Class Practice Research Aimed at Achieving Proactive, Interactive, and Deep Learning in the Junior High School Music Department

—From the Perspective of Teaching Methods in Instrumental Ensemble—

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Abstract:　The purpose of this study was to clarify which teaching method could produce proactive, interactive, and deep learning, during an instrumental ensemble, and to assess the results of implementing such a program. We developed and presented the instrumental ensemble class plan based on the bottom-up-instruction method at two junior high schools. Data were collected by using a questionnaire and an M-GTA. We found that each student displayed a proactive learning attitude toward the music while maintaining an awareness of their own development areas and growth. Furthermore, the students showed an interactive learning attitude during collaborative activities by watching and listening to others while observing their performance in an effort to improve the quality of music, and learn through the class experience. In addition, we noticed an attitude that promoted deep learning whereby students attempted to solve problems and create music while utilizing what they learned from negative experiences. In addition, the bottom-up-instruction approach used during instrumental ensemble training was associated with originality, growth, and the acceptance and awareness of others.

1. INTRODUCTION

In December 2016, the Central Education Council proposed "proactive, interactive, and deep learning" in a report to the advisory of Ministry of Education, Culture, Sports, Science and Technology (November 2014). Based on their recommendation of "*Improvement of the curriculum guidelines for kindergartens, elementary schools, junior high schools, high schools and special schools [report]*", several studies have been conducted concerning the expression and appreciation of music in Japanese schools (Imanari et al. 2018, Ishida et al. 2018, Kobayashi, 2017, Watanabe, 2017). Interestingly, instrumental ensembles have not been explored yet. The "ensemble," in this respect, refers to a performance form in which all class members take part.

The significance of performing instrumental ensembles has been highlighted often before. For example, the German music education scholar Carl Orff emphasizes the role of the individual in the "community" and "*the awareness of being part of the whole ensemble*" (Choksy et al., pp. 201-202).

Studies have been conducted that revealed the significance of ensembles in the teacher training

courses from the perspectives of human relationship (Inaka, 2010) and man-made/human-formed culture (Morrison, 2001). However, no instrumental ensemble research aimed at the realization of proactive, interactive, and deep learning has been conducted since the Central Education Council made its recommendation in their 2016 report, .

The principal investigator of this study also discussed the teaching method used in instrumental music ensembles and noted: "*If the instructor gives instructional guidance, the performers may feel obliged to imitate [the instructor] regardless of their [own' thoughts and images.*" "*The instructor should change the method once the musical expression has been mastered*" (Saito, 2019). In addition, Suga (2009) stated that: "*there is no consensus among the views on effective performance instruction methods*" (p.14) and set out results according to the years of experience of the instructor. In other words, it is necessary to establish the best teaching method by keeping an eye on where the performer is at and what the goals aim for.

The purpose of this study is to explore which instrumental ensemble teaching method can realize proactive, interactive, and deep learning. We do this by conducting a preliminary study. Then, we develop a lesson plan for an instrumental music ensemble and implement it at the chosen Junior High schools to assess the impact thereof.

2. METHOD

2.1 Preliminary study

During the preliminary survey stage, one teacher (N=1) and students (N=57) from the Grade 9 class of the Mihara Junior High School (9th grade) affiliated with the University of Hiroshima, were involved in the instrumental music ensemble class.

We compiled a questionnaire with reference to "*Basic policy for revising the points of the summary of the deliberations so far toward the next course of study, etc.*" One section contained closed questions and the students needed to indicate the statement most applicable to them, personally. The answer options included 5 (very applicable), 4 (somewhat applicable), 3 (neither can be said), 2 (not very applicable), and 1 (not applicable at all). See Table 1 below.

The other section of the questionnaire contained questions that required of them to freely describe their thoughts on a certain question. The sections with the selection options were for quantitative analysis purposes and the free description sections are for reference purposes.

The teacher provided ensemble guidance in two ways. In the first half the teacher provided guidance starting with the words "*Please do...,*" which reflected a position of absolute authority and a top-down-approach to teaching. During the second half the teachers act as facilitators who recommend and encourage student activities by using statements such as "*What should I do?*" This presents a bottom-up instructional method.

Thereafter, the students took part in a performance of an arrangement of the song "*We are the world.*" Then, the students were requested to complete the two-part questionnaire.

The results of the preliminary survey are presented in Tables 2 and 3. These are the ratios of the positive (4 and 5) and negative (1 and 2) ratings of the aggregated questionnaire. We calculate it by using an accurate binomial test (direct probability calculation).

Table 1. Questionnaire items: preliminary survey

1 A	This teaching method encourages independent performance.
1 B	This teaching method makes you aware of this learning.
1 C	This teaching method makes you aware of the problems and prospects for the next time.
2 A	This teaching method encourages "dialogue" between the instructor and the learner to deepen their thoughts.
2 B	This teaching method encourages "dialogue" between learners to deepen their thoughts.
3 A	This teaching method includes situations where past learning (such as what was learned during today's ensemble) is used.
3 B	This teaching method makes you think about the solution to the problem.
3 C	This teaching method includes the situations of "creating" based on the performer's thoughts.

1 = proactive learning, 2 = interactive learning, 3 = deep learning

Table 2. Top-down-instruction results

	①A	①B	①C	②A	②B	③A	③B	③C
Average	2.684	3.474	3.719	2.228	2.035	3.158	2.895	2.632
Standard deviation	0.994	0.881	0.932	1.043	1.075	1.136	1.103	1.086
Median	2	4	4	2	2	3	3	3
Frequency of 5 and 4	13	29	37	7	6	24	16	10
Frequency of 2 and 1	31	7	3	38	41	15	21	26
Two-sided measurement	$p<.01$	$p<.01$	$p<.01$	$p<.01$	$p<.01$	$.10<p$	$.10<p$	$p<.05$

Table 3. Bottom-up-instruction results

	①A	①B	①C	②A	②B	③A	③B	③C
Average	4.158	3.912	3.684	4.316	4.456	3.947	4.000	4.246
Standard deviation	0.744	0.683	0.940	0.901	0.727	0.736	0.937	0.756
Median	4	4	4	5	5	4	4	4
Frequency of 5 and 4	47	45	38	49	51	42	45	48
Frequency of 2 and 1	1	2	6	3	1	1	5	1
Two-sided measurement	$p<.01$	$p<.01$	$p<.01$	$p<.01$	$p<.01$	$p<.01$	$p<.01$	$p<.01$

For the top-down-approach, the frequency of the negative answers exceeded the positive answers for questions (1) A, (2) A, (2) B, and (3) C. There was also a significant difference between the two ratios. It is probable that 1 and 2 were added to the items related to the learner's independent attitude, dialogue, and creativity through instructional guidance such as "*Please play here with forte.*"

The bottom-up approach received significantly more positive than negative responses. By asking "*what should I do about the strength here*" and "*who should I listen to here?*," we propose that the students were able to think for themselves and consult with their surroundings when performing.

However, this approach is not perfect, considering the students' answers to the open-ended section of the pre-liminary questionnaire, "*I do not know if I have my own thoughts about the performance, so I do not even know if it is a problem in the first place,*" "*I don't know what has been fixed by myself,*" "*It is difficult to be aware of learning because there is no instruction from the teacher.*" This means that there were individual differences in awareness of learning outcomes and problems.

Teachers should take appropriate measures to accommodate and address those differences. Moreover, when students reach the limit of mutual learning, teachers need to assist in promoting

new learning.

Based on the preliminary survey results, we constructed the main study related to instrumental ensemble teaching.

2.2 Primary study

Students from two schools were involved in this study: the Mihara Junior High School (two classes in 9th grade: N=79) and the junior high school (three classes in the 3rd grade; N=121). The Mihara students don't have a particularly high musical ability compared to other schools. Furthermore, students in the 9th grade rarely played instrumental ensembles in class. This is the first time in junior high school. They often describe things, such as looking back. In contrast, the junior high school students actively perform instrumental music ensembles in class and the school presents orchestra club activities, which includes children with excellent musical skills. Although their basic academic ability is particularly good, there are many students who try to make a brief description, such as looking back.

To establish an environment where students could independently identify problems and solve them through free thinking, we provided recorders as supplementary materials to be used to enable the children to objectively experience their own performance.

Within the larger context of bottom-up-instructions, we needed to ensure that students were clear about their learning outcomes and the development areas or problems they experienced. Consequently, we prepared a "learning accumulation sheet" for students to record hourly learning and next problems retrospectively. Moreover, we asked the students (part leaders, etc.) and teacher to judge the quality of the ideas and performance proposals from other students. The teacher had to check learnings recorded on the "learning accumulation sheet" and assist with problems where necessary.

Due to the impact of COVID-19 that prevailed from the end of 2019, some expressions in the questionnaire were altered from the preliminary questionnaire survey (Table 1). For example, due to concerns about virus transmission, direct conversion was discouraged, and we replaced the word "dialogue" (pre-liminary study questionnaire; Table 1 [2]) with more suitable text (Table 5 [2]). Furthermore, in the Lesson Practice Questionnaire, the notation was changed to "(students) in the instrumental music ensemble." Response options to this questionnaire were: 5 (Very applicable), 4 (Somewhat applicable), 3 (Neither can be said), 2 (Not very applicable) and 1 (Not applicable at all), where 4 and 5 presents positive and 1 and 2 negative answers, respectively.

We developed a lesson plan and introduced multiple-take recording (Table 4). Multiple-take recording is a performance format that has developed exponentially since 2020 and involves a process where one person oversees the recording of multiple voices or musical instruments which are edited. One video recording was needed.

Moreover, we proposed that both bottom-up and top-down guidance were allowed considering the time available and number of problems or content that the teacher needed to impart.

From the second half of the second session, we introduced the recorder to support learners in discovering and solving problems by themselves.

During the third session, the use of the recorder was integrated with a bottom-up method and teachers were encouraged to asked questions such as "*What should I do with the volume here*?," instead of "*What should I do*?"

After having planned the Practice Lesson, we implemented it at both schools.

Table 4. Lesson Plan

First Session: Introduction and explanation of instrumental ensemble (approximately one hour)	● Introduction of instrumental ensemble using multiple recording videos and presenting the main question: "*What kind of ability can be nurtured by an instrumental ensemble?*" ● A brief description of the performance piece: "Hana wa Saku" (composer, composition history, etc.) ● Appreciation of "Hana wa Saku" (instrumental ensemble version)
Second Session: Strengthening the technology of piece (3 hours)	● Basic practice ● Music practice (both individual practice and ensemble / individual in the first half of class, ensemble in the second half) ● Filling out and cleaning up the summary
Third Session: Pursuit of expression of piece (2 hours)	● Music practice for individuals and parts ● Expression pursuit ensemble ● Filling out the summary / questionnaire

Table 5. Lesson Practice Questionnaire

1 A	During the instrumental ensemble, I was willing to play, not as I was told.
1 B	During the instrumental ensemble, I was aware of learning at each point in time.
1 C	During the instrumental music ensemble, I was aware of the problems as well as the prospects for next time.
2 A	During the instrumental ensemble, I did not follow the teacher, but considered my thoughts while keeping in mind the teacher's ideas.
2 B	During the instrumental ensemble, I did not follow other performers (classmates), but considered my own thoughts while referring to the ideas of the other performers.
3 A	During the instrumental ensemble, I thought and played using past learning (for example, if it is the 6th hour now, the preceding 1-5 hours), and the learning I experienced in the previous music class).
3 B	In the instrumental ensemble, I played while thinking about solutions to the problems during the performance.
3 C	In the instrumental ensemble, I created my own performance based on my ideas.

1 = proactive learning, 2 = interactive learning, 3 = deep learning

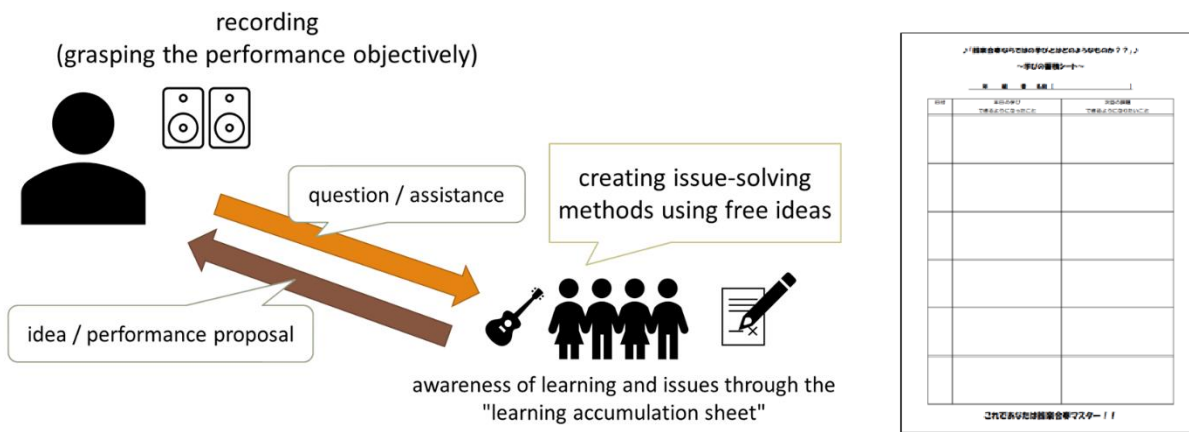Figure 1. Lesson Plan concept
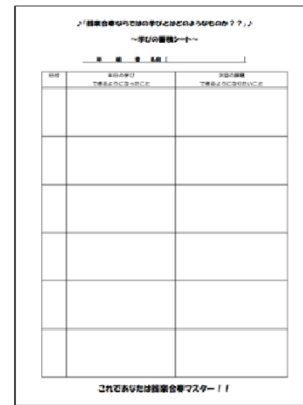

Figure 2. Learning Accumulation sheet

2.3 Data analysis

We analyzed the quantitative and qualitative results of the study. To determine the ratio of positive (4 and 5) and negative (1 and 2) responses of the aggregated questionnaire (Table 5) during quantitative analysis, we used an accurate binomial test (direct probability calculation), as in the preliminary survey.

For the qualitative analysis, we used the modified grounded theory approach (M-GTA) which "*excellently explains and predicts human behavior*" (Kinoshita, 2003, p.89). We explored how students achieved proactive, interactive, and deep learning by qualitatively analyzing the "Learning Accumulation sheets" from each school. Furthermore, we conceptualized the data to explain and predict the emotions and behaviors of students and their interactions with others. The data were schematized to clarify the underlying relationships. First, we generated a concept from each description in the "Learning Accumulation sheet." Each concept was presented with its definition, a concrete example (variation), and theoretical memo about the background and reason for concept generation. Multiple concepts were bundled together as a category and several core categories were clustered together as a core category.

For example, descriptions such as "*I could play the guitar*," "*I could read the score*," and "*I understood the musical symbols*" are collectively named "Acquisition of knowledge/skills" (Figure 3).

We then created a diagram to reflect the relationship between concepts, categories, and core categories, clarifying how students proceeded with their learning.
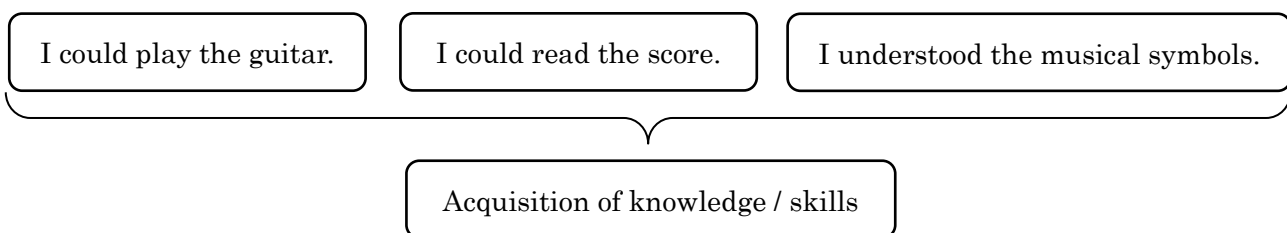

Figure 3. An example of conceptualizing in M-GTA

3. RESULTS

In general, by using the bottom-up instruction method, the teacher entrusted students with the discovery and solving of problems while actively providing advice or guidance to assist them wherever needed.

The boxed text below is an example of the Teacher-student dialogue that occurred during the program implementation at the Mihara Junior High School (2nd session / 3rd hour). T is the teacher, A is a female student who is in charge of a guitar part leader, and B and C are male students who are in charge of percussion instruments. B is the part leader. In this example, B and C collaborate to solve the problem discovered by A. C did not perform all the movements he was responsible for in "*Don dodo*," but only increased the volume of "*Don*." The teacher and A judged the effect of this idea and evaluated it.

After one "Hana wa Saku" performance

T: Let's listen to the current recording.

　(They listen to the ensemble recording together)

T: By listening to this recording, what do you feel about it so far?

　(A seems to say something)

T: So, I'll focus on part leaders today. Then ...A, tell me what you felt, frankly.

A: I couldn't hear the guitar, so I think it's better to hear it more overall.

T: Overall? For example?

A: (See the percussion instrument part)

T: Yes, I see. B, what did you think?

B: (Our) sound is loud.

T: Oh, you felt that, didn't you? If so, I would like you to try to reduce the volume, but leave the
　　hardness that can be used as a standard.

　(T teaches the other instrument parts while the percussion part is trying problem-solving)

T: Have you finished, percussion part?

B: (nods lightly)

T: Alright, let's play it again.

(They play together, record again, and listen)

T: (Judging the part with the most unusual sound, and asking as follows: Bass drum, what did you devise?

C: I strengthened only the part of "*Don*" in "*Don dodo Don dodo*."

T: Yeah, I felt that way, too. That is why you can hear more of the guitar elsewhere ("*dodo*"). How
　　about you, guitar part?

A: (Nods while laughing)

T: Percussion instrument part, that idea is good!

3.1 Quantitative analysis results

The results of the questionnaire survey at the Mihara Junior High School (Table 6) and the

Junior High School (Table 7) indicate a significant difference in all the items at both schools. In particular, the results for (1) B and (1) C, are different in the preliminary survey. This could be ascribed to the use of the "Learning Accumulation sheet" which made it possible for students to become aware of their achievements and tasks each time. This same effect is observed for (3) A, where the numerical value is slightly higher than during the preliminary study. It is possible that the environment which was set up to encourage conscious learning may have enhanced problem solving.

Table 6. Mihara Junior High School results

	①A	①B	①C	②A	②B	③A	③B	③C
Average	4.481	4.519	4.455	4.169	4.195	4.429	4.364	4.532
Standard deviation	0.657	0.616	0.615	0.746	0.685	0.780	0.682	0.594
Median	5	5	5	4	4	5	4	5
Frequency of 5 and 4	72	74	72	66	65	67	68	73
Frequency of 2 and 1	1	1	0	1	0	2	0	0
Two-sided measurement	$p<.01$	$p<.01$	$p<.01$	$p<.01$	$p<.01$	$p<.01$	$p<.01$	$p<.01$

Table 7. Junior High School results

	①A	①B	①C	②A	②B	③A	③B	③C
Average	4.319	4.466	4.431	4.190	4.207	4.259	4.302	4.466
Standard deviation	0.772	0.803	0.863	0.946	0.905	0.975	0.853	0.803
Median	4	5	5	4	4	5	4.5	5
Frequency of 5 and 4	100	102	101	91	98	94	98	105
Frequency of 2 and 1	3	3	4	6	7	8	3	3
Two-sided measurement	$p<.01$	$p<.01$	$p<.01$	$p<.01$	$p<.01$	$p<.01$	$p<.01$	$p<.01$

3.2 Qualitative analysis results

We identified 49 concepts from which 14 categories and four core categories were extracted (Table 8). Moreover, Figure 4 shows the learning process of the students constructed by M-GTA.

The student learning during musical activities begins with "formation of the foundation" (Figure 4). This is the starting point for musical activities, such as reviewing previous sessions and approaching new learning. Students feel anxious about their performance and experience fear of failure, but simultaneously are thinking "*what should I/we do to get better*" and make efforts to improve their skills. Upon progressing to the next stage, they experience growth and a longing to be

able to do more.

During "Adaptation to instrumental ensemble," (Figure 4) students emerge from individual musical activities and gradually adapt to playing in unison. At first, due to differences between the individual and the greater ensemble, they experience anxiety ("*what was possible up to now cannot be done with the ensemble*") or recall their weaknesses. Concurrently, a sense of responsibility that "*I must do*" and an empathic attitude ("*I should refer to what was said by others*") emerge. Thereafter, the students attempt various strategies to improve the level of instrumental ensemble and begin to perform original instrumental ensembles to achieve a balance between volume and tone, or breathing and timing. The presence of others is important for such activities. Students actively incorporate other performances and opinions to solve problems, while working together in an effort to produce better music.

As they become aware of others, students progress to "deepening instrumental ensemble" (Figure 4) where technique is enhanced and expressed within the context of the music, the role of the instruments that they are playing, and the effect of the musical composition (for example, "*what kind of effect does this chord have?*") Here, students' thoughts are not just focused on improving performance, but how to make music.

Through these performance activities, students displayed "learning in instrumental ensembles." Referring to the main question, "What kind of ability can be nurtured by instrumental ensemble?" asked at the beginning of the practice session (see Table 4), the students revealed that they experienced growth.

Table 8. The definition of: Concept (CO), Category (CA), and Core Category (CC)

CC: Formation of the foundation	
CA: Strict metacognition	
CO: Technical anxiety	CO: Emphasis on failure avoidance
d ： Being aware of their own problems and weaknesses and not being confident in their performance.	d: Being afraid of making mistakes and trying to perform perfectly.
CA: Starting to learn	
CO: Approaching new learning	CO: Progressing thorough baseline and foundation
d: Handling the contents that first appeared in this instrumental ensemble and producing results of learning.	d: Focusing on reviewing what they have learned and basic learning.
CA: Efforts to improve technology	
CO: Building strategies to drive progress	CO: Limiting activity contents
d: Devising a practice method to make up for their problems and weaknesses.	d: Performing by deciding the minimum requirements and conditions.
CO: Utilization of failure experience	CO: Collaborative problem solving
d: Setting new learning goals after mistakes and failures and devising strategies and ideas.	d: Overcoming problems and experiencing growth through discussions and mutual teaching.
CA: Changes in awareness in the early stages	
CO: Level up orientation	CO: Realization of growth from the past
d: Motivation to improve current abilities.	d: Being able to do what they couldn't do in their previous study.
CO: Emerging awareness of others	CO: Tenacious attitude
d: Trying to play while inspiring others.	d: Never giving up and working on learning, even if they can't do something.

CC: Adaptation to instrumental ensemble		
CA: Gap between the individual and the greater ensemble		
CO: Anxiety about ensemble	CO: Recalling weakness	CO: Highlighting to the ensemble
d: Feeling anxious because they cannot do what they were able to do individually, in the ensemble.	d: Identifying weak points in the music through the whole performance.	d: Having an awareness of the problems that need to be addressed in the whole ensemble, not just oneself.
CA: Opportunity for Initiative		
CO: Strong sense of responsibility		CO: Empathy for surroundings
d: A sense of responsibility for the whole performance and practice.		d: Considering the opinions of the teacher and other students when carrying out activities.
CA: Implementing a variety of strategies		
CO: Pursuit of efficiency	CO: Searching for a standard	CO: Consciousness of others during the performance
d: Making new discoveries and furthering their own learning.	d: Learning while relying on the performer or conductor as the axis of the performance.	d: Performing while being aware of the performers and conductors around them.
CO: Demonstrating individuality	CO: Actively using supplementary materials	CO: Intuitive problem solving
d: Making use of their own strengths and unique characteristics.	d: Using of supplementary materials such as CDs and recording devices.	d: Solving problems immediately during instrumental ensemble.
CA: Pursuit of high-quality music		
CO: Pursuit of harmonious performance	CO: Pursuit of music in harmony with the breath	CO: Orientated toward Originality
d: Trying to achieve a balance between the individual and the whole in terms of volume, tone, and so on.	d: Trying to match tempo, timing, and breathing.	d: Pursuing original music, such as arrangements and playing techniques.
CA: Mental development		
CO: Room for technical growth		CO: Happiness associated with growth
d: Trying to perform musical activities from various perspectives as they grow technically.		d: Gaining happiness and joy from their own growth.
CO: Sustained learning		CO: Cultivation of a sense of acceptance of others
d: Attempting to perform while utilizing past learning.		d: Developing an attitude of positive recognition of others' performances and skills.
CC: Strengthening instrumental ensemble		
CA: Developmental music activities		
CO: Supporting others		CO: Considering the role of the instrument
d: Assisting others with technical aspects.		d: Trying to derive the unique role of a particular instrument.
CO: Considering the effects of the musical structure		CO: Respect for silence and breaks
d: Deepening their understanding of music by independently examining the structure of music and its effects.		d: Considering non-playing parts as part of the music.
CA: Focus on expression		
CO: Expanding the range of expression		CO: Desire to improve expression techniques
d: Trying to acquire various techniques of expression		d: Trying to improve the quality of music through better expression
CA: Devising a performance		
CO: Specific expression of emotions	CO: Connection between musical idea and technique of expression	
d: Thinking of strategies to express emotions in music.	d: Linking the image and impression of the piece with specific expression techniques.	
CO: Brushing up the expression ideas	CO: Sending out a message	CO: Dialogue with the creator
d: Selecting the appropriate method of expression.	d: Trying to convey one's feelings and thoughts through the music.	d: Trying to understand the message of the composer and arranger.

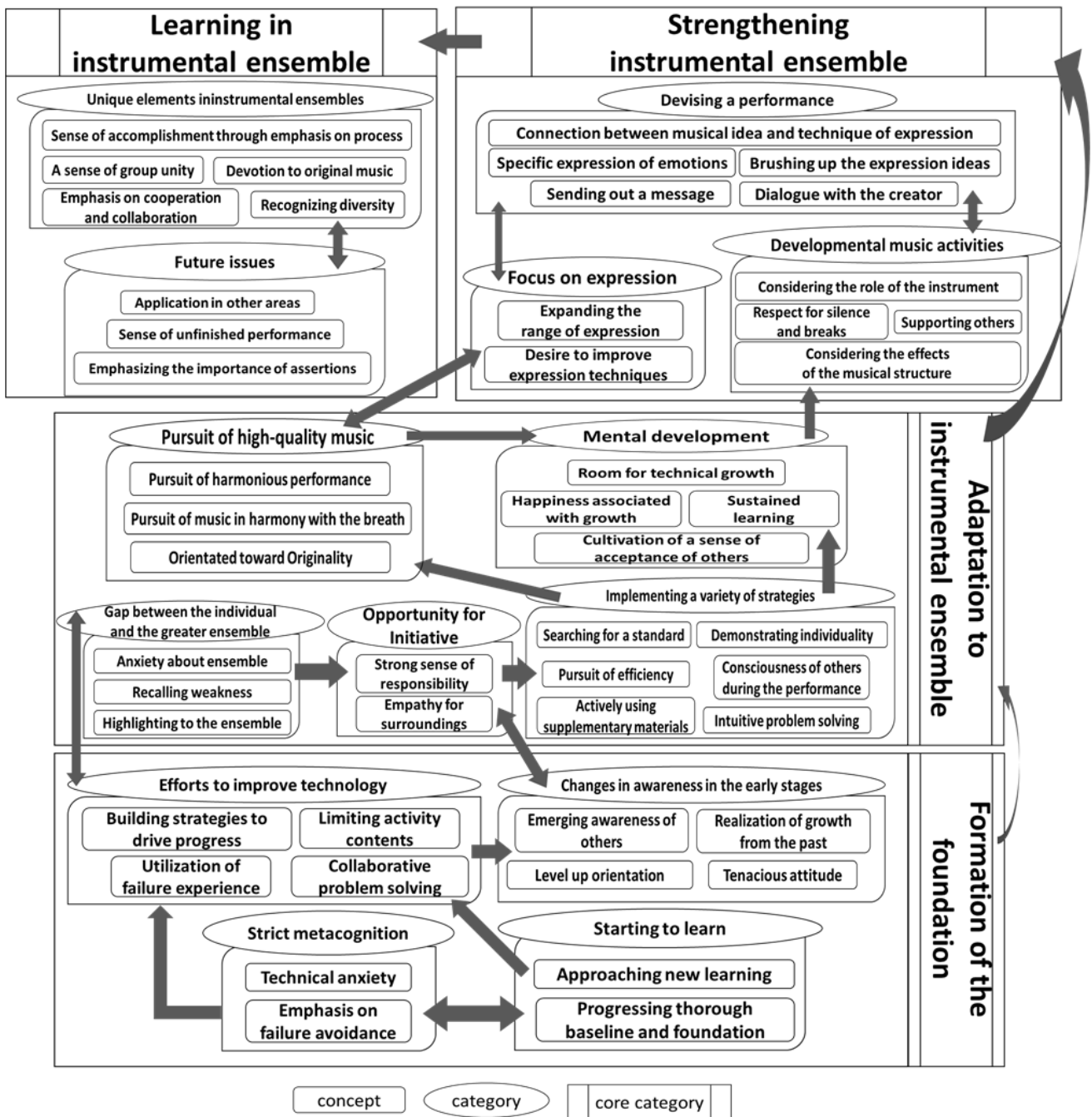| CC: Learning in instrumental ensemble			
CA: Unique elements in instrumental ensembles			
CO: Emphasis on cooperation and collaboration		CO: Sense of accomplishment through emphasis on process	
d: Recognizing the importance of cooperation and collaboration when performing in ensembles.		d: Being immersed in a sense of accomplishment in the final stage of the ensemble by actively carrying out the activities.	
CO: A sense of group unity	CO: Devotion to original music	CO: Recognizing diversity	
d: Feeling the appeal and importance of group performance.	d: Actively pursuing original music in class.	d: Recognizing the coexistence of different instruments, opinions, and performance views.	
CA: Future issues			
CO: Application in other areas	CO: Sense of unfinished performance	CO: Emphasizing the importance of assertions	
d: Attempting to apply the learning from this lesson to other areas of activity.	d: Regretting the lack of practice and forgotten expressions.	d: Realizing the importance of proposing opinions to the whole group.	

Figure 4. Conceptual diagram of student learning in instrumental ensemble (M-GTA)

4. DISCUSSION

This topic has not been studied before and we hoped to enhance the understanding of the educational environment. Our results enabled us to obtain a better understanding of students' proactive, interactive, and deep learning in the musical ensemble context.

Concerning proactive learning, first, we found two base elements of proactive learning that are experienced by each student (Figure 4). The first, personal growth, entails self-affirmation by thinking, "*I can now do…*" or "*I can now play….*" Students had a desire to improve ("*I want to be able to do more*"). The other factor encompassed the anxiety, crisis, and fear that each student experiences. Many students were confused about their initial activities or felt uncomfortable with certain activities. Consequently, they critically evaluated themselves, highlighting their own problems by thinking "*I can't do…* ". However, their negative mind-set improved such that they developed a positive attitude, which enabled them to overcome their problems. In short, students accumulated positive achievements and negative emotions, from where they proactively engaged in musical activities for personal growth. Figure 4 shows how students' awareness of their learning related achievements and problems forms the basis of their willingness to learn.

For interactive learning, we have to consider the existence of "others," which is an important concept in instrumental ensemble. Referring to Figure 4, we can see that the students regarded the 'others' (students in the ensemble) in three main ways.

First, students viewed others as necessary for the performance to take place. The experience of not being able to do what they were able to do by themselves in a group setting generated negative feelings. Thereafter the students identified the standard by listening to the performance of others and exploring strategies for problem solving along with them. By doing so, each student improved his/her skills through musical activities while being accepting of others.

In addition, for each student, others are "necessary to produce better music". This is related to the "pursuit of high-quality music" in Figure 4. Students who adapted to instrumental ensemble music collaboratively by listening to the sounds of others in acquiring a balance, matched their breathing with them, and discovered a source of originality by considering others' opinions. Through these activities, each student thought about what is required in ensembles with others and engaged in developmental musical activities.

Furthermore, students accepted others as necessary for learning in an instrumental ensemble. During the "strengthening instrumental ensemble" and "learning in instrumental ensemble" stages, students discovered the essence of instrumental ensemble through collaboration with others. Figure 4 revealed that the students were thinking about the significance of the performance piece and instrumental ensemble through dialogues with other learners, and various others, such as the composer, lyricist (of the original piece), arranger, and teacher.

In terms of deep learning, as mentioned in 2-1 & 2-2, the use of past learning, problem solving, and the creation of music, are required to this type of learning. If we look at Figure 4 from this perspective, it appears that concerning "use of past learning," students were aware of their growth and problems at each particular point in time. This is done in the process of connecting them to the next time. Of course, students can use what they have learned to perform developmental music

activities, but what is more apparent in the diagram is that they used what they had learned from negative experiences. Students learned from their failures and unsuccessful performances that they can do better next time, or that they can strengthen their sense of crisis and responsibility before the next musical activity. In this way, self-improvement and spiritual development were linked to a review of the past.

"Problem solving" was the most prominent element in the diagram. During the practice study, each student clearly recognized his/her problems by using the "learning accumulation sheet." However, they also considered which specific practice they wanted to perform and tried it out during the next lesson. If their solutions were effective, they moved on to the next stage. However, if it was ineffective, they tried other methods, as is evident from Figure 4. In essence, students devised and tried many approaches and strategies to solve their problems. They also developed their own learning content for the next period by applying the effective strategies that they had identified. Thus, by repeating the process of "awareness of the problem," "devising and attempting strategies," and "verifying their effectiveness" students persevered in their studies.

Concerning the "creation of music" (upper part of the diagram), it is evident that the teacher's bottom-up approach respected the students' freedom of thought in the instrumental ensemble space. This allowed them to perform while devising original ways of expression without being bound by preconceived ideas or stereotypes. Interestingly, in both junior high schools, each class performed in a completely different way. For example, where the main part was repeated, some classes raised the volume the second time, whereas others lowered it. There were also some original ideas, such as taking a break before the main part to let the students relax, or changing the instrumentation.

Concerning personal development, during the instrumental ensemble, students developed themselves through proactive, interactive, and deep learning, as described above. For example, in the transition from "formation of the foundation" to the "adaptation to instrumental ensemble," the students underwent "changes in awareness in the early stages." In particular, while tending to the basics and laying the foundation for performance, students realized how much they have grown, which increased their motivation to continue developing, thinking, "*I want to be able to do more.*" In the process they developed an awareness of others and cultivated a persistent learning attitude.

When students moved from "adapting to instrumental ensemble" to "deepening instrumental ensemble," they developed mentally. Furthermore, their technical growth provided a sense of well-being and comfort, and they could recognize the merits of others' performances. This encouraged them to continue learning. In time, not only the students' musical knowledge and skills, but also their ability to learn and develop on a personal level, were enhanced. Through this study, each student discovered the significance of the instrumental ensemble while reflecting on their growth. Five concepts were revealed and are indicated below.

Concept: A sense of group unity (Examples are as follows, and the same applies thereafter)
● Working together to create a single piece of music is a great sense of accomplishment.
● In an instrumental ensemble, everyone's heart can be united, and the music becomes magnificent.

Concept: Devotion to original music
● Since we thought and created everything, I thought it was a learning experience for all of us to work together to create one thing.

Concept: Emphasis on cooperation and collaboration
● In an ensemble, it is necessary to match the sound of the surroundings. In order to do so, I learned that it is important to look carefully at the conductor and listen carefully to the sounds around me.
● In an instrumental ensemble, you can improve your skills by cooperating with your peers, and consider your own thoughts about the music while interacting with them to experience a variety of ideas.

Concept: Sense of accomplishment through emphasis on process
● Today I was able to give my best performance ever. I didn't make any mistakes with the chords, I matched the overall tempo, and express our strengths and weaknesses.

Concept: Recognizing diversity
● The dark sound of the guitar and the high sound of the xylophone combine to make a beautiful sound. There are many different sounds, and they sound more beautiful than just voices.
● In an ensemble, I learned that it is important to understand and trust each other.

Significantly, through instrumental ensembles with bottom-up instruction, students became more accepting of others, and they realized the importance of focusing on the music and working together to solve problems. Furthermore, they experienced the joy of group performances while acknowledging the difference in values within the community. Moreover, they wanted to pursue original music and became aware of their growth and problems, while trying to improve their music.

Conclusion

The purpose of this study was to identify which instrumental ensemble teaching method produced proactive, interactive, and deep learning and to use those results to develop and implement a related program. Our preliminary survey indicated that the bottom-up (facilitating) approach was more effective in promoting proactive, interactive, and deep learning than the top-down (absolute authority) position. Consequently, we chose it as the main method of instruction in this study.

Interestingly, the bottom-up method prompted individual differences in learning outcomes and problem awareness among students. Therefore, we developed an integrated method where "learning accumulation sheets" were provided to students to increase their awareness of the tasks they performed, and their learning by reflecting on events. However, we incorporated a basic approach whereby the teacher's guidance mainly consisted of questions and assistance to the students. The students then devised and proposed their own performances in response. In essence,

we prepared an environment where students could identify their own development areas and attempt to address them through free thinking (e.g., by utilizing the recording equipment).

During the practical implementation of our study, the Mihara Junior High school and Junior High school students practiced the instrumental ensemble. The results of the quantitative survey and qualitative analysis (M-GTA) of the students' reflections (obtained via the "learning accumulation sheet") confirmed the proactive, interactive, and deep learning achieved in both schools. The students had a proactive learning approach toward the music while remaining aware of their own development areas and growth. Moreover, they displayed an interactive learning attitude during collaborative activities by watching and listening to others while observing their performance in an effort to improve the quality of the music, and learn from the class experience. During deep learning they attempted to solve problems and create music by utilizing what they have learned from past negative experiences.

Furthermore, the M-GTA analysis revealed that the students who engaged in proactive, interactive, and deep learning through instrumental ensembles ultimately expanded their social qualities, including a sense of group unity, cooperation and collaboration, and recognition of diversity. They also developed aspects related to originality (including "devotion to original music") and growth (including a "sense of accomplishment by means of a process"). This means that the acceptance and awareness of others, originality, and the experience of growth may be the basis of instrumental ensembles where bottom-up instruction is applied.

Of course, students cannot achieve all of this on their own since many students did not voluntarily engage in "strict metacognition" and motivation at each stage (e.g., changing awareness of the "opportunity for initiative"). In addition, the quality of the attitude toward music as well as the students' attitude toward music may vary greatly depending on the actual situation in class. Therefore, teachers should not fully rely on the bottom-up approach, but maintain a balance between the bottom-up and top-down approaches while continuously monitoring where each student and the class as a whole, are at. It is important to remember that students cannot function independently from the start.

In terms of limitations, future research should explore to what extent the bottom-up instruction method is applicable to various junior high schools. We conducted the study at two junior high schools affiliated with the Hiroshima University and it is possible that other schools may produce different results. The purpose and method of those studies should be adjusted according to the characteristics and class color of the selected schools.

Finally, the bottom-up instruction method can also be applied to the oral field. As instrumental ensembles require multiple instruments, it is difficult to introduce it to all schools. However, choral music requires only voices and the necessary instruments. Therefore, it can be used in almost all schools. Due to the integrated nature of playing music in a group, the various sounds (voice types and quality) and related ideas can also produce ensembles. In future, we would like to investigate how to utilize the bottom-up instruction approach in choirs.

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