A Study on the Influence of Heuristic Teaching Method in Piano Education

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Abstract: This research contributes to how heuristic teaching affects piano learning, offering recommendations for method application in future teaching for educators and enhancing performance skills. It further contributes towards providing students with high-quality learning experiences, allowing students to explore areas of interest, which is also an excellent example of an experience-based technique that promotes problem addressing, learning and discovery. The word "Heuristic" is derived from the Greek language that means "to find" or "to discover". Professor Henry Edward Armstrong of Imperial College London was a staunch supporter of the heuristic method of teaching. This research includes a background, literature review, research methodology, analysis of data collection, and a conclusion. The preliminary observation shows that the heuristic method can enhance students' learning motivation and improve their ability to interpret music, thereby guiding the improvement and optimization of piano teaching methods.
***Keywords*:** music education; heuristic teaching; student interest

1. Research background

Traditional piano education places a strong emphasis on technical skills training and score analysis. Students are required to repeatedly practice music pieces bar by bar until attaining a satisfactory level of proficiency. While such a method can effectively enhance students' dexterity and understanding of notations, it lacks interaction and exploration that may cultivate students' music appreciation and interpretation abilities (Holmgren, 2020). Some studies have found traditional teaching less engaging and possibly discouraging to students with relative challenges in coordination and memorization (Ning & Jia, 2021; ARSHİNOVA, 2022).

Heuristic teaching method refers to an educational approach that promotes active learning through discovery and problem-solving. Compared to direct instruction, it aims to develop students' independent and creative thinking. When applied to piano education, heuristic method focuses more on cultivating students' music cognition and expression from the inner aesthetic experience, rather than rote memorization of notes, fingers movements and rhythms (Yang, 2023). Teachers act as facilitators who design stimulating activities and guide students to explore musical elements, comprehend the storyline or emotions behind compositions, and find their own ways to deliver the artistic essence. Some pioneering piano instructors have experimented with incorporating heuristic elements into their lessons, such as interactive discussions, simulated performances, composition imitation and other discovery-based tasks (Tamir-Ostrover et al., 2022). Preliminary observations suggested its potential in enhancing students' motivations and elevating their music interpretations to a higher conceptual level compared to only technical training. However, its effectiveness in fundamentally improving students' all-around competencies is yet to be systematically examined and quantified with scientific evidence.

2. Research significance

Traditional piano education emphasizes technical skills training and knowledge memorization. Students are required to repeat the exercises mechanically and memorize musical scores. However, such approach lacks consideration of students' cognitive development and interest cultivation (Crappell, 2019). As a result, many students lose interest and motivation in piano learning. Some even develop piano anxiety due to the intense pressure of assessments and competitions. While technical skills are important, the core of music education should be nurturing students' music comprehension and aesthetic appreciation (Bobbe et al., 2021). Unfortunately, traditional teaching methods fall short in achieving this goal. Students trained with this approach usually have limited understanding of musical elements such as rhythm, tonality, dynamics and musical expression. They may lack skills in responding to music and improvising with the acquired piano techniques. Their performances often lack vitality, creativity and emotional resonance (Jiang & Dumlavwalla, 2023). To address these issues, exploring an alternative teaching method that aims to cultivate students' music cognition and inspire their creative thinking is in urgent need. A student-centered heuristic approach may help optimize the effect of piano teaching by engaging students' multiple intelligences and fostering their interest in perceiving and creating music. This requires systematic evaluation of the

influence of such teaching method on students' music learning.

From the practical perspective, the research findings would provide insights into how heuristic teaching approaches influence students' comprehension and internalization of musical concepts, which would evaluate if such methods help connect theoretical musical knowledge with practical piano skills. This could contribute to shaping constructivist and inquiry-based learning theories in music education. In particular, it may offer support for the idea that heuristic techniques foster deep, active learning compared to more passive lecturing styles, determining the impacts of heuristic methods on technical abilities and overall performance. If such methods prove effective in enhancing skills, it would suggest that they should be more widely adopted in piano curricula. Improving performance outcomes is crucial for developing well-rounded student musicians. Additionally, understanding how heuristic teaching influences student engagement and motivation would provide practical guidance for piano teachers. Retaining student interest and continuous enthusiasm for practice is vital for long-term progress and success. Therefore, the findings could help optimize teaching approaches and studio policies to maximize student motivation throughout their piano studies.

3. Literature Review

Constructivist learning theories posit that students actively construct knowledge through experience and self-discovery, rather than passively receiving information from teachers (Bada & Olusegun, 2015). This philosophy aligns well with the nature of music, which requires doing, thinking and feeling simultaneously. Several studies have demonstrated the applicability of constructivist principles in music education. Costes-Onishi & Kwek (2023) explored how inquiry-based learning fostered deeper conceptual understanding for middle school students compared to solely lecturing. Students took a more active role answering their own questions through exploration and experimentation. Lapidaki (2020) investigated discovery learning techniques at the elementary level and found they are more conducive to improving technical skills, composition abilities, and creative thinking than traditional instruction. Beyond academic outcomes, constructivism may also impact student motivation. Pitt (2020) observed intrinsically inspired engagement when children partook in open-ended music projects versus teacher-directed work. This suggests constructivist activities can make learning fun and appealing versus a chore. Overall, existent literature provides mounting evidence that constructivism cultivates solid music comprehension, performance skills, and sustained interest. However, the majority of studies examined ensemble-based classes or general music courses rather than private lessons on a single instrument. Further research is still needed to explore how constructivist theories including active, student-centered pedagogies may specifically apply to and benefit individualized instruction contexts like piano education.

Heuristic teaching methods are closely aligned with constructivist philosophies as they emphasize student-centered, experiential learning through exploration and discovery (Gutierrez, 2019). In music education, heuristics promotes active participation in content by challenging students to make connections between theoretical concepts and practical applications. Several studies have investigated the use of heuristics for different musical goals. Deja (2021) examined the impact of performance heuristics on instrumental improvisation. Students worked through a series of guideline questions to internalize and integrate their skills. Results demonstrated this approach strengthened understanding and integration of theoretical ideas. Navbakhor (2020) explored heuristic composition exercises with high school students. By working step-by-step through a guided discovery process, students were able to independently combine harmonic progressions, melodic contour, form, and other elements into original pieces. These suggested heuristics helped develop compositional craft. Similarly, Zhang & Gao (2024) studied senior music students' learning about musical form and structure through a heuristic method of analyzing existing works. Compared with the traditional classroom based teaching, students can more thoroughly break down pieces into their component parts through self-directed exploration. Across these examples, heuristics appear effective at promoting deep, active engagement with different facets of music.

In addition to enhancing academic achievement, effective teaching methods also cultivate students' lasting interest in the subject. This is particularly important for music education given the requirements of regular individual practice (Asmus, 2021). Research has observed constructivist-based approaches may foster intrinsic motivation compared to more passive instruction. Freer & Evans (2018) found elementary students were highly engaged when learning music concepts through open-ended explorative projects versus teacher-directed work. Being able to direct their own learning appeared intrinsically inspiring. Similarly, Girgin (2020) reported undergraduates exhibited strong motivation when learning musical form through guided discovery exercises versus traditional lecture-based formats. The motivational benefits of constructivism may be especially evident in the private studio environment. For piano students, continual motivation is essential for maintaining regular practice routines outside of lessons. However, previous studies have not examined impacts on student engagement specific to the individualized context of piano pedagogy. Heuristic methods in particular seem well-suited to sustaining

interest through their emphasis on guided independent exploration. Further research could provide valuable insights into whether such techniques cultivate higher levels of intrinsic inspiration and commitment to piano study over longer terms compared to more passive teaching approaches. This may ultimately influence practice habits and achievement outcomes.

4. Research Methodology

To comprehensively analyze the effects of heuristic teaching methods on piano education, this study uses mixed methods: quantitative research, qualitative research, and a combination of both methods. The principal research design adopted is a quasi-experimental design with pre-tests and post-tests to assess the gain in music comprehension and performance skills. The experiment group receives heuristic teaching throughout 12 weeks, while the control group maintains the traditional methods. Quantitative data are collected through standardized tests and performance assessments. Qualitative data consist of interview, survey, and classroom observations to help delve into students' experiences and perceptions.

A stratified random sampling method will be used to form a representative sample of 100 Chinese piano students from three local high schools. It enables a representative distribution of students among different demographic and skill levels, including age, gender, prior piano experience. Such design helps us control confounders to ensure the generalizability of the findings. The sample will be divided into two groups of 50 students each (experimental group and control group). In the experimental group, the teacher will take use of heuristic teaching methods to replace traditional teaching methods used in the control group. Collected demographic information will range from ages of 15 to 18 years old and will have an even split between male and females and different levels of piano experience.

5. Data Collection

Data collection will cover both quantitative and qualitative methods to fully address the research questions. Pre- and post-tests will be conducted to assess students' music comprehension and performance skills. The tests will include multiple-choice questions, short answer questions, and performance tasks that assess music concepts, theories and structures. Piano performances will be recorded and judged by three expert judges using a standardized rubric, which assesses technical abilities, accuracy, dynamics, and overall performance skills. Surveys will be distributed to measure students' engagement, motivation, and practice habits, including Likert-scale questions and open-ended questions. Semi-structured interviews will be conducted with a subset of students (n=20) from both groups to explore their perceptions of the teaching methods and their learning experiences. Additionally, classroom observations will be conducted to document the teaching methods used and students' interactions during lessons, with detailed field notes taken to provide qualitative data on the implementation and student responses to heuristic teaching methods.

6. Data Analysis

This section will respond to three research questions in detail. For the first research question--How do heuristic teaching methods influence students' comprehension of music concepts and their ability to analyze and interpret piano compositions, quantitative data from the pre-tests and post-tests on music comprehension will be analyzed using paired t-tests to compare scores before and after the intervention for both the experimental and control groups. Additionally, descriptive statistics will summarize the overall performance and inferential statistics will determine if there are any significant differences between the two groups. The qualitative data from the interviews and observations are coded and analyzed by themes. The themes identified are recurring regarding students' understanding of musical concepts, and their ability to analyze and interpret piano compositions themselves. In summary, the data analysis results will clarify the effectiveness of heuristic teaching methods in improving students' music understanding and their ability to analyze and interpret piano compositions.

For the second research question--To what extent do heuristic teaching methods improve students' technical abilities, accuracy, dynamics, and overall performance skills in piano playing, paired t-tests and ANOVA will be used to analyze the tabulated quantitative data of performance scores and examine the performance differences between the control group and the experimental group. Technical abilities, accuracy, dynamics, and overall performance skills along with composite scores will be used to judge students' performances. Scores will be analyzed in relation to improvements and group differences. Qualitative data will be obtained through observations and interviews to analyze improvements in technical skills and performance quality. The above will give a comprehensive idea that heuristic teaching methods will have a positive impact on performance skills and performance quality.

For the third research question--What is the relationship between heuristic teaching methods and students' engagement, motivation, and practice habits in piano education, descriptive statistics will be used to analyze the quantitative data gathered from surveys, which will provide measurements for students' level of engagement, motivation, and practice habits. Correlation

analysis will be used to investigate the relationship between heuristic teaching methods and these variables. Data gathered from interviews and classroom observations will be thematically analyzed to understand students' level of engagement and motivation. This analysis will offer insight into factors that affect students' practice habits and learning experiences in piano, and will provide a deeper understanding of the positive impact of heuristic teaching methods on students' attitudes and practices toward music.

7. Conclusion

By systematically discussing the effectiveness of heuristic teaching methods in piano education, it was found that heuristic teaching positively influences students' learning, such as training students' logical abilities and cultivating their creativity and imagination. The research results will help the field of music education to better understand the impact of heuristic teaching methods on students' music understanding, performance skills and learning motivation, thereby guiding the improvement and optimization of piano teaching methods.

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