Designing instructions for active and reflective students in cello class

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Abstract: This study emphasizes the importance of developing a more effective learning model for teaching the cello at Surabaya State University, particularly to address the limitations of traditional methods that often render students passive. The primary aim of this research is to design and evaluate a learning model that combines Active Learning and Reflective Learning strategies to enhance student engagement and deepen their understanding and practical skills. The methodology employed in this study is qualitative, utilizing a case study approach that focuses on gaining an in-depth understanding of students' experiences with the implemented learning model. Data collection methods included observations, interviews, and students' reflective journals over the course of one semester. The findings indicate that the application of this model effectively improves students' comprehension, technical abilities, and reflective skills. Each learning cycle demonstrated significant progress in areas such as connection, association, communication, and reflection, which underscores the model's success in enhancing students' competencies in mastering the cello. This research is expected to contribute to the development of more adaptive and interactive music teaching methods and to open new avenues for further research in the field of music education.

Keywords: *Active learning, Learning innovation in higher education, Music education, Reflective learning, Student engagement.*

1. Introduction

A learning model is designed based on a selected learning approach and accommodates one or more learning methods/strategies, and even includes classroom management techniques [1]. In the context of arts education, particularly in practical music courses such as Cello, the implementation of adequate and high-quality learning models is often less than optimal. This is due to the inappropriate selection of approaches, methods, and media used during the teaching and learning process, which in turn impacts students' creativity and engagement [2]. The role of instructors as educational facilitators is crucial. Instructors not only deliver content but also assist students in internalizing and reflecting on the learning experiences they gain [1]. According to Article 20 of Law Number 14 of 2005 on Teachers and Lecturers, teachers in Indonesia are obligated to plan and implement quality learning [3].

The phenomenon of students' lack of enthusiasm in teaching and learning activities is directly related to their inability to manage reflective and active aspects of learning [4]. This is evident from the students' grades throughout the course, which tend to be unsatisfactory, as indicated by their low level of understanding of the Cello material [5, 6]. In order to improve the quality of learning, the researcher aims to develop a more engaging and interactive learning model that can facilitate active student involvement and promote reflective thinking in the learning process [7]. With an adaptive and innovative learning model, it is hoped that students can interact with one another and reflect on their learning outcomes continuously, even outside of class meetings [4].

Therefore, it is necessary to formulate a learning model that can accommodate two main ideas: (1) the delivery of subject matter that is more interesting and relevant to the scientific context being taught, and (2) the creation of a learning environment that encourages the development of values and critical skills in students Healy, et al. [8]. This study seeks to contribute to the search for innovative solutions to challenges in music education, particularly in cello teaching at the university level [9-11].

In the learning outcomes for the Cello Instrument course, students are required to have basic skills in playing this musical instrument, including breathing techniques, intonation, articulation, phrasing, and expression through mastery of musical compositions and etudes. However, experience in the field shows that the learning process often still relies on conventional methods, such as teaching through verbal instruction and textbooks, which affects student engagement and attitude [12]. This is a challenge for music teachers, as noted in a study by Feng [13] which found that students tend to be more engaged in practical activities such as chamber music than in traditional approaches [11, 13].

There is an urgent need to design more interactive and enjoyable learning models that can optimize students' potential. Pollio, et al. [14] states that students only focus on learning about 40% of the total time available [15]. Making the classroom atmosphere more dynamic and interesting can increase the effectiveness of learning. In this context, Active Learning emerges as a promising approach. It is said that Active Learning focuses on the use of active and participatory methods to optimize students' attention and involvement in the learning process [16]. This is in line with research showing that the implementation of practical activities in learning can attract students' attention and improve learning efficiency [17].

Active Learning, integrated with Reflective Learning, also provides opportunities for students to internalize the information they have acquired and reflect on their learning experiences. In this case, music education must take into account the different learning styles of each student, whether they prefer reading, discussing, or hands-on practice [18]. Additionally, this approach enables students to actively participate in the evaluation and critique of their own learning, creating a more responsive and productive learning environment [19].

Proposals to overhaul existing learning models are in line with the growing attention to technology-based learning. In the digital age, music education can leverage online platforms and digital tools to create richer and more diverse learning experiences [20]. Thus, well-designed instruction for active and reflective students can enhance their practical skills while strengthening their theoretical understanding. As a result, enjoyable and meaningful teaching can be achieved, leading to more holistic development for students in learning musical instruments such as the cello [21, 22].

In the *Reflective Learning* process, students are given the opportunity to analyze their experiences so that they can reflect on what they have learned, both the strengths and weaknesses. This reflective learning model was adopted from the idea of reflective thinking proposed by Dewey [23]. Dewey defines reflective thinking as the active, persistent, and careful consideration of beliefs or forms of knowledge and the consequences that arise from such consideration [24]. He adds that mentoring activities, peer involvement, and critical reflection on experiences are examples of current reflective thinking practices. Reflective Learning also encourages students to think creatively, question attitudes, and promote learner independence. Reflection in the learning process is important for lecturers, especially for students. Learning should be constructed from students' learning experiences, which, at its core, is a process of meaning-making that has visibility or desire. One principle to ensure that learning connects students' learning experiences is that learners must reflect on their learning experiences to articulate both their weaknesses and strengths, enabling students to seek solutions if concepts or skills are not yet understood.

With reflection in every learning activity, the implication in learning the *cello* instrument is that lecturers will have a better understanding of the extent of students' interest in participating in the learning process, as well as their desires and needs in detail. More importantly, students will have a space for positive expression towards lecturers and the learning process they experience. *Reflective*

learning also involves two higher-order thinking skills, namely critical and creative thinking. This opinion underlies and motivates the researcher to develop a learning model that makes students *active* and *reflective* after gaining learning experiences. In this case, the researcher has a positive view that learning to play the cello will enable students to actively learn during the learning process and enable them to reflect on their learning outcomes, so that students are able to develop their creativity, ultimately making learning enjoyable. This model is named by the researcher as the "Active and Reflective Learning Model."

2. Methods

This study uses a qualitative design with a case study approach, which aims to explore the effectiveness of Active Learning and Reflective Learning-based instruction in cello classes for students of the Music Study Program at Surabaya State University. This approach was chosen to gain an in-depth understanding of the students' experiences and to explore how they interact with the learning methods applied [25]. With this design, it is expected that patterns, themes, and meanings emerging from the learning process can be identified, reflecting the dynamics of cello instrument instruction.

The approach applied in this study is phenomenological. Phenomenology focuses on the subjective experiences of individuals and how they give meaning to those experiences. In the context of this study, this approach aims to explore how students experience learning the cello through Active Learning and Reflective Learning methods, as well as to understand the meaning they derive from the process [26]. In this study, emphasis on the students' voices is important, as they are the focus of this study [27].

The research procedure consists of several steps: (1) Identification of participants, in which 10 students from the cello class will be involved as research subjects. (2) Development of a teaching curriculum that integrates Active Learning and Reflective Learning. (3) Implementation of teaching for one semester, which includes lesson sessions and reflection assignments. (4) Data collection through observation, interviews, and reflective journals written by students every week [28]. These steps will ensure that relevant data is collected to produce a comprehensive understanding.

Data collection was conducted using triangulation techniques, which included a combination of observation, interviews, and document analysis (student reflective journals). Observations will be conducted during class to record student-teacher interactions and the effectiveness of the methods used. Interviews will be conducted after the learning process is complete to explore students' perspectives on their learning experiences [29]. Student reflective journals will be used to capture their thoughts and feelings about the learning process they have undergone [30].

Data validity is checked through source and technique triangulation. Source triangulation involves comparing data obtained from observation, interviews, and reflective journals to ensure consistency [28]. In addition, critical analysis of the data is also carried out, where the research team will discuss to verify the findings and conclusions drawn from the data collection [31]. To enhance internal validity, feedback from participants will also be sought after the initial analysis, ensuring that the research interpretation aligns with their experiences.

The collected data will be analyzed using thematic analysis, in which the researcher will identify common themes that emerge from the data. The thematic analysis process includes several stages, namely: interview transcription, data coding, grouping codes into themes, and interpreting themes in the context of the study [32]. Qualitative software analysis tools, such as NVivo, can be used to support the data analysis process and help visualize the relationships between themes [33]. This process is expected to produce a deep understanding of the impact of Active and Reflective Learning on cello skill mastery.

The participants in this study were 10 students from the Music Study Program at Surabaya State University who were enrolled in the cello course. Participants were selected using purposive sampling, where students were chosen based on their diverse backgrounds in terms of musical learning experience and enrollment in the Cello course during the same semester [34]. An introductory meeting was held at

the Art House to explain the research objectives and obtain consent from each participating student, ensuring that participants' rights were upheld throughout the research process.

Ethical considerations were a key focus in this study. All participants were given a full explanation of the purpose of the study, the procedures, and the use of the data collected. Written consent was obtained from all students before the experiment began [35]. In addition, the identity of participants will be kept confidential, and all data will be stored securely and used only for research purposes. The researcher is committed to adhering to all applicable research ethics guidelines and ensuring that participants' rights are protected throughout the data collection and analysis process [36].

The results and findings of this study are expected to contribute not only to cello teaching at Surabaya State University but also to the development of music pedagogy more generally. By analyzing the effects of Active Learning and Reflective Learning, this study has the potential to offer insights into best practices that can be adopted by music teachers in other educational contexts [37]. In addition, the research can also be used as a reference for developing a curriculum that is more responsive to the characteristics and needs of students in music studies [38].

By integrating Active Learning and Reflective Learning methods in cello teaching, this study aims to increase student engagement in learning and optimize the overall music learning process. Through a qualitative approach, it is hoped that in-depth and meaningful information about students' learning needs in music can be obtained [39]. With this, it is hoped that this research can serve as a foundation for further research in the field of music education and provide an empirical basis for the development of more innovative and effective learning models in the future [40].

Table 1.
Response from the informant.

No.	Question	Answer	
		Lecturer 1	Lecturer 2
1	What learning model do you apply to cello instrument courses?	In applying the learning model to the cello instrument course, I use a learning model that refers to behavioristic learning theory, because practical learning requires repetition and habit so that students are able to play their musical instruments well	My learning model adjusts in terms of students' abilities and psychology, but often uses a learning model that provides repetitive learning so that students are able to imitate and be able to play their musical instruments.
2	Is the learning model you apply in accordance with the curriculum and learning outcomes made by the S1 Music Study Program?	It is appropriate, because with the curriculum and learning outcomes, I analyze it according to the needs of the lecture, so as to produce a learning model that is in accordance with the description of the Cello instrument course.	It is appropriate, I analyze the needs of learning outcomes desired by the curriculum of the Cello instrument course.
3	What are the difficulties in applying your learning model to a cello instrument course?	The difficulty is that students become passive in the teaching and learning process, and lack mastery in terms of theory. Students are always waiting for their lecturers, they do not have the motivation to study independently.	The unevenness of the assessment results received by students. Students who master the material and understand my explanation will get a high score or score, on the contrary if students do not understand my explanation will get a low score or score.
4	Have you ever applied an *active* or *reflective learning model*?	So far it has never been, but for reflection I do it in terms of the method only to reflect the learning results.	Never, because I think it is not suitable for practical learning.
5	What do you think about *the Active* learning model and the Reflective learning model *applied in the Cello instrument course*?	In my opinion, the reflective learning model can only be used , because *the Active* learning model refers to students who must be active, while this course requires a behavioristic learning model	It can be applied, depending on managing and analyzing starting from the curriculum and learning outcomes, so that students are able in terms of theory or knowledge and practice.

3. Results and Discussion

3.1. Initial Stage

In this stage, an analysis of the field requirements of the prospective users, namely cello instrument instructors in the Bachelor of Music program at Surabaya State University, was conducted. The data was obtained through investigation and information gathering via interviews about the model, methods, steps, student worksheets, assessment of learning outcomes, as well as the books used by students and instructors in the cello instrument course. The following are the responses from the interviews with the informants:

Based on the interview excerpts above and supported by documents such as the curriculum, syllabus, RPS complete with learning steps, and assessment documents from the cello instrument course lecturer, the identification based on the data can be interpreted as follows: (1) The cello instrument course lecturer uses a learning model based on behaviorist learning theory, which is a teacher-centered learning model where students are merely recipients of material. (2) The lecturer feels that the behaviorist learning model is appropriate for the curriculum and learning outcomes. (3) When applying the behaviorist learning model in the cello instrument course, instructors feel that students become passive, lack theoretical knowledge, and receive inconsistent assessments. Students who master the material and understand the instructor's explanations receive high grades, while those who do not understand the explanations receive low grades. (4) Lecturers have never applied a learning model that encourages students to actively learn. (5) Lecturers have used reflective methods in evaluating learning. (6) Lecturers are optimistic that active and reflective learning will enable students to be competent in taking cello instrument courses, provided that lecturers are able to analyze the curriculum and learning outcomes.

3.2. Stages of Developing the Active and Reflective Learning Syntax

The Active and Reflective learning model syntax is designed to facilitate lecturers in implementing this methodology in the cello learning process. This model encompasses two main aspects: knowledge and skills. In this learning process, learning steps are systematically structured to ensure active student engagement, which is the core of effective pedagogy in the context of music education [41, 42]. By applying steps such as connection, association, communication, and reflection, students are expected to develop a deeper understanding and the technical skills required to play the cello effectively[43] as explained below:

3.2.1. Syntax of Knowledge Aspects

There are four learning steps in the knowledge aspect, namely: (1) Connection, carried out in the initial learning activities. The process of connecting prior knowledge with the knowledge to be imparted uses the *Brainstorming* method and lectures. As a result of this connection, students are able to perceive the material; (2) Association, carried out in the core learning activities. This process provides students with worksheets that use High Order Thinking Skills (HOTS), with high-level questions accompanied by learning resources so that students are able to think critically and solve problems through discussion and collaboration, resulting in associations that can be communicated. (3) Communication, conducted in the core learning activity. This method is used to communicate the results of the discussion. The methods used are lectures and *take and give*. In implementing this method, the lecturer obtains responses from students; (4) Reflection, conducted in the closing activity. This method is used to clarify the group and reflect on the achievement of learning. The methods used are discussion and question-and-answer sessions, enabling the instructor to obtain final outcomes. At each step, the methods used must be able to stimulate critical and collaborative thinking among students. For example, the use of Higher Order Thinking Skills (HOTS) in the association phase not only encourages students to respond actively but also provides space for them to discuss, share, and build knowledge together [44, 45]. Varied methods, such as brainstorming and lectures, are utilized to connect existing knowledge with new knowledge, thereby enhancing student engagement in learning [46]. Additionally, during reflection, discussion and

question-and-answer methods are effective ways to explore students' understanding of what they have learned [47].

Through the *Active and Reflective* learning model steps above, the process of forming students' social attitudes is built during the learning process. This can be identified, such as the experience of discussing with groups in learning the characteristics of the string instrument *Cello*. Students look for their own learning resources through textbooks provided by lecturers, accredited journals, virtual libraries, and figures who are experienced in the field of string instruments *Cello*. This learning model positions students as active participants in the learning process, where they are expected not only to receive information but also to explore and create new knowledge together [48, 49]. In this way, instructors do not merely function as information providers but also as facilitators who support deeper and more meaningful learning experiences for students.

With the development of students' social competencies as mentioned above, through the application of the Active and Reflective learning model, a change in mindset occurs in teaching students, namely: (1) The teacher's role in planning learning activities. (2) The selection of knowledge materials appropriate for students. (3) Students are free to search for their own literature. (4) Before learning, lecturers need to prepare media to support the learning process. (5) Lecturers can use various methods. (6) Lecturers provide individual guidance to each student in completing assignments. This is supported by facilities and infrastructure to support the optimal implementation of the learning process. The following are the support systems needed in the Active and Reflective learning model: (1) The media used in the Active and Reflective learning model are audio and visual, such as a sound system and DVD player. (2) The learning resources selected by the lecturer can be adapted to the teaching methods used by the lecturer.

Next are the instructional and accompanying impacts of using the Active and Reflective learning model. Instructional impacts are learning outcomes that are achieved or directly related to the learning material, while accompanying impacts are learning outcomes that are achieved as a result of using the Active and Reflective learning model. The following are the instructional and accompanying impacts of the Active and Reflective learning model: (1) Summarizing the objectives achieved in the Active and Reflective learning model. (2) Students are able to optimize their memory skills in carrying out learning activities. (3) Students are able to reflect on their learning outcomes in carrying out learning activities. (4) The accompanying objective of instilling attitudes is achieved through learning. (5) The accompanying impact is that students have attitudes in learning.

3.2.2. Syntax of Skill Aspects

In the knowledge aspect, there are four learning steps, namely: (1) connection, carried out in the initial learning activities. The process of connecting prior knowledge with the knowledge to be imparted uses brainstorming and lectures. As a result of this connection, students are able to perceive the material; (2) association, carried out in the core learning activities. This process allows students to exchange opinions through playing the string instrument *cello*; (3) communication, carried out in the core learning activities. This method is used to communicate the results obtained from exchanging ideas. The method used is the "take and give" method. In implementing this method, the lecturer obtains responses from students; (4) reflection, carried out in the closing activity. This method is used to clarify the group and reflect on the achievement of learning. The methods used are discussion and question and answer, so that the lecturer obtains the final results. In terms of skills, the synergy between theory and practice in the classroom is very important. Initial activities, such as knowledge connection, increase student engagement with the learning material [50, 51]. Practical activities such as playing the cello, in the context of Active and Reflective learning, should encourage students to critically reflect on their experiences, which in turn encourages them to learn from their own practice [52].

Through the learning steps designed using the *Active and Reflective* learning model above, a social system will be built during the learning process, resulting in: (1) Experience discussing with groups in learning the characteristics of the string instrument *Cello*. (2) Students search for their own learning resources through textbooks provided by lecturers, accredited journals, virtual libraries, and figures

experienced in the field of string instruments *Cello*. Through group interaction and the experience of exchanging opinions, students can hone their collaborative and communicative skills [53]. Effective communication in this activity is an important foundation for building confidence in expressing ideas and learning outcomes, which is also expected to have an impact on students' social attitudes [54]. With the support of appropriate learning media and relevant learning resources, lecturers can enrich students' learning experiences and support continuous learning [55-57].

With the existence of the social system described above in implementing the *Active and Reflective* learning model, the following patterns between lecturers and students occur: (1) The teacher's role in planning learning activities. (2) Selecting appropriate learning materials for students. (3) Students are encouraged to independently seek out relevant literature. (4) Before the lesson begins, the teacher must prepare the necessary materials to support the learning process. (5) The teacher may use a variety of teaching methods. (6) The teacher provides individual guidance to each student in completing their assignments.

This is supported by a system that provides all the necessary facilities and infrastructure to ensure that the learning process runs optimally. The following support systems apply to the Active and Reflective learning model: (1) The media used in the Active and Reflective learning model are audio and visual, in the form of a sound system and DVD player. (2) The learning resources selected by the lecturer can be adapted to the learning method used by the lecturer.

Next are the instructional and accompanying impacts of using the Active and Reflective learning model. The instructional impact is the learning outcome achieved or directly related to the learning material, while the accompanying impact is the learning outcome achieved as a result of using the Active and Reflective learning model. The following are the objectives of the instructional and accompanying impacts on the Active and Reflective learning model: (1) To summarize the objectives achieved in the Active and Reflective learning model. (2) Students are able to optimize their memory skills in carrying out learning activities. (3) Students are able to reflect on their learning outcomes in carrying out learning activities. (4) The accompanying objective is to instill attitudes from learning. (5) The accompanying impact is that students have attitudes in learning.

Table 2.
Results of Instructional Experiments.

No.	Aspects	Siklus 1 (S^1)	Siklus 2 (S^2)	Siklus 3 (S^3)
1	Connection			
	Perceiving cello material	75%	80%	88%
2	Association			
	Critical thinking	70%	78%	85%
	Troubleshoot	70%	75%	84%
	Collaboration in cello instrument practice	80%	85%	90%
3	Communication			
	Provide feedback on the results of cello learning	80%	86%	92%
4	Reflection			
	Classifying cello learning outcomes	72%	80%	85%
	Reflecting on learning the cello instrument	80%	85%	90%

Based on the data in Table 1, the instructional trial of the Cello Instrument course conducted in three cycles showed significant improvement in all aspects of learning, namely connection, association, communication, and reflection. In the *connection* aspect, students' ability to relate cello instrument learning materials to their prior knowledge or experience increased from 75% in the first cycle to 80% in the second cycle, and reached 88% in the third cycle. This indicates that students are increasingly able to understand the context and meaning of the material being studied and can relate it to relevant musical references.

In the *association* aspect, which includes critical thinking, problem solving, and collaboration, consistent improvement was also recorded in each cycle. Students' critical thinking skills increased from 70% in the first cycle to 78% in the second cycle, reaching 85% in the third cycle. This reflects the development of students' ability to analyze and evaluate cello playing techniques in depth. Problem-solving skills, such as overcoming technical errors or finding solutions when facing difficulties in playing certain parts, also improved from 70% to 75%, and finally reached 84%. Meanwhile, collaboration in cello practice, which was already quite good from the start (80%), continued to increase to 90% in the third cycle. This shows that teamwork and the ability to interact in ensemble or duet activities were successfully developed during the learning process.

In terms of communication, students' ability to provide feedback on the cello learning process and outcomes showed a significant improvement. The achievement increased from 80% in the first cycle to 86% in the second cycle and reached 92% in the third cycle. This shows that students are increasingly active in discussing, giving advice, and expressing their opinions constructively about their own performance and that of their peers.

The final aspect is *reflection*, which includes the ability to classify learning outcomes and reflect on the learning process that has been undergone. In the indicator of classifying learning outcomes, achievement increased from 72% in the first cycle to 80% in the second cycle, and reached 85% in the third cycle. Meanwhile, on the indicator of reflecting on cello learning, the results achieved were quite high from the start, at 80%, then increased to 85%, and finally 90%. This shows that students have increasingly better abilities in recognizing their strengths and weaknesses during the learning process and are able to evaluate and plan improvements independently.

Overall, this instructional trial showed very positive results. All aspects of learning experienced significant improvements from cycle to cycle. This proves that the learning approach applied, which is likely based on cycles, reflection, and direct practice, has been effective in improving students' competence in cello mastery. The final impact of the implementation of the Active and Reflective learning model can be seen from the improvement in memory, reflection on learning, and positive attitudes formed during the more interactive and participatory teaching process [58, 59]. Thus, students not only gain theoretical knowledge but also practical skills that can be applied in musical contexts and their daily lives. It is recommended to maintain the learning model that has been used, while incorporating elements to strengthen critical thinking and reflection through group discussions or performance presentations as part of the formative evaluation process.

4. Conclusions

This study proposes and evaluates the application of the Active and Reflective learning model for the Cello instrument course at Surabaya State University. This learning model is designed to increase students' active involvement in the learning process and encourage them to reflect on their learning experiences. This approach aims to overcome the challenges faced in music teaching, where students tend to be passive and less involved in more in-depth learning activities. In general, the Active and Reflective learning model involves several important stages, including connection (linking prior knowledge with new material), association (developing critical thinking and problem-solving skills), communication (discussion and feedback between students and lecturers), and reflection (self-evaluation of learning outcomes). Through the implementation of these steps, it is hoped that students will become more active learners, think critically, and improve their practical skills in playing the cello.

The results of the pilot test show that this learning model is effective in improving students' competence, both in terms of knowledge and skills. In each learning cycle, there was a significant increase in students' ability to connect learning material with previous experiences, collaborate in instrument practice, provide constructive feedback, and reflect on their learning outcomes. This improvement indicates that the active and reflective learning approach has successfully created a more comprehensive and meaningful learning experience for students. The impressions of the lecturers involved also support the potential application of this model. Although some lecturers acknowledge that

this learning model requires adjustments in terms of curriculum and learning outcomes, they are optimistic that the implementation of Active and Reflective Learning can result in more interactive learning and increase students' motivation to learn independently.

Therefore, this model is expected to serve as a guideline for improving the quality of education in the field of music, particularly in cello instruction. Overall, this study makes an important contribution to developing more innovative learning strategies that not only emphasize technical mastery but also foster critical and creative attitudes among students through the reflective process.

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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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