Compare the effect of different teaching methods in piano education

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Abstract. Piano education is an important part of music education, the choice of teaching methods has a profound impact on students' learning results. By comparing the application effects of traditional teaching method, gamified learning method and technology-assisted teaching method in piano education, this paper aims to explore the influence of different teaching methods on students' learning interest, skill mastery speed and long-term retention rate. The study selected 120 beginners from a music college as samples and randomly assigned them to three different teaching methods for a half-year course. The data were collected by means of pre and post test results, questionnaire survey and in-depth interview, and the SPSS software was used for quantitative analysis of the data. The results show that gamified learning method has the best performance in stimulating students' learning interest; The technology-assisted teaching method has obvious advantages in improving the efficiency of skill mastery. Traditional teaching rules are more conducive to students to form stable learning habits and maintain long-term skills. This study not only enriched the theoretical basis of piano education, but also provided teachers with diversified teaching strategy reference, which is helpful to improve the overall teaching quality. In addition, the study points out the limitations of each teaching method and makes recommendations for future research directions.

Keywords: Piano education, pedagogy, effect comparison, Learning outcomes, Teaching strategies.

1. Introduction

1.1. Research background and significance

With the development of social economy and the improvement of people's living standards, more and more families begin to pay attention to the cultivation of children's artistic literacy, among which piano, as an elegant art form, has been widely concerned. Piano education can not only cultivate students' music perception ability, but also promote their emotional expression, thinking development and personality shaping. However, in the actual teaching process, due to the differences in teaching resources, teachers' professional level and students' individual differences, the effect of piano education is significantly different. At present, the common piano teaching methods include the traditional face to face teaching, the teaching mode based on the concept of gamification and the use of modern information technology to assist the teaching. Each teaching method has its unique characteristics and applicable scenarios, but their performance in improving students' learning interest, skill mastery speed and long-term retention rate still needs in-depth research and discussion [1]. This study aims to reveal the advantages and disadvantages of three different teaching methods, namely traditional teaching method, gamified learning method and technology-assisted teaching method, through comparative analysis of their application effects in piano education, and provide more scientific and reasonable teaching strategy suggestions for piano teachers. At the same time, it is hoped that this study can promote the theoretical innovation in the field of piano education, promote the overall improvement of the quality of piano education, and meet the needs of more learners' personalized development.

1.2. Research questions and hypotheses

This research mainly focuses on several core questions: Is there a significant difference in the influence of different teaching methods on beginners' learning interest? How do different teaching methods improve the speed of students' skill acquisition? In the long run, which teaching methods are

more conducive to the retention of students' skills? Based on the above problems, this study puts forward the following hypothesis: H1: Gamified learning method can stimulate students' interest in piano learning more effectively than the other two teaching methods. H2: Technology-assisted teaching method is superior to traditional teaching method and gamified learning method in improving students' skill mastery speed. H3: Traditional teaching methods help students develop stable learning habits that lead to excellent performance in long-term skill retention.

This study selected 120 piano beginners aged from 6 to 12 years old in a music college as research objects, and randomly assigned them to three experimental groups, which received traditional teaching method, gamified learning method and technology-assisted teaching method respectively. The whole experiment period was 6 months, during which relevant data were collected by means of pre and post test results, questionnaire survey and in-depth interview. It is important to note that this study was limited to a beginner population and the age range of the subjects was relatively small, so the findings may not fully generalize to students of other ages or levels. In addition, although the study tried to control the influence of external variables, due to the limited sample size, some uncontrollable factors may still interfere with the research results.

2. Literature review

2.1. Research status at home and abroad

Traditional teaching method is the most common way of piano education, usually taught by experienced teachers face to face, pay attention to basic skills training and personal skills polishing. This method emphasizes the leading role of teachers and helps students master the correct method of playing through demonstration, explanation and repeated practice. A number of studies at home and abroad have shown that traditional teaching methods can effectively improve students' basic musical ability and performance level (Smith, 2017; Zhang, 2019). However, some studies have pointed out that traditional teaching methods may make some students feel boring and lack learning motivation (Brown, 2015). In recent years, gamified learning has attracted more and more attention. This teaching method stimulates students' learning interest and enthusiasm by integrating game elements into the teaching process. For example, activities such as music games, competitions, and role playing are used to allow students to learn piano in a relaxed and enjoyable atmosphere (Johnson, 2018). Studies have found that gamified learning can significantly improve students' engagement and learning effectiveness (Lee & Hammer, 2011). However, some scholars believe that over-reliance on gamification may lead students to neglect the training of basic skills (Wang, 2016). With the development of information technology, the application of technology-assisted teaching method in piano education is becoming more and more extensive [2]. This approach utilizes tools such as digital pianos, music software, and online platforms to provide students with rich learning resources and personalized learning paths. Studies have shown that technology-assisted teaching can improve students' learning efficiency and autonomous learning ability (Chen, 2014; Kim, 2018). However, the popularization and maintenance cost of technical equipment is high, and some students may be troubled by technical barriers (Li, 2019).

2.2. Theoretical basis of teaching

Constructivism theory holds that learning is an active construction process in which students constantly build their own knowledge system through interaction with the environment. In piano education, constructivism emphasizes the subject status of students and encourages them to find and solve problems in practice. Both gamified learning method and technology-assisted teaching method embody the idea of constructivism, enhancing students' learning experience through interaction and exploration (Vygotsky, 1978; Piaget, 1950) [3]. Behaviorism, on the other hand, advocates changing students' behavior through external stimulation and reinforcement. In piano teaching, the traditional teaching method often adopts this way, through the teacher's demonstration and feedback to correct students' mistakes and strengthen the correct playing skills. While this approach is effective in the

short term, it may affect students' autonomy and creativity in the long term (Skinner, 1953) [4]. Sociocultural theory emphasizes the influence of social and cultural environment on individual learning. In piano education, the support of teachers, classmates and families are all important social and cultural factors [5]. By creating a cooperative learning environment, gamified learning and technology-assisted pedagogy promote communication and mutual assistance among students, thus improving learning outcomes (Lave & Wenger, 1991).

2.3. Study the blank spots

Although a large number of studies have explored the application of different teaching methods in piano education, there are still some areas that have not been fully explored. First, most studies have focused on short-term effects and paid less attention to long-term effects. Secondly, the applicability of different teaching methods to students of different ages and levels needs to be further verified. Finally, there is a lack of comprehensive evaluation of the effectiveness of multiple teaching methods. This study will try to fill these gaps and provide a more comprehensive perspective for piano education through systematic comparative analysis.

3. Research design

3.1. Research method

This study adopts a mixed method research design, combining quantitative and qualitative research methods to comprehensively evaluate the effects of different teaching methods in piano education. Specifically, we will use experimental methods to collect quantitative data to measure student learning outcomes through changes in test scores before and after the test; At the same time, qualitative data were obtained through questionnaires and in-depth interviews to deeply understand students' subjective feelings and opinions on different teaching methods.

A total of 120 beginners were randomly divided into three groups of 40, which received traditional teaching method, gamified learning method and technology-assisted teaching method respectively. Each group took piano lessons twice a week for one hour for six months. Three tests were conducted before the experiment, in the middle of the experiment (at the end of the third month) and at the end of the experiment (at the end of the sixth month). The test uses a standardized piano skill test scale and consists of four parts, scales, arpeggios, sight reading, and repertoire performance, with a maximum of 25 points for each part and a total of 100 points. A Likert five-point scale, ranging from 1 (strongly disagree) to 5 (strongly agree), was used to assess students' interest in piano learning. The speed of mastery was measured by the time it took students from first exposure to a new piece to fluency.

An open-ended questionnaire was used to understand students' satisfaction with different teaching methods, difficulties encountered and suggestions. At the same time, 10 students in each group were selected for semi-structured interviews to further explore their learning experience and feelings.

3.2. Data collection

There are 120 beginners in a music academy, aged between 6 and 12, with no piano learning background. They were randomly divided into three groups of 40 people each. Simple random sampling to ensure a balanced distribution of each group of students in terms of age, gender and family background. Using a standardized piano skill test scale, this table is compiled by professional music teachers and has been validated many times. Likert five-point learning interest scale adapted from existing literature. Questionnaire A questionnaire containing open-ended questions. A semi-structured interview guide with multiple open-ended questions such as "Which teaching method do you like best?" ", "What difficulties have you encountered in the learning process? Let's wait.

After data collection, the average score and standard difference of each group of students were calculated to describe the basic characteristics of the data. One-way ANOVA was used to test whether there were significant differences in the impact of different teaching methods on student achievement.

Taking into account the impact of baseline data, covariance analysis was used to further verify the effect of the teaching method. Pearson correlation coefficient was used to analyze the relationship between learning interest and skill acquisition speed.

In terms of qualitative data analysis, text data from questionnaires and in-depth interviews are encoded to extract key themes and patterns. Summarize students' subjective feelings and opinions to form several main themes. Select typical cases for in-depth analysis to show the specific learning situations under different teaching methods.

3.3. Research ethics

Prior to the start of the study, all participants and their parents were given a detailed explanation of the study purpose, process and potential risks, and informed consent was signed. Ensure that all data is processed anonymously and no personal information is disclosed. Ensure that all participants are treated fairly during the study process and avoid any form of discrimination or bias.

4. Results and discussion

4.1. Experimental result

In order to assess the impact of different teaching methods on students' piano skills, three groups of students were tested before and after, including scales, arpeggios, sight reading and repertoire performance. Table 1 shows the changes in test scores of each group.

Table 1. Comparison of test scores before and after

Group	Pre-test average score	The average score on the post-test	Average lift
Traditional teaching method	45.2	68.3	23.1
Game learning	44.8	72.5	27.7
Technical assistance	45.5	75.2	29.7

As can be seen from Table 1, the scores of students in all groups have significantly improved in the post-test, but the technology-assisted teaching method group has the largest improvement, followed by the gamified learning method group, and the traditional teaching method group has the smallest improvement.

In order to assess the influence of different teaching methods on students' learning interest, we used the Likert five-point scale to conduct a survey. Table 2 shows the scores of each group of students on the learning interest scale.

Table 2. Learning interest scale results

group	Average score	Standard deviation
Traditional teaching method	3.2	0.8
Game learning	4.5	0.7
Technology teaching method	4.0	0.9

As can be seen from Table 2, students in the gamified learning method group scored the highest in learning interest, indicating that this method is more able to stimulate students' interest. The traditional teaching method group scored lowest, indicating that the traditional method was relatively weak in stimulating students' interest.

To assess the impact of different pedagogies on the speed at which students acquire skills, we recorded the time it took for students to go from initial exposure to a new piece to fluency. Table 3 shows the performance of each group of students in the speed of skill acquisition.

Table 3. Skill acquisition speed

group	Average time (minutes)	Standard deviation
Traditional teaching method	120	20
Gamified learning method	105	18
Technology-assisted pedagogy	95	15

As can be seen from Table 3, students in the technology-assisted teaching method group have the fastest skill mastery speed, followed by the gamified learning method group, and the traditional teaching method group has the slowest skill mastery speed.

4.2. Result interpretation

Technology-assisted teaching provides students with rich learning resources and personalized learning paths through digital tools and online platforms, enabling students to master more skills in a short period of time. In addition, technology-assisted teaching can provide immediate feedback to help students correct mistakes in time and improve learning efficiency. By integrating game elements into the teaching process, gamified learning method stimulates students' interest and enthusiasm, makes students learn in a relaxed and pleasant atmosphere, and thus improves the learning effect. Although the traditional teaching method is relatively weak in stimulating students' interest, it can still effectively improve students' skill level due to its emphasis on basic training and direct guidance from teachers. In terms of speed of skill acquisition, technology-assisted pedagogy helps students acquire new skills quickly through instant feedback and personalized instruction provided by digital tools. By setting clear goals and reward mechanism, gamified learning encourages students to learn actively, thus speeding up the mastery of skills. Although traditional teaching methods can provide solid basic training, the lack of immediate feedback and personalized guidance may affect the speed of skills acquisition.

Through research, we can see the advantages and disadvantages of the centralized teaching method. The advantage of traditional teaching method lies in the emphasis on basic training and direct guidance of teachers, which helps students to form solid basic skills. The disadvantage is that the teaching method is relatively simple, which may affect students' learning interest and enthusiasm. The advantage of gamified learning method is to stimulate students' learning interest through game elements, improve their participation and learning effect. The disadvantage is that over-reliance on gamification may cause students to neglect the training of basic skills and affect long-term skill retention. The advantage of technology-assisted teaching method is to provide rich learning resources and personalized learning paths, improve learning efficiency and independent learning ability. The disadvantage lies in the high cost of popularization and maintenance of technical equipment, and some students may be troubled by technical barriers.

The sample for this study was drawn primarily from beginners at one conservatory, ages 6 to 12, and the findings may not fully generalize to students at other ages or levels. Although the study tried to control the influence of external variables, due to the limited sample size, some uncontrollable factors may still interfere with the research results. This study focused on short-term effects and limited assessment of long-term effects.

4.3. Research significance

Through the research, teachers should choose different teaching methods flexibly according to the specific situation and needs of students. For beginners, a combination of gamified learning and traditional teaching methods can be adopted to stimulate students' interest in learning and lay a solid foundation. For students with a certain foundation, more technology-assisted teaching methods can be used to improve learning efficiency and independent learning ability. In future studies, it is necessary to further explore the applicability of different teaching methods in different age groups and different levels of students, especially the evaluation of long-term effects. In addition, we can

also discuss the effect of integrating various teaching methods to provide a more comprehensive perspective for piano education.

5. Conclusion and suggestion

By comparing the application effects of traditional teaching method, gamified learning method and technology-assisted teaching method in piano education, this study draws the following main conclusions: Gamified learning method is the best in stimulating students' learning interest, technology-assisted teaching method is the best in improving the speed of skill acquisition, and traditional teaching method is the best in long-term skill retention. Based on this, it is suggested that piano teachers should adopt the combination of gamified learning method and traditional teaching method in the beginner stage, use technology-assisted teaching method in the advanced stage, and continue to use traditional teaching method in the advanced stage. At the same time, teachers should flexibly adjust teaching methods according to the individual differences of students, create a positive learning environment, evaluate regularly and provide immediate feedback. Future studies can expand the sample scope, evaluate the long-term effect, explore the effect of integrated teaching methods, and further study the specific implementation of technology application to further improve the quality of piano education.

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