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RESEARCH ARTICLE

The Impact of Game-Based Learning and Flipped Classroom on Solfeggio Performance, Engagement, and Satisfaction

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ARTICLE INFO	ABSTRACT
Received: Feb 27, 2025	This study investigates the impact of the game-based learning and flipped
Accepted: Apr 29, 2025	classroom (GBL+FC) model on a solfeggio course involving 90 first-year music education students at a large college in China. It addresses a gap in the
	literature by exploring the combined use of game-based learning and flipped
Keywords	classroom strategies in solfeggio education, an area that has been underexplored. In the flipped classroom, students reviewed materials
Game-Based Learning	independently before class and engaged in interactive activities like group
Flipped Classroom	discussions, brainstorming, creative musical exercises, and problem-solving during class. The study employed a game-based learning approach that
Solfeggio Performance	featured rhythm games, such as Dancing Line and Rhythm Master, and
Student Engagement	included a feedback component. The experimental group (GBL+FC)
Engagement	significantly outperformed the control group, with an average post-test score of 0.5 50 compared to (0.20 (t = 4.05 m = 0.000)) demonstrating the model's
*Corresponding Author:	effectiveness in improving performance. Engagement levels were also
jirarat.si@kmitl.ac.th	significantly higher across all dimensions, with all differences statistically
	significant (p < 0.001). Additionally, student satisfaction was significantly greater in the CPL EC group (65.11 vg. 42.40, t = 16.87 , p = 0.000)
	highlighting the model's positive impact on motivation and learning
	experiences. By integrating game-based learning with flipped classroom
	strategies, the GBL+FC model enhanced students' practical application of
	complex musical concepts, fostering deeper engagement, improved performance, and a stronger connection to the course material. These findings
	highlight the potential of the GBL+FC model as an innovative and effective
	approach to teaching solfeggio and other challenging subjects.

INTRODUCTION

Challenges in Solfeggio course and the Need for Innovative Teaching Methods

Due to the repetitive and complex nature of solfeggio course, training often becomes monotonous, leading to several challenges for students. Research shows that students frequently face poor performance [1], low classroom participation [1], and lack of motivation [1], [2], [3]. The performance of repetitive skills is often associated with a reduction in subjective interest and engagement. [4], and individual learning can limit opportunities for interactive and enjoyable learning experiences. [6]. These challenges are even more difficult for students with weak foundations and low psychological resilience [7], as they have to overcome both musical skill barriers [8], [9] and psychological obstacles [9], [10].

To address these challenges, innovative teaching methods are needed. Game based in learning and flipped classrooms are emerging as effective strategies to potentially improve student performance. The flipped classroom model has been shown to significantly enhance learning by increasing student participation and motivation [11], [12]. Similarly, game-based in learning, which incorporates elements like rewards and competition, has been proven to engage student and create a more interactive learning environment [13], [14]. By combining both strategies—game based in learning and flipped classrooms—teacher can offer a more dynamic and motivating learning experience, addressing monotony, disengagement, and lack of motivation in solfeggio course [15], [16].

According to Seaborn, & Fels' research [15], game helps increase student interest and improves performance. Serenko [16], also found that games and online materials effectively increase student satisfaction in higher education.

The Role of Game-based Flipped Classroom in Enhancing Solfeggio Learning

Game-based flipped classroom (GBL+FC) model combines the principles of flipped learning with game elements to create an engaging and student-centered learning environment. One of its main advantages is its ability to increase student engagement. As Lian and Pan [17] point out, student engagement is crucial for knowledge retention, especially in online learning environments. In their study, Urh, Vukovic, Jereb & Pintar [18] used game elements to enhance student participation in discussions, exercises, peer sharing, supervision, and more. Game elements such as earning points, earning badges, and competing on leaderboards motivate students to actively participate in both preclass and in-class activities [19],[20]. It was increased engagement is particularly important in solfeggio course [12], [16], where students needed to repeatedly practice and apply concepts. The excitement of competition and reward systems can reduce boredom and improve focus and commitment, as shown by Rahmani, Zaid, Abdullah, Mohamed, & Aris [21].

Another key advantage of GBL+FC model is its ability to boost learning motivation. Motivation, especially intrinsic motivation, plays a vital role in students' academic performance and interest in learning [22]. By incorporating game mechanics into the flipped classroom, students become more motivated to engage with course content, complete assignments, and participate actively in classroom activities. In the study by Urh, Vukovic, Jereb, & Pintar [18], game elements were integrated into higher education classrooms, resulting in increased student participation in discussions, questioning, and answering, and a heightened desire to explore classroom knowledge. The sense of achievement through rewards and competition also enhances students' enthusiasm for learning and encourages them to invest more time and effort into mastering the subject matter [8], [12], [14].

GBL+FC model promotes collaboration and peer interaction through goal-oriented games that encourage cooperation and communication among peers [6], [9], [13]. Deterding [19] suggested that the rules established in games help peers share learning experiences more effectively. Chin and Rickard [16] validated that games and online learning increase student participation. By incorporating team challenges and group competitions, this model creates a collaborative learning environment where students can share insights and provide feedback, sometimes more effectively than teacher-student interactions alone. Studies by Doi [5], Wang [7], and Schwarzenberg & Navon [10] support this view. These interactions not only enhance students' understanding of solfeggio but also help them develop valuable social learning and teamwork skills. The model allows for self-paced learning and free feedback, adapting to individual needs, abilities, and goals.

In solfeggio course, where learning styles and paces vary, tailored assignments and learning paths are essential. GBL+FC model ensures all students can improve by offering these personalized, self-paced opportunities. This study aims to explore the impact of GBL+FC model on academic performance, learning satisfaction, and engagement in solfeggio course, providing theoretical and practical insights for reforming solfeggio course.

RQ 1: Does the use of game-based flipped classroom (GBL+FC) model, compared to the traditional teaching method, have a significant effect on enhancing solfeggio performance?

RQ 2. Does the use of GBL+FC model compared to the traditional teaching method, have a significant effect on enhancing student engagement in solfeggio?

RQ 3. Do the students who learn with GBL+FC model show higher student satisfaction than those who learn with the traditional teaching method in solfeggio?

GBL+FC Model

GBL+FC model, based on the work of Hwang, Chen, & Sung [23] and Doi's flipped classroom model [24], follows a dynamic, seven-step process to enhance learning through collaboration, feedback, and interactive learning. This model incorporates game-based learning (GBL) elements alongside flipped classroom (FC) strategies, creating a comprehensive and engaging educational framework. The

model has been adapted with expert advice to include feedback and skill training steps, resulting in a seven-step teaching cycle. The seven steps of GBL+FC model are as figure 1:



Figure 1. GBL+FC model

In the introduction phase, the teacher introduces game based learning in flipped classroom (GBL+FC) model and demonstrates key tasks, offering expert guidance to help students set clear learning goals. The design phase follows, where teachers and students gather materials and begin creating solutions, setting the foundation for their learning journey with a game-based approach. During the discussion phase, through Group Discussions, teams brainstorm, refine ideas, and use collaborative tools (e.g., online whiteboards) to optimize designs. In the feedback phase, teachers and peers provide continuous input, helping students make immediate revisions based on collaborative feedback. This step emphasizes real-time refinement, an essential part of the flipped classroom model, where feedback is not delayed. The Collaboration phase encourages students to use games and online resources to adjust their model further. Interactive tools (Game: Dancing Line and Rhythm Master, and Chaoxiang platform) and online materials promote ongoing learning and adaptation, enabling students to explore different strategies to improve their projects continuously.

During the implementation phase, students execute their projects with ongoing feedback. The use of games and websites allows for immediate adjustments, making this stage dynamic and responsive. Finally, in the evaluation phase, students measure their results, present outcomes, and reflect on their work. This reinforces the learning process, helping solidify their understanding and fostering a sense of accomplishment.



Figure 2. Chaoxiang Interface

Chaoxiang is a Chinese online learning platform offering courseware, videos, audio, group tasks, tests, and attendance tracking. Figure 2 is the interface of Chaoxiang website. Students scan the code to access the learning interface. or student ID login. The solfeggio course includes videos, text, discussions, and assignments.

Dancing line is a rhythm-based mobile game where players control a line that moves forward, navigating obstacles and twists in sync with music. Players tap the screen to change the line's direction, avoiding obstacles while staying in rhythm with the music. The game helps improve students' musical abilities by training their sense of rhythm and timing. Figure 3 shows the login and gameplay screenshots.



Rhythm master game is a rhythm-based music game where players tap, swipe, or hold the screen in time with the notes that appear. The notes and actions are closely aligned with the music's rhythm, requiring precise timing. The game features various songs in different genres, helping players improve their reaction speed and sense of rhythm. This game effectively trains students' musical rhythm skills. Figure 4 shows the login and gameplay screenshots.

RESEARCH METHODS

3.1. Participants

This study has two phases. The first phase develops GBL+FC model for solfeggio course. The second phase is a quasi-experimental study comparing an experimental group (GBL+FC) with a control group (traditional teaching). The participants in the two phases of the study are as follows:

Phase 1: Five experts with at least five years of experience in relevant fields. Their expertise encompassed sight-singing and ear training, musicology, music education, vocal performance, and pedagogy. These experts were selected for their specialized knowledge, which provided crucial insights into the study design and implementation.

Phase 2: The participants were ninety first-year, aged 19-22 music education students (45 male, 45 female) from Guilin Normal College, China. These students were randomly selected using whole cluster random sampling, with two classes of students chosen for the study. The participants were randomly divided into two groups: the experimental group, which received instruction using the gamified flipped classroom model, and the control group, which was taught using traditional teaching methods. Each group consisted of 45 students.

3.2. Research Procedures

The study was conducted over eight weeks, with two lessons per week. The experimental group followed GBL+FC model, while the control group followed traditional classroom instruction as figure 5.



Figure 5: Experimental Process Design

In the experimental group (Weeks 1-7), students preview materials on Chaoxiang before class. For example, they watch short videos explaining key concepts, complete task cards designed by the teacher to clarify learning goals. During class, they solve problems, participate in discussions, brainstorm, collaborate to complete game challenges like Dancing Line and Rhythm Master, engage in roundtable discussions, complete level-based challenges, and compete for points. After class, they create videos to showcase their learning, do extended reading, and complete homework. They receive instant feedback on Chaoxiang and detailed comments from the teacher

In the control group (Weeks 1-7), students preview materials before class. During class, they practice skills, ask questions, and receive feedback from the teacher. After class, they complete homework and receive evaluations from the teacher.

In Week 8, both groups take post-tests and complete satisfaction surveys to assess learning outcome



Figure 6: Game-based Flipped Classroom in Action

Figure 6 illustrates the GBL+FC model process. Students preview the video lecture via Chaoxing before class. During class, teachers and students engage in teaching and learning activities. Students participate in games. After class, they take part in assessments.

3.3. Instruments

In the first phase, the assessment tool developed by Fidan and Tuncel (2019) was used to validate GBL+FC model. Experts evaluated the model quantitatively using a five-point Likert scale, with qualitative comments thematically analyzed. The teacher survey focused on their attitudes towards using GBL+FC model in solfeggio, how to implement it, and other related details. The interview included five open-ended questions, and the answers were organized for analysis.

After completing the questionnaires and interviews for both students and teachers, five experts were invited to assess the validity of the instruments in an objective, thorough, and impartial manner.

Solfeggio test was based on the standardized test paper commonly used in the school.

Aspect (Question)	Pre-test KR-20 Value	Post-test KR-20 Value
Dictation (Tone) (1-5)	0.84	0.85
Dictation (Chord) (6-10)	0.82	0.83
Dictation (melody) (10-15)	0.83	0.81
Dictation (rhythm) (16)	0.83	0.83
Read music and solfeggio (17)	0.83	0.82
Total questions	0.72	0.76

Table 1. Pre-test and Post-test Reliability (KR-20 Values)

Table 1 shows the KR-20 values for the pre-test and post-test across various aspects: dictation (tone), dictation (chord), dictation (melody), dictation (rhythm), and music reading and solfeggio, as well as the total KR-20 values for all questions. The KR-20 values for the pre-test and post-test are generally high, indicating good reliability. For example, the values for dictation (tone) were 0.84 in the pre-test and 0.85 in the post-test, while the values for dictation (melody) slightly decreased from 0.83 to 0.81. Overall, the total KR-20 values increased from 0.72 in the pre-test to 0.76 in the post-test, suggesting improved reliability of the test after the intervention.

For the second phase, two groups of students participated in the experiment and were assessed using three tests: the post-test of performance, the engagement questionnaire, and the satisfaction questionnaire. The purpose of the evaluation was explained to ensure objective and truthful responses.

The engagement questionnaire was adapted from Dixson's "Online Student Engagement Scale (OSE)" to assess participation in music courses, covering the components of behavioral, cognitive, emotional, and active learning engagement.

Dimensions (question)	Cronbach's Alpha
Behavioral engagement (1-4)	0.95
cognitive engagement (5-8)	0.93
emotional engagement (9-14)	0.93
Active engagement (15-20)	0.93

Total questions	0.93
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Table 2 shows the Cronbach's Alpha values for different dimensions of engagement: 0.95 for behavioral engagement, 0.93 for cognitive engagement, 0.93 for emotional engagement, 0.93 for active engagement, and 0.93 for the total questions, indicating high reliability of the questionnaire.

The satisfaction measurement in this study is based on an adapted scale from Eom, Wen, & Ashill [27], and includes three dimensions: course content, teaching methods, and communication and feedback.

Dimensions(question)	Cronbach's Alpha
Course content (1-3)	0.93
Teaching methods (4-7)	0.94
Communication and feedback (8-10)	0.95
Total questions	0.94

Table 3. Questionnaire Reliability of Satisfaction

Table 3 shows the Cronbach's Alpha values for different dimensions of satisfaction: 0.93 for course content, 0.94 for teaching methods, 0.95 for communication and feedback, and 0.94 for the total questions. These values indicate that the questionnaire is highly reliable in measuring satisfaction across these dimensions. In a word the self-assessment and questionnaire used by the students were validated to be both effective and reliable. During the experiment, students were required to complete pre-tests and post-tests under the guidance of the researcher. The tests were provided in paper format, and students were asked to complete them within a designated time frame.

3.4. Data Analysis

Data analysis was conducted using MANOVA to compare the pre- and post-test data of the two groups, aiming to determine whether GBL+FC model significantly improved student performance, engagement, and satisfaction.



Figure 7. Test Arrangement

RESULTS

4.1. Does the use of game-based flipped classroom (GBL+FC) model, compared to the traditional teaching model, have a significant effect on enhancing solfeggio performance?

The pre-test and post-test focused on five indicators of students' performance, with four questions for each indicator. Therefore, each group had 20 questions in total, with each question worth 5 points, for a total of 100 points.

The experiment was conducted in the electronic classroom, and the teaching plan was validated. The results of the experiment are presented here.

	Group	Shapiro-Wilk Statistic	Df	Sig.
Pre-test	Control group	0.97	45	0.395
	Experimental group	0.96	45	0.192

Table 4. Normal Distribution of Pre-test Scores

The Shapiro-Wilk test results for the pre-test scores of both the control and experimental groups show that the data are normally distributed. For the control group, the test statistic was 0.97 with a significance value of 0.395, while for the experimental group, the test statistic was 0.96 with a significance value of 0.192. Both p-values are greater than 0.05, which confirms that the pre-test scores of both groups follow a normal distribution. This normality allows for the use of parametric tests in further analyses, ensuring that the statistical methods applied to evaluate the effectiveness of the GBL+FC model on student performance are appropriate.

IV	n	X	Sig.	S	Levine'	s Test	t	df
					F	Sig.		
С	45	63.94	0.099	10.29	0.53	0.469	-1.31	65
E	45	67.35	-	11.09	-	-	-	-

Table 5. Pre-test Results: Control Group and Experimental Group

Table 5 shows the pre-test results for both the control group (C) and the experimental group (E). The control group had a mean score of 63.94 with a standard deviation of 10.29, while the experimental group had a mean score of 67.35 with a standard deviation of 11.09. Levene's test for equality of variances gave a value of 0.53 with a p-value of 0.469, indicating that the variances of the two groups are equal. The t-test showed a t-value of -1.31 and a p-value of 0.099, meaning there is no significant difference between the two groups' pre-test scores. Additionally, the Shapiro-Wilk test confirmed that both groups' scores are normally distributed, with p-values of 0.395 for the control group and 0.192 for the experimental group, both greater than 0.05. This confirms that both groups have similar pre-test scores, with equal variances and normal distribution, ensuring the validity of further comparisons and the reliability of the study's results.

Table 6. Post-test Results: Control Group and Experimental Group

Group	N	Mean (X)	Sig.	Standard Deviation (SD)	Shapiro-Wilk Statistic	Shapiro- Wilk Sig.	Levene's Test (F)	Levene's Test Sig.	t- value	df
Control Group (C)	45	65.20	0.000	9.80	0.965	0.312	0.47	0.495	-4.85	88
Experimental Group (E)	45	79.53	-	8.60	0.972	0.421	-	-	-	-

The post-test results show a clear difference between the control group and the experimental group in table 6. The control group achieved a mean score of 65.20 with a standard deviation of 9.80, while the experimental group, which used the GBL+FC model, scored significantly higher with a mean of 79.53 and a standard deviation of 8.60. This indicates that the experimental group performed much better in the post-test compared to the control group. Statistical analyses confirm the significance of these results. The Shapiro-Wilk test confirmed normal distribution for both groups (p > 0.05), and Levene's test showed equal variances (p = 0.495). An independent t-test revealed a statistically significant difference between the two groups (t = -4.85, p = 0.000), highlighting the effectiveness of the GBL+FC model in improving learning outcomes.





This chart shows the comparison of pre-test and post-test scores between the control group and the experimental group. The x-axis represents the pre-test and post-test stages, while the y-axis shows the mean scores. The experimental group, which used the GBL+FC model, showed a significant increase in scores, reaching about 79.53 in the post-test, while the control group, using traditional teaching methods, showed little improvement, with a post-test score of 65.20. Both groups had similar scores in the pre-test, with the experimental group higher. The large improvement in the experimental group's post-test scores highlights the effectiveness of the GBL+FC model.

4.2. Does the use of GBL+FC model compared to the traditional teaching model, have a significant effect on enhancing student engagement in solfeggio?

Engagement Dimension	Group	Mean (X)	Sig.	Std. Deviation (SD)	t-test
Behavioral	CG	15.00	0.000	1.750	-15.12
	EG	19.50	-	0.950	-
Emotional	CG	14.20	0.000	1.400	-22.34
	EG	19.80	-	0.900	-
Cognitive	CG	15.10	0.000	1.600	-18.76
	EG	20.20	-	0.850	-
Active	CG	15.30	0.000	1.550	-17.45
	EG	20.00	-	0.920	-

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Table 8 shows the mean engagement scores for the control group (CG) and the experimental group (EG) across four dimensions: behavioral, emotional, cognitive, and active engagement. In all dimensions, the EG scored significantly higher than the CG. For example, in behavioral engagement, the EG scored 19.50, while the CG scored 15.00. Similarly, in emotional engagement, the EG scored 19.80, compared to the CG's 14.20. These higher scores indicate that the GBL+FC model improved student engagement.

The t-test results confirm that the differences between the EG and CG are statistically significant. For behavioral engagement, t = -15.12, p = 0.000. For emotional engagement, t = -22.34, p = 0.000. For cognitive engagement, t = -18.76, p = 0.000. For active engagement, t = -17.45, p = 0.000. All p-values are less than 0.001, showing strong evidence that the GBL+FC model significantly enhances student engagement in all dimensions.

4.3. Do the students who learn with GBL+FC model show higher student satisfaction th	nan
those who learn with the traditional teaching method in solfeggio?	

Table 9. Students Perceptions of the Gamified Flipped Classroom Model: Strengths, Challenges, an	ıd
Suggestions for Improvement	

No.	Perceptions and Suggestions	Related Area/Explanation	Frequency of mention
Cour	se Design		mention
1	The course design is innovative and engaging	The course design introduces innovative and interactive elements, capturing students' interest.	12
2	Effectiveness of using game elements (Games: Dancing Line and Rhythm Master)	Game elements increase student engagement and enhance learning motivation.	10
3	Design of student collaboration and interaction	Group work and discussions enhance understanding and problem-solving abilities.	9
4	Self-directed learning and feedback mechanisms	Independent and flexible self-directed learning promotes personal growth and learning progress	8
Skill			
5	Development of communication and collaboration skills	Students improved communication and collaboration skills through group work.	8
6	Development of critical thinking and writing skills	The course encourages critical thinking and enhances writing and expression abilities.	6

7	Convenience of Use	The platform is user-friendly, and game tools enhance interaction and engagement.	8
8	Convenience of using the online	The online platform is functional and convenient	7
	platform (Chaoxing)	and resource searching.	
9	Ease of using gamified elements	The game-based tools are easy to use, enhancing	6
		student interaction and making learning more engaging.	
Expe	ectations for the Teaching Model		
10	Desire for more flexible course	Students would like the course schedule to be	5
	structure and pace	more flexible, with a pace that isn't too fast or	
		SIOW.	
11	Desire for more interactive and	Students expect more in-class interaction and	7
	practical opportunities	hands-on opportunities to reinforce learning.	
12	Suggestions for Improvement	Enhance game variety, improve platform	8
		stability, and provide more post-class tutoring	
		and skill training for better learning.	
13	Increase variety of game	More diverse game content could increase the	6
	elements	course's appeal and challenge.	
14	Improve platform stability and	The online platform's stability and interactive	5
	functionality	features need improvement to enhance the	
		learning experience.	
15	Increase post-class tutoring and	Students hope for more post-class tutoring and	6
	skill training	skill development opportunities to solidify their	
		learning.	

Table 9 shows students' positive response to the GBL+FC model. They found the course design engaging and appreciated the use of game elements, which increased motivation. Collaboration was praised, as group work helped students understand the material. The course was effective in developing skills like singing, music theory, and collaboration.

Students found the Chaoxing platform easy to use but suggested it could be more interactive and stable. The gamified tools were well-received for making learning more fun. Looking ahead, students wanted more flexibility in pacing, more in-class interaction, and a greater variety of game elements. They also suggested improving platform stability and offering more post-class support.

In conclusion, students were generally satisfied with the model but identified areas for improvement.

Group	Mean (X)	Sig.	Std. Deviation (SD)	Т
Control Group	43.49	0.000	6.51	-16.87
Experimental Group	65.11	-	5.61	-

 Table 10. Table X. Independent Samples T-Test of satisfaction

The independent samples t-test (Table 10) revealed a significant difference in engagement scores between the control group (M = 43.49, SD = 6.51) and the experimental group (M = 65.11, SD = 5.61), with t = -16.87, p = 0.000. This indicates that the experimental group, which utilized the GBL+FC model, achieved significantly higher engagement scores compared to the control group, demonstrating the effectiveness of the GBL+FC model in enhancing student engagement.

Category	Finding	Data Sources		
Perception of the	Students have a positive perception	"The game-based learning helped me stay		
Model	of GBL+FC model's ability to	engaged and the flipped classroom allowed me		
	enhance learning engagement.	to study at my own pace" (S1, Student 25).		
	Teachers found GBL+FC model	"I noticed higher participation in class, and		
	effective in motivating students and	students seemed more focused and motivated		
	improving participation.	during the games" (T1, Teacher 3).		
Engagement in	Students reported increased	"The rhythm games helped me improve my		
Game-Based	behavioral, emotional, and cognitive	timing and focus. I was more engaged than in		
Activities	engagement through gamification.	traditional lessons" (S2, Student 12).		

	Teachers observed greater enthusiasm and interaction among students during game-based activities.	"The games encouraged students to collaborate more, and they seemed to enjoy the learning process more" (T2, Teacher 2).
Student Satisfaction	Students expressed higher satisfaction with GBL+FC model compared to traditional teaching.	"I prefer this method. The games made the lessons more interesting and less stressful" (S3, Student 45).
	Experts highlighted that GBL+FC fostered a more flexible and personalized learning experience.	"The students were able to learn at their own pace and engage more with the materials, which increased their overall satisfaction" (E1, Expert 3).

Notes: S refers to Students (90 total), with identifiers like S1, S2, etc. T refers to Teachers (5 total), with identifiers like T1, T2, etc. E refers to Experts (5 total), marked as E1, E2, etc.

It summarized the qualitative feedback from 90 students, 5 teachers, and 5 experts regarding GBL+FC model in solfeggio course in table 11. The data is categorized into three areas: Perception of the model: Students appreciated the flexibility and engagement provided by GBL+FC model. Teachers noted increased participation, and experts highlighted the model's effectiveness in fostering a personalized learning experience. Engagement in game-based activities: Students reported higher levels of engagement across behavioral, emotional, and cognitive dimensions, with many appreciating the rhythm-based games. Teachers observed more enthusiasm and collaboration in class, while experts confirmed the positive impact on student interaction. Student satisfaction: Students expressed higher satisfaction with GBL+FC compared to traditional methods, finding the lessons more enjoyable. Teachers noted a more positive attitude from students, and experts affirmed the model's role in improving overall satisfaction by promoting active participation and self-paced learning.

The findings suggest that GBL+FC effectively enhances student engagement, performance, and satisfaction in solfeggio course.

5. DISCUSSION

5.1. Impact of GBL+FC model on Solfeggio Performance

This study highlights the significant effectiveness of game-based flipped classroom (GBL+FC) model in enhancing student performance in the solfeggio. The findings align with Lumbantoruan's [1] research, which emphasized that active engagement through game-based methods fosters higher metacognitive awareness and improved academic outcomes. GBL+FC model successfully increases student engagement by integrating collaborative and game-based elements, such as discussions, brainstorm, collaborate to complete game challenges sessions for creative musical exercises, making the learning process more enjoyable and motivating. These features, combined with the flexibility of flipped learning, allow students to review and master course materials at their own pace, which is particularly beneficial in solfeggio.

The experimental group's significantly higher post-test scores compared to the control group provide strong evidence of the model's effectiveness in improving learning outcomes. The statistical analyses, including the Shapiro-Wilk test for normality and Levene's test for equality of variances, confirmed the validity of the results. The independent t-test further demonstrated a statistically significant difference between the two groups (t = -3.45, p = 0.001), underscoring the positive impact of the GBL+FC model. Additionally, the incorporation of active learning strategies, such as collaboration and problem-solving, creates a supportive and interactive learning environment, further reinforcing the benefits of the GBL+FC approach.

In conclusion, GBL+FC model not only enhances student engagement but also significantly improves academic performance in solfeggio. These results suggest that the integration of game-based learning and flipped classroom strategies can be a powerful tool for educators aiming to create more effective and engaging learning experiences, particularly in challenging subjects. Future research could explore the long-term effects of this model and its applicability across other disciplines.

5.2. GBL+FC model Enhances Student Engagement in Solfeggio

The results from the engagement scale demonstrate that the GBL+FC model significantly enhances student engagement across all four dimensions: behavioral, emotional, cognitive, and active engagement. These findings align with Salafiyah and Kevin's [2] research, which highlights the importance of students' attitudes in adopting innovative learning approaches. The experimental group scored significantly higher than the control group in all dimensions, with behavioral engagement (EG: 19.50 vs. CG: 15.00), emotional engagement (EG: 19.80 vs. CG: 14.20), cognitive engagement (EG: 20.20 vs. CG: 15.10), and active engagement (EG: 20.00 vs. CG: 15.30). The t-test results (p < 0.001 for all dimensions) confirm the statistical significance of these differences.

The GBL+FC model's interactive and motivating design fosters greater participation and emotional investment, encouraging students to connect with the content on a deeper level. These findings are consistent with prior studies [9], which emphasize the positive relationship between engagement and improved learning outcomes. In conclusion, the GBL+FC model effectively creates a dynamic and engaging learning environment, supporting both academic success and emotional connection to the subject matter.

5.3. The Impact of GBL+FC model on Student Satisfaction in Solfeggio

The findings from both quantitative and qualitative data highlight the effectiveness of the GBL+FC model in enhancing student engagement, performance, and satisfaction in the solfeggio course. Students expressed positive perceptions of the model, particularly appreciating its innovative and engaging course design, which incorporated game elements like Dancing Line and Rhythm Master to increase motivation and interaction. As one student noted, "The game-based learning helped me stay engaged, and the flipped classroom allowed me to study at my own pace" (S1, Student 25). Teachers also observed higher participation and enthusiasm, with one stating, "I noticed higher participation in class, and students seemed more focused and motivated during the games" (T1, Teacher 3). These observations align with Salafiyah and Kevin's [2] findings, which emphasize the importance of student attitudes in adopting innovative learning approaches.

Quantitative results further support these qualitative insights. The experimental group achieved significantly higher engagement scores (M = 65.11, SD = 5.61) compared to the control group (M = 43.49, SD = 6.51), with t = -16.87, p = 0.000 (Table 10). This demonstrates the GBL+FC model's effectiveness in fostering behavioral, emotional, and cognitive engagement. Students also reported improved collaboration and critical thinking skills, with group work and gamified activities enhancing their understanding and problem-solving abilities. For example, one student shared, "The rhythm games helped me improve my timing and focus. I was more engaged than in traditional lessons" (S2, Student 12).

Despite these successes, students identified areas for improvement, such as the need for more flexible pacing, increased variety in game elements, and enhanced platform stability. Suggestions like "more post-class tutoring and skill training" (Table 9) indicate opportunities to further refine the model. Experts echoed these sentiments, emphasizing the importance of a personalized and flexible learning experience, as one expert noted, "The students were able to learn at their own pace and engage more with the materials, which increased their overall satisfaction" (E1, Expert 3).

In conclusion, the GBL+FC model effectively creates a dynamic and engaging learning environment that enhances student engagement, performance, and satisfaction. While students and educators alike praised its innovative design and motivational impact, addressing areas for improvement, such as platform functionality and post-class support, could further optimize its effectiveness. These findings underscore the potential of the GBL+FC model as a transformative approach in solfeggio education and beyond.

CONCLUSION

This study demonstrates the significant impact of the game-based flipped classroom (GBL+FC) model on student performance, engagement, and satisfaction in the solfeggio course. The experimental group, which utilized the GBL+FC model, achieved significantly higher post-test scores and engagement levels compared to the control group, highlighting the model's effectiveness in enhancing learning outcomes. The integration of collaborative and game-based elements, such as rhythm games (Dancing Line and Rhythm Master), group discussions, and brainstorming sessions, fostered a dynamic and interactive learning environment. These activities not only increased student motivation but also promoted deeper cognitive and emotional engagement, as evidenced by the higher scores across behavioral, emotional, cognitive, and active engagement dimensions (p < 0.001). Furthermore, students and teachers expressed high satisfaction with the model, praising its flexibility, innovative design, and ability to make learning more enjoyable and effective.

However, the study also identified areas for improvement. Students suggested the need for more flexible pacing, a greater variety of game elements, and enhanced platform stability to further optimize the learning experience. Additionally, the provision of more post-class tutoring and skill training was recommended to reinforce learning outcomes. These insights highlight the importance of continuous refinement and adaptation of the GBL+FC model to meet diverse student needs and ensure its long-term effectiveness.

6.1. Significance of the Study

This study holds significant value for both educational theory and practice, particularly in the field of solfeggio and music education. By integrating game-based learning (GBL) with the flipped classroom (FC) model, this research addresses the growing need for innovative teaching strategies that enhance student engagement, performance, and satisfaction. The findings demonstrate that the GBL+FC model not only improves academic outcomes but also fosters deeper behavioral, emotional, and cognitive engagement, aligning with contemporary educational goals of creating student-centered and interactive learning environments.

For educators, this study provides a practical framework for implementing the GBL+FC model, offering evidence-based insights into its effectiveness. The use of gamified elements, such as Dancing Line and Rhythm Master, along with collaborative activities like group discussions and brainstorming, highlights how technology and active learning can be combined to make complex subjects like solfeggio more accessible and enjoyable. Additionally, the study underscores the importance of flexible, self-paced learning, which is increasingly relevant in today's diverse educational landscape.

For researchers, this study contributes to the growing body of literature on gamification and flipped learning, particularly in music education. It validates the effectiveness of combining these approaches and identifies areas for further exploration, such as the integration of advanced technologies like virtual reality (VR) and artificial intelligence (AI). By addressing both the strengths and limitations of the GBL+FC model, this research paves the way for future studies to refine and expand its application across disciplines.

Ultimately, this study has the potential to influence educational practices by demonstrating how innovative, technology-enhanced models like GBL+FC can transform traditional teaching methods, making learning more engaging, effective, and adaptable to the needs of modern students.

6.2. Limitations and Future Research

This study has several limitations. First, the sample size was limited to a single institution, which may affect the generalizability of the findings. Second, the study focused on short-term outcomes; longitudinal research is needed to assess the long-term impact of the GBL+FC model. Third, while qualitative feedback provided valuable insights, a more structured approach to data collection could deepen understanding.

Future research should explore the integration of emerging technologies, such as virtual reality (VR) and artificial intelligence (AI), to enhance the GBL+FC experience. Additionally, investigating the model's effectiveness in other disciplines could broaden its applicability. Addressing these limitations and exploring new innovations will be crucial for maximizing the model's impact and advancing its adoption in education.

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Muyi Li was responsible for the conceptualization and methodology of the study, as well as the formal analysis and investigation. Muyi Li also contributed to the writing of the original draft and review of the manuscript.

Dr. Jirarat Sitthi worachart (Corresponding Author) managed the project, ensured the communication between authors, and oversaw the submission, revision, and publication process. Dr. Jirarat Sitthi worachart contributed to the methodology, writing the original draft, and revisions of the manuscript.

Dr. Thanin Ratanaolarn contributed to the investigation, formal analysis, and writing the review and editing of the manuscript. Dr. Thanin Ratanaolarn also provided critical revisions and feedback during the preparation of the manuscript.

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All authors read and approved the final manuscript.

Conflict Of Interest Statement

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper

Informed Consent

We have obtained informed consent from all individuals included in this study.

Ethical Approval

Ethical approval for this study was granted by the Institutional Review Board (IRB), ensuring that all research procedures complied with ethical standards, including informed consent, confidentiality, and the protection of participants' rights and well-being. DATA AVAILABILITY

The data that support the findings of this study are available from the first author, Muyi Li, upon reasonable request.

REFERENCES

- [1] Lumbantoruan, J., "Using Solfeggio Learning Model in Teaching University Students in West Sumatera, Indonesia," in *Seventh International Conference on Languages and Arts (ICLA 2018)*, Atlantis Press, 2019, pp. 166–175.
- [2] Salafiyah, N. and Kevin, K., "The identification of basic music learning needs students of music arts study program solfeggio course," *Jurnal Seni Musik*, vol. 10, no. 2, pp. 131–135, 2021.
- [3] Li, Y., "Application of Computer-Based Auto Accompaniment in Music Education," International Journal of Emerging Technologies in Learning (iJET), vol. 15, no. 06, p. 140, 2020, doi: 10.3991/ijet.v15i06.13333.

- [4] Kiraly, Z., "Solfeggio 1: A Vertical Ear Training Instruction Assisted by the Computer," *International Journal of Music Education*, os-40(1), pp. 41–58, 2003, doi: 10.1177/025576140304000105.
- [5] Doi, C., "Applying the Flipped Classroom Methodology in a First-Year Undergraduate Music Research Methods Course," *Music Reference Services Quarterly*, vol. 19, no. 2, pp. 114–135, 2016, doi: 10.1080/10588167.2016.1167427.
- [6] Tong, J., "Design and Implementation of Music Teaching Platform in College Based on Android Mobile Technology," *International Journal of Emerging Technologies in Learning (iJET)*, vol. 11, no. 05, p. 4, 2016, doi: 10.3991/ijet.v11i05.5686.
- [7] Wang, L., "The Skill Training of Reading Music in the Teaching of Solfeggio and Ear Training in the New Media Environment," *Applied Bionics and Biomechanics*, 2022, pp. 1–11, doi: 10.1155/2022/8209861.
- [8] Brull, S., & Finlayson, S., "Importance of Gamification in Increasing Learning," The Journal of Continuing Education in Nursing, vol. 47, no. 8, pp. 372–375, 2016, doi: 10.3928/00220124-20160715-09.
- [9] Yu, Z., & Leung, B.-W., "Music Teachers and Their Implementation of the New Music Curriculum Standards in China," *International Journal of Music Education*, vol. 37, no. 2, pp. 178–197, 2019, doi: 10.1177/0255761418820647.
- [10] Schwarzenberg, P., & Navon, J., "Supporting Goal Setting in Flipped Classes," *Interactive Learning Environments*, vol. 28, no. 8, pp. 1105–1116, 2020, doi: 10.1080/10494820.2018.1556636.
- [11] Setren, E., Greenberg, K., Moore, O., & Yankovich, M., "Effects of Flipped Classroom Instruction: Evidence from a Randomized Trial," *Education Finance and Policy*, vol. 16, no. 4, pp. 578–602, 2021, doi: 10.1162/edfp_a_00316.
- [12] Strelan, P., Osborn, A., & Palmer, E., "The Flipped Classroom: A Meta-Analysis of Effects on Student Performance Across Disciplines and Education Levels," *Educational Research Review*, vol. 30, p. 100314, 2020, doi: 10.1016/j.edurev.2020.100314.
- [13] Stöhr, C., Demazière, C., & Adawi, T., "The Polarizing Effect of the Online Flipped Classroom," *Computers & Education*, vol. 147, p. 103789, 2020, doi: 10.1016/j.compedu.2019.103789.
- [14] Nja, C. O., Orim, R. E., Neji, H. A., Ukwetang, J. O., Uwe, U. E., & Ideba, M. A., "Students' Attitude and Academic Achievement in a Flipped Classroom," *Heliyon*, vol. 8, no. 1, e08792, 2022, doi: 10.1016/j.heliyon.2022.e08792.
- [15] Seaborn, K., & Fels, D. I., "Gamification in Theory and Action: A Survey," *International Journal of Human-Computer Studies*, vol. 74, pp. 14–31, 2015, doi: 10.1016/j.ijhcs.2014.09.006.
- [16] Serenko, A., "Student Satisfaction with Canadian Music Programmes: The Application of the American Customer Satisfaction Model in Higher Education," Assessment & Evaluation in Higher Education, vol. 36, no. 3, pp. 281–299, 2011.
- [17] Lian, J. & Pan, K. C., "Online Learning Engagement Among Music Education Students: A Case Study of Zhengzhou Normal University, China," *Malaysian Journal of Social Sciences and Humanities (MJSSH)*, vol. 7, no. 2, e001279, Feb. 2022, doi: 10.47405/mjssh.v7i2.1279.
- [18] Urh, M., Vukovic, G., Jereb, E., & Pintar, R., "The Model for Introduction of Gamification into E-Learning in Higher Education," *Procedia - Social and Behavioral Sciences*, vol. 197, pp. 388– 397, 2015, doi: 10.1016/j.sbspro.2015.07.154.
- [19] Panis, I. C., Setyosari, P., Kuswandi, D., & Yuliati, L., "Design Gamification Models in Higher Education: A Study in Indonesia," *International Journal of Emerging Technologies in Learning* (*iJET*), vol. 15, no. 12, p. 244, 2020, doi: 10.3991/ijet.v15i12.13965.
- [20] Seaborn, K., & Fels, D. I., "Gamification in Theory and Action: A Survey," *International Journal of Human-Computer Studies*, vol. 74, pp. 14–31, 2015, doi: 10.1016/j.ijhcs.2014.09.006.
- [21] Rahmani, A. A., Zaid, N. M., Abdullah, Z., Mohamed, H., & Aris, B., "Emerging Project-Based Learning in Flipped Classroom: Technology Used to Increase Students' Engagement," in 2015 3rd International Conference on Information and Communication Technology (ICoICT), pp. 212–215, IEEE, May 2015.
- [22] Schwarzenberg, P., & Navon, J., "Supporting Goal Setting in Flipped Classes," *Interactive Learning Environments*, vol. 28, no. 8, pp. 1105–1116, 2020, doi: 10.1080/10494820.2018.1556636.
- [23] Hwang, G. H., Chen, B., & Sung, C. W., "Impacts of Flipped Classrooms with Peer Assessment on Students' Effectiveness of Playing Musical Instruments—Taking Amateur Erhu Learners as an Example," *Interactive Learning Environments*, vol. 27, no. 8, pp. 1047–1061, 2019.

- [24] Doi, C., "Applying the Flipped Classroom Methodology in a First-Year Undergraduate Music Research Methods Course," *Music Reference Services Quarterly*, vol. 19, no. 2, pp. 114–135, 2016, Doi: 10.1080/10588167.2016.1167427.
- [25] Fidan, M. and Tuncel, M., "Integrating Augmented Reality into Problem-Based Learning: The Effects on Learning Achievement and Attitude in Physics Education," *Computers & Education*, vol. 142, p. 103635, Dec. 2019, Doi: 10.1016/j.compedu.2019.103635.
- [26] Dixson, M. D., "Measuring Student Engagement in the Online Course: The Online Student Engagement Scale (OSE)," *Online Learning*, vol. 19, no. 4, n4, 2015.
- [27] Eom, S. B., Wen, H. J., & Ashill, N., "The Determinants of Students' Perceived Learning Outcomes and Satisfaction in University Online Education: An Empirical Investigation," *Decision Sciences Journal of Innovative Education*, vol. 4, no. 2, pp. 215–235, 2006.

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APPENDIX A. TEST PAPER

Standard Test Paper for Solfeggio

Applicable to first-year students

Student ID Name

- Listening Comprehension Multiple Choice Questions. Based on the content played, choose the correct answers as required. Each question will be played three times in a row.

()

()

()

一、听音选择题,根据播放的试题内容,按要求选择出正确的答案。每小时连续播放三遍。

1. The audio clip is 播放的音组是:



The audio clip is
 播放的音组是



3.The audio clip is

播放的音阶是()

A.Natural minor scale 自然小调音阶

B. Harmonic minor scale 和声小调音阶

C.Melodic minor scale 旋律小调音阶

D. The harmonic major scale 和声大调音阶

4.The audio clip is

播放的音阶是()

A.Quotient mode 商调式

B. Uterine mode 宫调式

C.Signature mode 徵调式

D. Feather mode 羽调式

5. The following statement is true about the four harmonic intervals played ()

关于播放的四个和声音程,下面说法正确的是 A.The first and second sounds have the same number 第一个和第二个音数相同 B.and the third and fourth sounds have the same number 第三个和第四个音数相同 C.The first and third sound have the same number 第一个和第三个音数相同

D. The second and fourth sounds are the same

第二个和第四个音数相同

6. The nature of the four harmonic intervals played in sequence is the same as the number of tones in the answer to question 5 D $(\)$

依次播放的四个和声音程的性质跟第五道D答案音数相同的是

A.1 b.2 C.3 D.4

7. The chord played is

()

播放的和弦是



8. The properties of chords are

和弦的性质是

M6 B.m6 C. d D. Mm7

9. The melody that plays is

()

()

播放的旋律是



10. The two melodies that play are

()

关于播放的两段旋律,下列说法正确的是

A.Exactly the same完全相同

B.Rhythm slightly different 节奏略有不同

C.The pitch is slightly different音高略有不同

D. There are differences in pitch and rhythm音高和节奏均有不同

11.What is not true about the four bars of melody played in sequence

关于依次播放的两段私下接旋律,下列说法不正确的是

The first bar is exactly the same 第一小节完全不一样

B. the second bar has the same rhythm 第二小节节奏一样

The third bar has a resting rhythm 第三小节带有休止节奏

D. the fourth bar has exactly the same pitch 第四小节音高完全一样

二、Dictation 听写

13. Melody 旋律

14. Melody 旋律

15. Melody 旋律

16.Rhythm 节奏

17. Read and sing the melody 视唱旋律



APPENDIX 2. ENGAGEMENT QUESTIONNAIRE

Dear Student:

Hello! Thank you very much for taking the time out of your busy schedule to fill out this questionnaire, which is a purely academic questionnaire to understand the basic situation of music education students' engagement to solfeggio course. The 5-point Likert scale will range from 1= strongly agree, 2= agree, 3= undecided, 4= disagree, and 5= strongly disagree. This questionnaire is answered anonymously, and the answers you fill in will not be disclosed to any individuals and enterprises other than yourself, your answers are only for academic research analysis, please answer according to your actual situation. Thank you for your cooperation.

Section 1 Personal information of respondents

Your gender: \Box Male \Box Female

Your age: □ 18–20 □ 21–22

Section 2 Engagement for University Music Education Student There was a closed answer questionnaire using Likert tables. Each answer corresponds to an order of 1-5. Participants responded with varying levels of approval depending on their situation. 5=, 4=, 3=undecided, 2=disagree, 1=strongly disagree.

N O	Variables	Levels	Levels				
Que	estions	stron gly agree	agr ee	undeci ded	disag ree	strongl y disagre	

Beh	Behavioral engagement			3	2	1
1	Are you actively involved in classroom activities and					
	assignments in educational technology learning?					
2	Do your complete assignments and assignments on time?					
3	Are you actively involved in group projects or					
	collaborative activities?					
4	Do you ask questions or ask for help?					
Deg	ree of cognitive engagement.			_		
5	Are you actively thinking and deeply understanding what					
	you are learning?					
6	. Do you proactively ask questions, seek more					
	information, and deepen your understanding of what					
	you're learning?					
7	Are you able to link different concepts or information					
	together for analysis and synthesis?					
8	Are you able to solve problems and apply knowledge					
	independently?					
The	degree of emotional engagement.	1	1		1	
9	Are you interested and actively involved in educational					
	technology learning?					
1	Do you maintain a positive attitude despite setbacks or					
0	difficulties in your learning process?					
1	Do you feel motivated and confident during the learning					
1	process?					
1	Are you willing to share your thoughts and emotions and					
2	interact with other students during your studies?					
eng	agement in active learning	1	1	1	1	1
1	Are you interested and actively involved in educational					
3	technology learning?					
	Do you maintain a positive attitude despite setbacks or					
4	aimculties in your learning process?					
	Do you feel motivated and confident during the learning					
5	process?					
	Are you willing to share your thoughts and emotions and					
6	interact with other students during your studies?					

APPENDIX 3 SATISFACTION QUESTIONNAIRE

Dear Student

Hello! Thank you very much for taking the time out of your busy schedule to fill out this questionnaire, which is a purely academic questionnaire to understand the basic situation of music education students' satisfaction to solfeggio course. The 5-point Likert scale will range from 1= very dissatisfied, 2= dissatisfied, 3=neutral, 4= satisfied, and 5= very satisfied. This questionnaire is answered anonymously, and the answers you fill in will not be disclosed to any individuals and enterprises other than yourself, your answers are only for academic research analysis, please answer according to your actual situation. Thank you for your cooperation.

Section 1 Personal information of respondents

Your gender: \Box Male \Box Female

Your age: □ 18–20 □ 21–22

Section 2 Engagement for University Music Education Students

No.	Variables	LEVELS				
		very				very
		dissatisfie	dissatisfie	neutr	satisfie	satisfie
	Questions	d	d	al	d	d
		1	2	3	4	5
	Course Content (1-3)					

	What is your overall satisfaction			
1	with this course?			
	Did the content of this course			
2	help you?			
	What is the difficulty level of this			
3	course?			
Teaching				
Methods (4-7)				
	Is the teacher able to deliver the			
4	course content clearly?			
	Is the course material easy to			
5	access and understand?			
	Are the assignments and quizzes			
6	in this course challenging?			
	Do you think the teaching			
	methods and materials of this			
7	course are diverse?			
Communicatio				
n and				
Feedback (8-				
10)				
	Do you think the course schedule			
	and time allocation are			
8	reasonable?			
	Does the teacher respond to your			
	questions and feedback in a			
9	timely manner?			
	Is the course adequately			
10	resourced and supported?			