated assistant to ensure that individual responses were not seen by teachers.

5. Data analysis

Data were analyzed using SPSS and AMOS. The analysis involved several steps:

1. **Data screening and descriptive statistics:** Missing data and outliers were checked; means and standard deviations were calculated for all items and scales.
2. **Reliability analysis:** Internal consistency was assessed using Cronbach’s alpha. Values above 0.70 were

considered acceptable, and values above 0.80 indicated good reliability (Cronbach, 1951) [4].

3. **Construct validity:** The Kaiser–Meyer–Olkin (KMO) measure of sampling adequacy and Bartlett’s test of sphericity were used to assess the suitability of the correlation matrix for factor analysis and SEM (Kline, 2016) [9].
4. **Group differences:** Independent-samples t-tests (for gender) and one-way ANOVA (for grade) were conducted to examine potential differences in the five constructs.
5. **Structural equation modeling:** SEM was performed using AMOS to test a hypothesized model in which perceived teacher professional ability, knowledge, and sentiment were specified as exogenous latent variables predicting learning motivation and course satisfaction.

Model fit was evaluated using χ^2/df , RMSEA, NFI, IFI, TLI, and CFI, following widely used guidelines (Kline, 2016) [9]. Standardized path coefficients, standard errors, and p-values were examined to interpret the strength and significance of relationships.

Results

1. Reliability and validity

Analysis of Student Reliability

Dimensions	Number of items	Klonbach Alpha
Professional ability	11	0.92
Professional knowledge	10	0.922
Professional sentiment	9	0.905
Learning motivation	6	0.854
Learning satisfaction	9	0.912
Overall	45	0.935

Cronbach’s alpha coefficients demonstrated excellent internal consistency for all scales. For perceived professional ability, $\alpha = 0.920$; for perceived professional knowledge, $\alpha = 0.922$; for perceived professional sentiment, $\alpha = 0.905$; for learning motivation, $\alpha = 0.854$; and for course satisfaction, $\alpha = 0.912$. The overall 45-item scale had $\alpha = 0.935$. These values are well above conventional thresholds and suggest that each dimension is measured reliably (Cronbach, 1951) [4].

Academic effectiveness analysis

KMO and Bartlett test		
KMO sampling appropriateness measure.		0.929
Bartlett sphericity test	Approximate chi-square	7457.642
	Degrees of freedom	990
	Saliency	<0.001

The KMO value for the full questionnaire was 0.929, indicating “marvelous” sampling adequacy, and Bartlett’s test of sphericity was significant ($\chi^2 \approx 7458$, $p < 0.001$), demonstrating that the correlation matrix was suitable for factor analysis (Kline, 2016) [9]. These indices support the use of SEM with the student data.

2. Descriptive statistics and group differences

Table 1: Frequency Analysis of Demographic Variables

Classification	Variables	Frequency	Percentage
Gender	male	157	51.3
	female	149	48.7
Grade	Freshman	91	29.7
	Sophomore	106	34.6
	Junior	109	35.6
Duration of piano learning	Less than one year	112	36.6
	1-2 years	109	35.6
	2-4 years	85	27.8
Daily piano time	Less than 1 hour	130	42.5
	1-2 hours	101	33
	2 to 4 hours	75	24.5

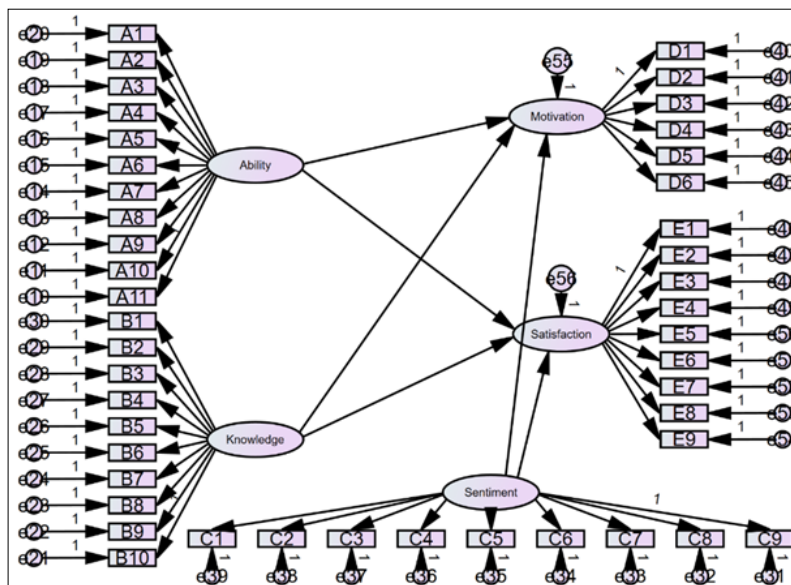
Analysis of differences in student dimensions across grades

Dimensions	Grade	Average	Standard deviation	F value	P value
Ability	Freshman	3.93	0.77	0.453	0.636
	Sophomore	3.85	0.83		
	Junior	3.82	0.79		
Knowledge	Freshman	3.83	0.80	0.031	0.97
	Sophomore	3.81	0.86		
	Junior	3.81	0.86		
Affection	Freshman	3.82	0.77	1.675	0.189
	Sophomore	3.65	0.86		
	Junior	3.84	0.80		
Motivation	Freshman	3.86	0.77	0.354	0.702
	Sophomore	3.85	0.82		
	Junior	3.78	0.83		
Satisfied	Freshman	3.79	0.74	0.804	0.449
	Sophomore	3.75	0.85		
	Junior	3.65	0.94		

Overall, students reported moderately high perceptions of teacher competence and positive motivational outcomes. Mean scores for professional ability, knowledge, and sentiment ranged between “neutral” and “agree,” indicating that most students evaluated their piano teachers favorably. Learning motivation and course satisfaction also showed means above the scale mid-point, reflecting generally positive evaluations of piano learning in higher vocational colleges.

Independent-samples t-tests revealed no statistically significant gender differences in any of the five constructs ($p > 0.05$). Similarly, one-way ANOVA showed no significant differences across grade levels (Year 1, 2, 3) in perceived teacher competence, learning motivation, or satisfaction ($p > 0.05$). These findings suggest that, within this sample, students’ perceptions and outcomes are relatively stable across gender and stage of study.

3. Structural equation modeling



The hypothesized SEM included three exogenous latent variables—perceived professional ability, perceived professional knowledge, and perceived professional sentiment—and two endogenous latent variables—learning motivation and course satisfaction. All five latent variables were measured by their respective item parcels.

Student model fitting results

Metrics	X2/df	RMSEA	NFI	RFI	IFI	TLI	CFI
Measured values	1.232	0.028	0.853	0.845	0.969	0.967	0.968
Fit values	<3	<0.08	>0.9	>0.9	>0.9	>0.9	>0.9
Fit discrimination	Good	Good	Good	Good	Good	Good	Good

Student Path Analysis

	Estimate	S.E.	C.R.	P
Motivation 2<-- ability 2	0.177	0.058	2.806	0.005
Satisfaction 2<-- ability 2	0.296	0.066	4.795	***
Motivation 2<-- knowledge 2	0.256	0.059	3.953	***
Satisfaction 2<-- knowledge 2	0.288	0.065	4.699	***
Motivation 2<-- sentiment 2	0.183	0.062	2.868	0.004
Satisfaction 2<-- sentiment 2	0.048	0.067	0.824	0.41

Overall, the model provided a good fit to the data: $\chi^2/df = 1.232$, $RMSEA = 0.028$, $IFI = 0.969$, $TLI = 0.967$, and $CFI = 0.968$. Although some incremental fit indices such as NFI and RFI were slightly below 0.90, the combination of low χ^2/df and $RMSEA$ and high IFI , TLI , and CFI supports the conclusion that the model fits well (Kline, 2016)^[9].

Standardized path coefficients were as follows:

Professional ability → learning motivation: $\beta = 0.177$, $p = 0.005$

Professional ability → course satisfaction: $\beta = 0.296$, $p < 0.001$

Professional knowledge → learning motivation: $\beta = 0.256$, $p < 0.001$

Professional knowledge → course satisfaction: $\beta = 0.288$, $p < 0.001$

Professional sentiment → learning motivation: $\beta = 0.183$, $p = 0.004$

Professional sentiment → course satisfaction: $\beta = 0.048$, $p = 0.410$ (non-significant)

Thus, all three dimensions of perceived professional competence significantly and positively predicted students' learning motivation. For course satisfaction, professional ability and professional knowledge had significant positive effects, whereas the direct effect of professional sentiment was small and statistically non-significant.

Discussion

1. Summary of main findings

This study examined how higher vocational piano teachers' professional competence, as perceived by students, is related to students' learning motivation and course satisfaction. The results show that students generally hold favorable views of their teachers' professional ability, knowledge, and sentiment and report relatively high levels of motivation and satisfaction. Reliability and validity indices support the robustness of the measurement model, while SEM results confirm that the three competence dimensions are significant predictors of motivation and, in part, satisfaction. Specifically, perceived professional ability and knowledge exerted strong, significant effects on both learning

motivation and satisfaction, while professional sentiment significantly predicted motivation but not satisfaction. These patterns offer a nuanced picture of how cognitive, instructional, and emotional aspects of teacher competence jointly shape students' experiences in higher vocational piano education.

2. Teacher competence, teaching quality, and student outcomes

The positive effects of professional ability and knowledge align with previous research in general and subject-specific education indicating that teacher competence is a key driver of teaching quality and student outcomes (Fauth *et al.*, 2019; Wang *et al.*, 2024)^[7, 19]. Teachers who can structure instruction effectively, explain content clearly, and adapt their methods to students' needs create learning environments that foster understanding, progress, and confidence. In music education, such instructional qualities translate into more efficient practice, clearer technical goals, and better performance outcomes (Evans & Bonneville-Roussy, 2016; Krause *et al.*, 2019; MacIntyre *et al.*, 2017)^[6, 10, 11].

From an SDT perspective, professional ability and knowledge primarily contribute to students' sense of **competence**—the feeling that they can master challenging tasks and improve over time (Ryan & Deci, 2000; Evans, 2015)^[5, 15, 16, 17]. When students perceive their piano teachers as skilled and knowledgeable, they are more likely to believe that their own efforts will lead to success, which supports autonomous motivation and positive evaluations of the course.

The strong positive paths from professional ability and knowledge to both motivation and satisfaction in the present study reinforce the central role of these dimensions in higher vocational piano education. Given the relatively heterogeneous backgrounds of vocational students, teachers may need particularly robust pedagogical strategies and subject-matter expertise to scaffold learning effectively (Qian, 2025; Xing, 2024)^[14, 21].

3. The motivational role of professional sentiment

The finding that professional sentiment significantly predicted learning motivation but not course satisfaction adds an important layer to our understanding of the emotional and relational aspects of teacher competence. In one-to-one and small-group instrumental lessons, teacher-student relationships are especially influential: students often look to their teachers not only for technical guidance but also for emotional support, encouragement, and validation (Zhukov, 2013; MacIntyre *et al.*, 2017)^[11, 22].

SDT emphasizes that teacher involvement, warmth, and care are crucial for satisfying students' need for **relatedness**, which in turn promotes internalization of values and more self-determined motivation (Ryan & Deci, 2000; Krause *et al.*, 2019)^[10, 15, 16, 17]. In the present study, students who perceived stronger professional sentiment—such as enthusiasm, patience, and care—reported higher motivation, consistent with SDT-based research in higher and music education (Evans, 2015; Krause *et al.*, 2019; Bogunović, 2023)^[2, 5, 10].

However, the non-significant direct path from sentiment to course satisfaction suggests that students' overall evaluation of the piano course may depend more strongly on instructional quality and perceived learning outcomes than

on relational qualities alone. In other words, professional sentiment may play an indirect role by energizing motivation, while satisfaction is more directly shaped by whether students feel they have learned effectively and seen tangible progress—domains more strongly associated with ability and knowledge.

4. Implications for higher vocational piano teacher development

The results have important implications for the professional development of piano teachers in higher vocational colleges. First, teacher education and in-service development should address all three dimensions of professional competence. For professional ability, training can focus on lesson planning, diagnostic listening, effective feedback, and the design of practice tasks that encourage deliberate and strategic practice (Evans & Bonneville-Roussy, 2016; Nielsen, 2018) [6, 12]. For professional knowledge, ongoing learning about repertoire, technique, music theory, and vocational pathways is needed so teachers can connect piano study with students' future careers (Qian, 2025; Xing, 2024) [14, 21].

Second, professional sentiment should be recognized as a legitimate and important component of competence. Training in communication, empathy, and emotion regulation can help teachers build trusting relationships with students and respond sensitively to performance anxiety, frustration, and stress (Zhukov, 2013; Bogunović, 2023) [2, 22]. Given that many vocational students face external pressures from examinations, family expectations, and uncertain job prospects (Bai, 2025) [1], emotionally responsive teaching may be vital for sustaining their motivation and well-being.

Third, consistent with international evidence on effective professional development, one-off workshops are unlikely to produce lasting change. Instead, teacher learning should be embedded in practice through peer observation, collaborative lesson study, and coaching (Ventista & Brown, 2023; Prakasha *et al.*, 2025) [13, 18]. For instance, piano teachers could analyze video recordings of lessons together, discuss how to scaffold autonomy and competence support, and experiment with different feedback strategies grounded in SDT principles.

5. Relation to broader SDT and SEM research

By applying SEM to model relations between perceived teacher competence and student outcomes, this study contributes to a growing body of research that uses advanced quantitative methods to understand motivational processes in education (Kline, 2016; Wang *et al.*, 2024) [9, 19]. The results are consistent with SDT-based meta-analyses and intervention studies showing that need-supportive teaching—combining structure, autonomy support, and involvement—enhances motivation and satisfaction across different educational levels and subjects (Ryan & Deci, 2020; Wang *et al.*, 2024; Krause *et al.*, 2019) [10, 15, 16, 17, 19].

In the specific context of music education, this study complements research demonstrating that teachers' support for students' psychological needs predicts quality of practice, performance, and well-being (Evans & Bonneville-Roussy, 2016; Krause *et al.*, 2019; Bonneville-Roussy & Evans, 2024; Wieser, 2024) [3, 6, 10, 20]. It adds to this literature by providing data from Chinese higher vocational

piano education, a context that has received relatively little attention in international journals.

6. Limitations and future directions

Several limitations should be acknowledged. First, the cross-sectional design does not allow strong causal inferences. Although the SEM model is theoretically grounded, longitudinal or experimental designs are needed to confirm the directionality of effects between perceived teacher competence, motivation, and satisfaction (Kline, 2016) [9]. Second, the data are based entirely on student self-reports, which may be affected by shared method variance or social desirability. Future research could incorporate multiple data sources, such as teacher self-ratings, classroom observations, and performance assessments, to triangulate findings (Fauth *et al.*, 2019; Zhukov, 2013) [7, 22]. Third, the sample is limited to higher vocational colleges in one city (Nanning, Guangxi), which may limit generalizability to other regions, conservatories, or university-based programs. Comparative studies across different institutional types and provinces would clarify how contextual factors shape the relationship between teacher competence and student outcomes (Qian, 2025; Xing, 2024) [14, 21]. Finally, the present model did not examine potential mediators (e.g., basic psychological need satisfaction, engagement) or moderators (e.g., years of study, daily practice time, parental expectations). Incorporating these variables in future SEM studies could yield a more comprehensive picture of motivational processes in piano education (Evans, 2015; MacIntyre *et al.*, 2017; Wang *et al.*, 2024) [5, 11, 19].

Conclusion

This study examined how higher vocational piano teachers' professional competence, as perceived by students, relates to students' learning motivation and course satisfaction. Using survey data from 306 piano-major students in Nanning, Guangxi, and structural equation modeling, the study found that perceived professional ability, knowledge, and sentiment all significantly predict learning motivation, while professional ability and knowledge also significantly predict course satisfaction. Professional sentiment showed a positive but non-significant direct path to satisfaction.

Anchored in Self-Determination Theory, these findings suggest that students are more motivated and satisfied when they see their piano teachers as pedagogically skilled, knowledgeable, and emotionally supportive. Professional ability and knowledge appear to support students' sense of competence and meaningful progress, whereas professional sentiment primarily nurtures relatedness and helps sustain motivation under pressure.

The study contributes domain-specific evidence to the international literature on SDT, teacher competence, and student motivation, and underscores the need for comprehensive professional development that strengthens piano teachers' instructional, cognitive, and emotional capacities. For higher vocational institutions aiming to enhance the quality of piano education, investing in such holistic professional development is essential to building need-supportive learning environments that foster students' sustained engagement, satisfaction, and long-term musical growth.

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