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Developing peer-assessment based station rotation learning model to enhance students' cucurbit flute skills and learning motivation: A need assessment research

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Abstract: This study aims to address pedagogical challenges in cucurbit flute (hulusi) education—such as limited instructional resources, teacher-centered approaches, and low student engagement-by proposing a peer-assessment-based station rotation model to enhance students' performance skills and learning motivation. Grounded in constructivism and self-determination theory, the research employed a mixed-methods design, combining structured interviews with five teachers and a 5-point Likert scale questionnaire administered to 150 students to assess needs. Findings revealed strong consensus among both teachers and students on the necessity of improving current teaching methods, with particular emphasis on fostering motivation and technical proficiency. The proposed model, validated through literature review and expert evaluation, integrates peer feedback within a rotational learning framework to promote active engagement and collaborative skill development. Results suggest that this approach can bridge gaps in traditional instruction by creating a more interactive and student-centered learning environment. The study contributes to music education by offering an innovative pedagogical model tailored to cucurbit flute instruction, with practical implications for educators seeking to enhance student motivation, peer collaboration, and cultural preservation in traditional music training. Future research could explore its applicability to other niche instruments and diverse educational settings.

Keywords: *Cucurbit flute skills, Learning motivation, Need assessment, Peer-assessment, Station rotation.*

1. Introduction

The cucurbit flute, also known as the hulusi, is a traditional Chinese wind instrument that has garnered attention in educational contexts, particularly in music education [1]. The cucurbit flute is made from a gourd whose music has undergone significant transformations over time, reflecting changes in playing techniques, expressive forms, and social inheritance [2]. The historical development of cucurbit flute music can be categorized into traditional and contemporary stages, with distinct characteristics and reasons for its evolution [3].

In recent years, there has been an increased acknowledgment of the need to bring traditional instruments such as the cucurbit flute into music education programs. It not only helps students have a better grasp of musical diversity, but it also promotes cultural awareness and empathy. However, pedagogical approaches for teaching such instruments frequently fall behind those for more mainstream instruments, leaving educators looking for novel ways to improve learning outcomes.

Many colleges, like many other educational institutions, have common challenges in music instruction, including the traditional teacher-centered approach, resource shortages, and time constraints. This may result in a less engaging learning environment in which students do not have sufficient one-on-one time or opportunities to polish their skills. Furthermore, because the cucurbit flute

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is a specialized instrument, it may not receive the same level of attention or organized training as other commonly used instruments. As a result, there may not be adequate standardized curriculum or assessment tools built expressly for cucurbit flute students' unique learning needs.

In a traditional classroom, a teacher may be unable to provide each student with the individualized attention required to understand the nuances of playing the cucurbit flute. Students may not have enough time in class to practice, limiting their capacity to master new abilities. Traditional teaching strategies may not fully engage students, reducing their motivation and enthusiasm for learning the cucurbit flute. It is probable that current assessment methods do not accurately reflect students' progress or provide useful feedback for future improvement. Given these limitations, there is an obvious need for a novel teaching paradigm that can cater to the specific learning needs of cucurbit flute pupils.

Peer assessment has various educational benefits for students, including domain-specific skill acquisition [4] academic performance improvement, and assessment skill development. Station rotation, according to the research Horn and Staker [5] is a blended learning strategy in which students move between many technology-based stations in the classroom. Using this principle, educators provide several stations for students to go between in their classes. Students go in shifts to the next station and begin working on their homework at the time designated by the teacher [6]. Therefore, integrating peer assessment activities within specific stations offers a practical method to harness these educational benefits while leveraging the structured movement and varied task focus inherent in the station rotation model.

The creation of a peer assessment-based station rotation learning paradigm designed exclusively for cucurbit flute training is an intriguing opportunity to address the unique challenges involved with teaching this instrument. By incorporating peer assessment into the learning process, students can not only get feedback from their peers but also actively evaluate their own development, improving their self-regulation and metacognitive abilities [7]. Limited research has been conducted on using updated technologies in cucurbit flute education, particularly to improve skills and motivation. This study aims to identify the needs of teachers and students and suggest a learning strategy to improve college students' cucurbit flute skills and motivation.

2. Research Questions

Therefore, the research focuses on the following questions:

1. What are the needs of college teachers and students for cucurbit flute instruction?
2. What are the elements of Peer-Assessment Based on Station Rotation Model for enhancing cucurbit flute skills and learning motivation?

3. Literature Review

3.1. Peer-assessment

Peer-assessment is broadly defined as a process where students evaluate their peers' work using predefined criteria, fostering active engagement and metacognitive skills [8]. It is further highlighted that its capacity to promote self-regulation through reflective evaluation, arguing that peer-assessment shifts learners from passive recipients to active participants in their educational journey [9]. It is found that through peer assessment method lifelong learning skills have been advanced, and therefor they could achieve higher-order outcomes [10].

They corroborated these findings, noting that peer-assessment cultivates higher-order thinking and collaborative problem-solving [4]. Additionally, they reported that over 90% of students viewed peer-assessment as valuable, linking it to increased accountability and engagement [11]. They designed the peer assessment diagram after the research on higher education [12] (see Figure 1).

However, challenges persist in implementation of peer assessment methods. Not a lot studies on the effects syntheses of peer assessment, however most of them focus on a single area, making them less generalizable to other situations [13]. Their meta-analysis revealed moderate correlations between peer and teacher evaluations, suggesting the need for clear rubrics and training to ensure reliability [14]. It

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is further argued that students, even novices, can assess peers accurately if provided with explicit guidelines, though biases may arise without structured frameworks [15].

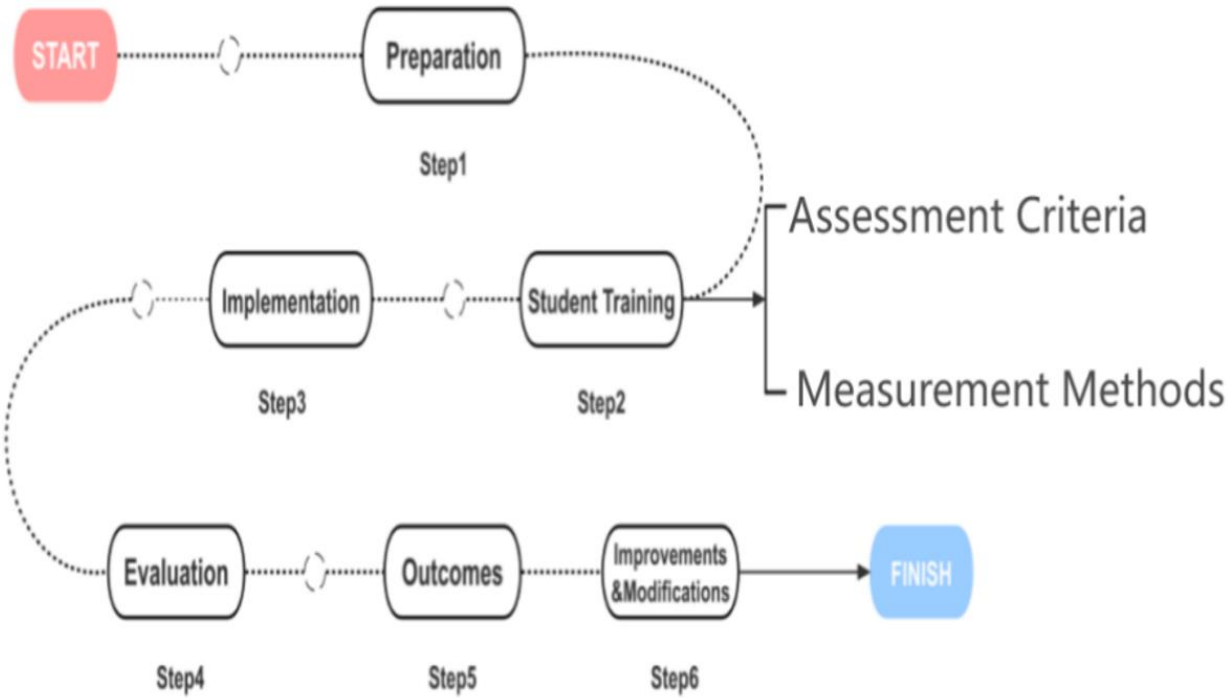

Figure 1.
Peer Assessment Flow-process Diagram.
Source: Boud and Falchikov [12].

3.2. Station Rotation

Station rotation model positions it as a cornerstone of blended learning, characterized by its structured yet flexible approach to instruction. Some scholars underscored its role in fostering engagement through varied instructional formats, arguing that alternating between autonomous, collaborative, and guided learning sustains student interest and deepens comprehension [16].

Bernatek and his team identified a common tripartite structure: online learning for individualized practice, collaborative stations for peer-driven problem-solving, and teacher-led sessions for targeted skill development [17]. It is reported that there is a 21% rise in academic achievement when station rotation is paired with flipped classroom techniques, emphasizing its capacity to promote active learning and critical thinking [17]. The station rotation model designed and described (see Figure 2) from The Christensen Institute involved students switching between learning forms within a course or subject [18]. The rotation can follow a set schedule or at the teacher's discretion. One station focuses on online learning, while others offer activities like small-group discussions. This strategy combines face-to-face instruction, online learning, and collaborative learning opportunities provided by the teacher.

However, it is urged that success hinged on meticulous planning to harmonize technology use with meaningful face-to-face interactions, avoiding over-reliance on digital tools [19]. Researchers should examine how the micro-learning media with station rotation blended learning model affects learning outcomes in different cultures as well as the long-term impact of this strategy on students' language skills [20].

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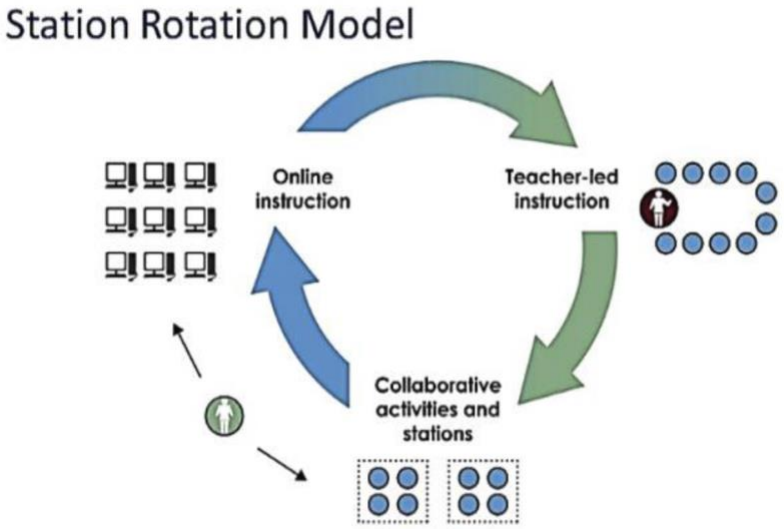

Figure 2.
Station Rotation Model.

3.3. Cucurbit Flute Skills

Cucurbit flute skills underscores the instrument's technical complexity and cultural significance, positioning it as both a musical and heritage artifact.The cucurbit flute (or hulusi) is characterized by its unique construction—a gourd wind chest with bamboo pipes and metal reeds—and its polyphonic sound production, blending melody with drone harmonies [21].

Despite its cultural richness, pedagogical resources for the cucurbit flute remain sparse in formal education. Traditional instruction often relies on apprenticeship models, which, while effective for cultural transmission, lack standardized curricula or assessment frameworks [3]. They also emphasized the role of technology in democratizing access to cucurbit flute education, with multimedia platforms offering visual and auditory modeling to supplement traditional methods [22].

Cucurbit flute skills demand not only mechanical proficiency but also an understanding of cultural idioms, as its repertoire often reflects traditional narratives, rituals, and emotional expressions intrinsic to these communities [2]. Technical skills include breath control for sustained tones, precise finger placement to manipulate pitch, and articulation techniques such as vibrato and trills, which require synchronized coordination of lips, hands, and aural sensitivity [22]. Advanced playing involves dynamics modulation to convey emotional depth and stylistic nuances tied to regional traditions, emphasizing the interplay between technical execution and artistic interpretation [3]. In this study, the cucurbit flute skills include five aspects which are notes, rhythm and timing, articulation, dynamics, style and mood (see Table 1).

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Table 1.
Cucurbit Flute Skills.

Cucurbit Flute Skills	Explanation
Notes	Notes are the individual pitches or tones generated by a cucurbit flute as a result of regulated air vibration inside the instrument.
Rhythm and Timing	Rhythm and Timing skill refers to the ability to keep a steady beat and precise timing while performing. In music, rhythm is the systematic segmentation of notes into recurring beats that occur within a measure at a commonly understood tempo or time sign. Timing is the ability to keep exact beats and synchronize with the ensemble team.
Articulation	Articulation refers to the clarity, precision, and expressiveness with which notes and phrases are performed. Articulation is the capacity to make a clear, unique sound with each note played on the cucurbit flute.
Dynamics	Dynamics refers to the variation in loudness and intensity of the instrument's sound. This ability is critical for conveying the emotional content of music, creating musical phrases, and bringing contrast and intrigue to a performance.
Style and Mood	Style and Mood skill refers to the player's ability to elicit and transmit distinct stylistic and emotional elements through their performance.

3.4. Learning motivation

Motivation is a personality trait that can drive individuals to engage in specific behaviors to accomplish a goal or purpose [23]. Learning motivation emphasizes its pivotal role in shaping students' engagement, persistence, and academic success, particularly in specialized domains like cucurbit flute education. Rooted in self-determination theory [24], motivation is framed as a dynamic interplay between intrinsic and extrinsic factors.

Teaching efforts should result in the creation of intrinsic motivations that encourage future striving and achievement in a learning activity. The learning environment, teaching tactics, and feedback provided to students can all help to promote intrinsic motivation [25]. In cucurbit flute instruction, this translates to confidence in mastering techniques like breath control or vibrato, which are physically and cognitively demanding [22]. Traditional music education often neglects students' psychological needs for autonomy and relatedness, key tenets of self-determination theory [26]. Collaborative learning models with intrinsic motivation, however, mitigate these issues by fostering peer interaction, shared accountability, and collective problem-solving [27].

The MUSIC Model of Motivation further proposed that educational environments must foster empowerment (autonomy in learning), usefulness (perceived relevance of content), success (confidence in achieving goals), interest (engagement with material), and caring (supportive teacher-student relationships) to optimize motivation [28]. In this study, we will consider learning motivation in cucurbit flute learning as self-efficacy, goal orientation, perceived control, interest, value, attribution, affect, and learning strategies, in addition to intrinsic and extrinsic drive.

4. Research Methods

4.1. Participants

The study involved participants from the music education and music performance departments at Nantong Normal College in Jiangsu Province. Totally 150 students enrolled in the cucurbit flute course were selected to explore student needs on current learning method and new teaching strategy. Additionally, five teachers were interviewed to gather insights on cucurbit flute teaching method and new teaching strategy expectations.

4.2. Instruments

Need assessment questionnaire with the five-point Likert scale was administered to students to evaluate their needs across four dimensions: learning methods, content, environment, and motivation, which totally contain 20 items. Cronbach's alpha test was utilized by confirming its reliability and its alpha value is 0.96 which is greater than 0.70 indicating it has good reliability [29]. Concurrently,

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structured interviews were conducted with teachers to assess their perspectives on teaching methods, content, conditions, and student motivation.

4.3. Data Collection and Analysis

To ensure scientific data collection, three methods were employed. First, experts possessing relevant field knowledge and teaching experience anonymously completed an IOC form, guaranteeing objective and independent evaluation. Second, information about student needs was gathered via Wenjuanxing electronic questionnaires utilizing a five-point Likert scale; results were analyzed using means and standard deviations. Meanwhile, the need level was also given from Table 2 to show which level student need results are in. Finally, expert interviews were conducted, with thematic analysis applied to their opinions and suggestions to inform model improvement.

Table 2.
The Average Score of Need Level.

Level	Mean ranges
Lowest	1.00-1.80
Low	1.81-2.60
Moderate	2.61-3.40
High	3.41-4.20
Highest	4.21-5.00

5. Results

In this section, the need assessment analysis on student cucurbit flute learning was conducted by using Statistical Package for the Social Sciences (SPSS 26.0) to achieve the results about the average score of student learning need questions. Furthermore, the results were given based on the Table 3. In addition, results of teacher needs interviews were shown as followed in Table 4 by using thematic analysis.

5.1. Student Needs Assessment Results

Table 3.
Student Needs Assessment on Cucurbit Flute Learning.

Question Items	Mean	Std. Deviation	Results
Student Learning methods needs			
1. You hope the teacher can change the traditional face-to-face teaching method.	3.65	0.93	High
2. You hope the existing learning methods of "teacher lectures, student experiments, and after-school exercises" could be proved by using new methods.	4.05	0.78	High
3. You will actively think, answer teachers' questions, and interact with them.	4.01	0.86	High
4. You are very willing to try group collaboration learning.	4.05	0.82	High
5. You are very willing to try peer assessment-based station rotation model.	4.04	0.80	High
Total			High
Student Learning content needs			
6. You really do not enjoy the traditional single knowledge point by point learning and finally conducting knowledge organization.	3.98	0.86	High
7. You are very willing to try to participate in station rotation learning and complete the course knowledge organization through the group assignment.	4.07	0.78	High
8. You really need teachers to reserve sufficient time for discussion and learning in class to complete knowledge internalization.	4.04	0.75	High
9. You can accept the teaching content for Expansion training based on basic skills.	3.99	0.82	High

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10. You greatly need teachers to design teaching content that is related to practical applications or daily life.	3.99	0.81	High
Total			High
Student learning environment needs			
11. For the problems encountered during the learning process of cucurbit flute courses, you will use the learning method discussed in the group to promote course learning and achieve course objectives.	3.97	0.85	High
12. In the process of learning cucurbit flute courses, a good class learning environment can effectively promote learning activities.	3.99	0.79	High
13. In the process of learning cucurbit flute courses, you hope to have more opportunities to participate in classroom discussions and interactions and share your ideas and experiences.	4.05	0.75	High
14. You hope that teachers can actively encourage students to participate in learning and classroom activities, to improve the learning atmosphere and interaction.	4.04	0.76	High
15. You hope that the feedback you provide will be taken seriously, to fully experience the joy and sense of achievement of learning.	3.93	0.86	High
Total			High
Student learning motivation needs			
16. During the learning process of cucurbit flute courses, you really hope to cultivate or improve your learning motivation.	3.98	0.86	High
17. In the process of learning cucurbit flute courses, you hope you can build your confidence in the coursework.	4.00	0.80	High
18. In the process of learning cucurbit flute courses, you hope you have the freedom to complete the coursework successfully on your way.	4.08	0.78	High
19. In the process of learning cucurbit flute courses, you hope what I learn is relevant and helpful for my future.	3.95	0.78	High
20. In the process of learning cucurbit flute courses, you hope the teacher could provide instructional help and care for my performance.	4.02	0.83	High
Total			High

Strong agreement across four domains: learning methods, content, environment, and motivation. For learning methods (items 1–5, mean 3.65–4.05), students expressed a clear preference for innovative approaches over traditional face-to-face instruction, with high support for group collaboration (4.05), peer assessment (4.04), and interactive teaching (4.01). Learning content needs (items 6–10, mean 3.98–4.07) highlighted a desire for practical, application-based lessons (3.99–4.07), rejecting fragmented knowledge delivery (3.98) and favoring station rotation models for collaborative knowledge organization. Environmental needs (items 11–15, mean 3.93–4.05) emphasized the importance of interactive classrooms, with students valuing discussion opportunities (4.05), teacher encouragement (4.04), and a supportive atmosphere, though feedback recognition scored slightly lower (3.93). Motivational needs (items 16–20, mean 3.95–4.08) underscored students' desire for autonomy (4.08), confidence-building (4.00), and relevance to future goals (3.95), alongside teacher guidance (4.02). Overall, results reflect a demand for student-centered, collaborative, and practical pedagogy, with the highest priorities being autonomy in learning (4.08) and innovative methods like station rotation (4.07). The consistently high agreement (all means≥3.65) suggests a unified call for modernized, interactive, and motivation-driven approaches in cucurbit flute education.

5.2. Interview Results for Teacher Needs

The interview results revealed impracticality of traditional cucurbit flute pedagogy, emphasizing teacher-centered instruction, repetitive drills, and passive learning, which led to inconsistent skill mastery, low engagement, and stifled creativity. Structural limitations, such as insufficient instruments and overcrowded classrooms, further hindered effective learning. Teachers highlighted the necessity of adopting innovative models to address engagement gaps and skill diversity, advocating for peer-driven

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collaboration and station rotation strategies. Proposed methods included peer assessment with rubric-guided feedback loops and skill-specific stations (e.g., breath control, rhythm), alongside role-switching activities. To enhance motivation, interactive designs and peer assessment systems were suggested, paired with personalized elements such as student-choice stations and individualized goal-setting frameworks. Overall, the findings underscored a shift toward student-centered, collaborative, and adaptive approaches to improve learning outcomes.

Table 4.
Interview Results of Teacher Needs Towards Teaching Methods.

Question Items	Themes	Main Ideas
1.What teaching methods have been used in the teaching of cucurbit flute courses and how about the effect?	-Traditional Pedagogy	**-Traditional methods**: Teacher-centered instruction dominating lesson structure, repetitive drills without contextual application and passive learning through lecture-demonstration formats.
	-Minimal peer interaction or collaborative activities	**-Minimal peer interaction or collaborative activities:** students learned by themselves and lack of communications with each other.
	-Teacher-centered approaches	**-teacher-centered approaches**: inconsistent skill mastery due to lack of differentiation, low student engagement from monotony and limited creativity in musical interpretation.
2.Under traditional education mode, can the teaching conditions and resources of course meet needs? What are the shortcomings?	-Resource limitations	**-Resource limitations**: Insufficient access to instruments for hands-on practice and overcrowded classrooms reduce individualized attention
	-Structural issues	**-Structural issues**: Rigid curriculum leaving no room for student-paced learning and delayed or generic feedback from instructors.
3.Do you think it is necessary to apply a new model to solve the above problems you mentioned?	-Need for innovation	**-Need for innovation**: Addressing engagement gaps through interactive methods and personalized learning to accommodate skill diversity
	-Benefits of change	**-Benefits of change**: Peer-driven collaboration enhancing accountability and skill diversification through multi-station practice.
4.In the model that combines peer assessment and station rotation, what innovative methods do you think can better cultivate students' skill?	-Peer assessment integration	**-Peer assessment integration**: Constructive feedback loops fostering peer-to-peer learning and collaborative skill refinement through rubric-guided evaluations
	-Station rotation strategies	**-Station rotation strategies**: Skill-specific stations targeting breath control, rhythm, and ornamentation and role-switching activities (e.g., performer, critic, recorder)
5.What aspects of the cucurbit flute course can be designed to enhance student learning motivation under the new model?	-Interactive design	**-Interactive design**: Thematic station challenges (e.g., folk song vs. modern adaptation) Peer recognition systems for "skill star of the week"
	-Personalization	**-Personalization**: Student-choice stations for creative improvisation Goal-setting frameworks aligned with individual interests

5.3. Proposed Innovative Learning Model for Cucurbit Flute Students

The author has meticulously developed a novel peer assessment-based station rotation model (as shown in Figure 3) through dialogue and feedback with the experts in the field. The model is firmly rooted in theory, incorporates the essence of prior research findings, and is closely aligned with the real-world requirements of cucurbit flute education. This model effectively integrates the motivational benefits of peer evaluation with the adaptability of site rotation learning. It aims to encourage skill development and self-reflection by mutual evaluation among students, while also

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using a variety of learning environments to promote their interest in active exploration and teamwork. In this model, students can systematically learn cucurbit flute performance techniques under the guidance of teachers and continuously improve via peer encouragement and challenges, ultimately accomplishing a dual leap in personal music literacy and teamwork skills in an environment of cooperation and competition.

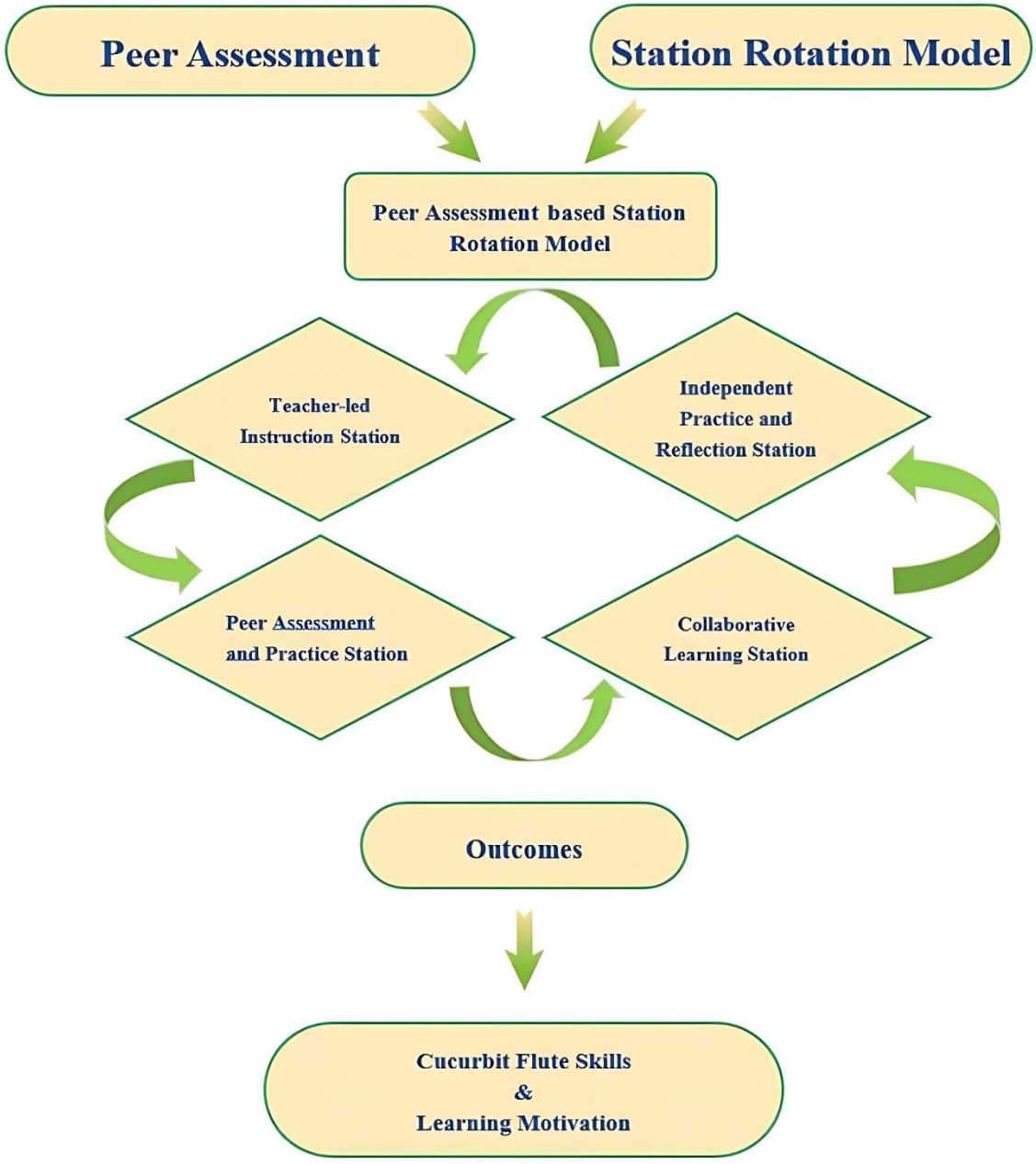

Figure 3.
Peer Assessment based Station Rotation Model.

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6. Discussion

This study sought to address pedagogical challenges in cucurbit flute education by proposing a peer-assessment-based station rotation model grounded in the needs of teachers and students. The needs assessment revealed that traditional teacher-centered methods and resource limitations hinder skill development and motivation, necessitating innovative, student-centered approaches. The proposed model integrates peer assessment and station rotation to foster collaborative learning, autonomy, and feedback-driven skill refinement, aligning with the identified priorities of enhancing motivation.

From the student perspective, the findings align strongly with prior research studies on peer assessment and blended learning. Students' high demand for collaborative, interactive methods (e.g., mean scores of 4.05–4.08 for group work and station rotation) echoes the assertion that peer assessment cultivates higher-order thinking through active participation [30]. Similarly, the preference for autonomy and practical content (mean=4.08 for freedom in coursework) resonates with self-determination theory [24] which emphasizes intrinsic motivation through choice and relevance. However, the emphasis on structured peer feedback diverges from the meta-analysis, which cautioned against reliability issues in peer evaluation [14]. This incongruence suggests that cucurbit flute education may require rubric-guided training to mitigate biases, a nuance supported by teachers' recommendations for explicit assessment frameworks.

For teachers, the results corroborate existing critiques of traditional music pedagogy while introducing context-specific insights. Educators' critiques of teacher-centered instruction and resource shortages mirror their observations on the lack of standardized curricula for traditional instruments [32]. Their advocacy for station rotation to address overcrowded classrooms aligns with Horn and Staker [5] blended learning principles but extends them by emphasizing peer assessment as a tool for personalized feedback—a response to structural limitations like delayed instructor feedback [5]. Notably, teachers' focus on rubric-guided peer assessment addresses a gap identified by Kearney, who argued that novices require structured frameworks to ensure assessment accuracy [15]. Thus, the proposed model bridges theoretical recommendations with practical constraints, offering a tailored approach to cucurbit flute education.

7. Conclusion and Recommendation

This study underscores the transformative potential of integrating peer assessment with station rotation to revitalize cucurbit flute education. By addressing the limitations of traditional teacher-centered approaches—low engagement, resource constraints, and insufficient feedback—the proposed model aligns with the urgent needs identified by both students and teachers. Students' strong preference for collaborative, autonomy-driven learning (e.g., peer assessment, interactive stations) and teachers' advocacy for structured innovation reflect a shared vision for pedagogy that balances skill mastery with motivational support. This study contributes a pragmatic, theory-informed strategy to bridge the gap between heritage preservation and modern pedagogical demands, ensuring that cucurbit flute education remains dynamic, inclusive, and culturally resonant in evolving academic landscapes.

Based on the research findings, future studies should validate the efficacy of the proposed peer-assessment-based station rotation model through longitudinal implementation, explore its adaptability for teaching other traditional instruments facing similar pedagogical challenges, and examine its scalability across diverse educational contexts and resource settings to maximize its transformative potential.

Transparency:

The authors confirm that the manuscript is an honest, accurate, and transparent account of the study; that no vital features of the study have been omitted; and that any discrepancies from the study as planned have been explained. This study followed all ethical practices during writing.

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