

Present conditions of private conferences in science education in Nara Prefecture, Japan

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Abstract

The purpose of this study is to investigate the actual conditions of private conferences in science education in Nara Prefecture, Japan. The results are as follows:

- (1) There are eight private conferences in science education in Nara Prefecture.
- (2) The number of activities per year is about 10, and the number of participants is less than 60.
- (3) Kinds of school in the participants are two or three in most of private meetings.
- (4) The conferences are held on holidays, and the participants do not receive any compensation for their attendance.
- (5) The activities are wide-ranging, and they do not contain a demonstration class.
- (6) The participants discuss science topics actively, and they can get information about what they want to know.
- (7) The private conferences play an important role in enhancing science teachers' teaching skills.

Introduction

It is said that in-service training is needed to enhance teachers' instructional skills. Various types of in-service training are done in all municipalities of Japan. The board of education organizes most of the training, and most in-service sessions are held in a municipal education center. These official in-service training sessions are compulsory for the teachers. However, the number of official in-service training sessions is only about three per year.

Education centers, research institutes for education, and education training centers in each municipality play important roles in training science teachers. These institutions are generally called science education centers or education centers and are derived from the science education centers that were established in 1961. Education centers have various training programs^{1,2)} for

new and experienced science teachers. The programs include lectures, experiments, observation, fieldwork, educational study, and university training³⁾. These education centers organize the National Science Education Conference, and they have published very useful books about experiments for elementary, lower secondary, and upper secondary schools^{4,5)}.

However, there are several controversies surrounding official in-service training. First, as the official in-service training is held on weekdays, teachers who want to enhance their teaching skills have limited opportunities to attend. Second, more teachers are obligated to take a training course than those who take it voluntarily⁶⁾. According to the curriculum council report⁷⁾, the government and municipalities should encourage teachers to participate in-service training sessions voluntarily and aggressively. Moreover, the government and municipalities should help the teachers to organize the training conferences. Motivation is a very important aspect of any type of training.

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When teachers have questions or need information, they often ask their colleagues or attend private conferences that are held during holidays⁸⁾. The teachers themselves organize many private conferences voluntarily. When the teachers attend an official conference, they can be reimbursed for travel expenses, and attendance is generally compulsory. There is no such a profit and duty in private conferences. Teachers who attend private conferences are motivated by no such profit or duty. Nevertheless, some teachers say private conferences enhance their ability to teach science.

Though many teachers acknowledge that private conferences play an important role in developing their teaching ability, little is known about the actual conditions of private conferences in science education in Japan. It is considered that the existence of private conferences for science education is unique to Japan and private conferences for teachers are similar to quality control (QC) circles in companies. QC circles in companies are private, after-work meetings at which employees discuss how to improve the quality of products.

There are many articles, some of them mentioned here, that discuss the actual conditions of official in-service training sessions. In contrast, only one report has been published on a private conference in Miyazaki Prefecture, Japan⁹⁾. It tells about only one such conference and does not cover other private conferences in Miyazaki Prefecture. As there is little information available, research into private conferences for science teachers is considered worthwhile. The purpose of this study is to investigate the number, member structure, activity content, and knowledge of participants in private conferences for science educators in Nara Prefecture, Japan. Moreover, in order to clarify the characteristics of the private conferences, official conferences are discussed. Among high school graduates in the Japanese municipalities, a high percentage of those from Nara Prefecture enter university. The prefectural government is said to emphasize education. Therefore, we investigated how private conferences are conducted in such a situation.

Method

A private conference is defined as a conference held on holidays which teachers may attend without the knowledge or consent of their principals.

1. We visited the board of education in Nara Prefecture

and asked about official conferences that teachers manage by themselves and about private conferences in science education.

2. We met with officers of each official conference in science education and asked about the number of members, participant fee, foundation, establishment, number of conferences, and annual reports.

3. We attended the official conferences in science education and recorded the activities.

4. We sent a questionnaire to 409 elementary, lower secondary, and upper secondary schools in Nara Prefecture. The content of questionnaire is as follows.

Please tell me what you know about private conferences in science education. If you know about private conferences in science education, write the name, the representative's name, and the representative's address and phone number.

5. We met with officers of each private conference in science education and asked about the number of members, participant fee, foundation, establishment, number of conferences, and annual reports.

6. We attended some private conferences in science education, recorded the activities, and interviewed some members.

7. We researched who received the Toray Science Education Prize and the Nara Prefecture board of education prize and who was chosen to be a presenter at the Youngster's Science Festival in Nara Prefecture.

Results and Discussion

1. A synopsis of the activities

We received 37 responses to our questionnaire. From the Nara Prefecture board of education, we were able to get information about official conferences but no information about private conferences. We received information about private conferences in other responses. Table 1 shows information about official conferences in science education, and Table 2 shows information about private conferences in science education. There are four official conferences and eight private conferences in science education in Nara Prefecture.

As shown in a comparison of Table 1 and Table 2, the number of the activity per year is difference between private conferences and official conferences. All official conferences are held 3 times per year. While, some private conferences are held monthly, while others are held 3, 6, or more times per year. With so many activities,

Table 1 Official conferences in science education

Name	Number of activity / year	Number of members	Kinds of schools	Subjects	Activity contents
Nara Prefecture Lower Secondary School Science Education Conference	3	218	Secondary	All subjects	Lecture, Demonstration class, Workshop
Nara Prefecture Elementary School Science Education Conference	3	250	Elementary	All subjects	Lecture, Demonstration class, Workshop
Nara Prefecture Upper Secondary School Science Education Conference	3	210	Secondary	Physics, Chemistry	Demonstration class, Workshop, Field study
Nara Prefecture Biology Education Conference	3	101	Secondary	Biology	Demonstration class, Workshop, Field study

Table 2 Private conferences in science education

Name	Number of activity / year	Number of members	Kinds of schools	Subjects	Activity contents
The Three Musketeers Science Conference	12	8	Elementary Secondary	Physics	Workshop, Field study
Modern Ages Physics History Conference	12	16	Secondary University	Physics	Workshop, Field study
Nara Prefecture Science Conference	12	10	Elementary Secondary	All subjects	Class study
Nara Plants Conference	10	20	Teachers and others	Biology	Field study, Workshop
Mr. Hagiwara Circle	24	15	Elementary	All subjects	Workshop
Sony Science Teachers Association Nara Branch	6	60	Elementary Secondary	All subjects	Class study
Salon de Science	3	18	Elementary Secondary University	All subjects	Lecture, Workshop
Nara Prefecture Earth Science education Conference	3	52	Elementary Secondary University	Earth science	Lecture, Field study

teachers have ample opportunities to ask questions or get advice from other members.

The number of members in official conferences in science education is approximately 100 or 200. The number of members of private conferences in science education is small, from 8 to 52. When the conferences are large, although the teachers have opportunities to make friends, it is more difficult for them to have an opportunity to share their opinions. With a small number of participants, it is easy to touch the new teaching materials and do new experiments that are demonstrated for the members.

At official conferences, teachers from one kind of school participate. At private conferences, teachers from two or three kind of schools participate. For example, at

one official conference, participants are elementary school teachers only and at another conference, participants are lower secondary school teachers only. While at one private conference, participants are elementary school teachers, lower secondary school teachers and upper secondary school teachers. Perhaps as Nara Prefecture has a small population, when the representatives of private conferences recruit members from among the small number of the teachers available, it may be necessary to recruit from two or three kinds of schools. This condition seems to be characteristic of private conferences in Nara Prefecture.

Activities also differ between official conferences and private conferences in science education. The activities include demonstration classes at official

conferences but not at private conferences in science education. The official conferences can include science demonstrations because, being managed by the board of education, they are held on weekdays and attendance by the science teachers is compulsory. On the other hand, the number of activities at official conferences in science education is limited. When a teacher makes an official trip, another teacher must fill in for him or her, or the teacher must leave instructions for the students to engage in self-study. The official conference also requires a budget.

The daily schedules for four official conferences are basically the same. There is a demonstration class and discussion in the morning and a presentation and a group discussion or workshop about teaching materials and experiments in the afternoon. The teachers who attend the official conference take turns presenting a demonstration and giving reports on teaching materials. Supervisors usually advise the demonstrators and reporters at the end of the discussion. The supervisors also share ideas from the Ministry of Education, Culture, Sports, Science, and Technology. Sometimes a university professor makes a speech. For field study, the

participants observe plants and animals or collect specimens. The field study is done during the summer holiday.

As Table 2 shows, the activities done during private conferences are varied. For example, the activities of Three Musketeers Science Conference include developing teaching materials. The participants in the Modern Age Physics and History Conference mainly read books, while teachers at the Nara Prefecture Science Conference discuss lesson plans. The common point among the private conferences is that they do not have a demonstration class and supervisors do not attend. The members themselves discuss the teaching materials and lesson plans in a relaxed atmosphere. Therefore, the participants can ask questions about anything. As the members attend the private conferences voluntarily, it seems that their incentive to participate in the activities is high.

2. Example 1: Three Musketeers Science Conference

Table 3 shows the activities of the Three Musketeers Science Conference, which was named for the three members who established it 8 years ago. The

Table 3 The content of the Three Musketeers Science Conference

The number of activity	12 per year, monthly
The content of activity	<p>This meeting main activity is workshop. The teaching materials that the representative developed are introduced. The teaching materials are mainly for physics education and almost hand made. The members make the teaching material in this activity.</p> <p>Sometimes they go to the fields for study. The fields are for biology and geology education.</p> <p>Many members attend the Youngster's Science Festival* in Tokyo and Nara and introduce new teaching materials and science toy every year. Some members apply to Toray Science Education Prize** every year.</p>
Member	Elementary school teachers, Secondary school teachers. 12 members
Activity time	9:00 - 16:00 The 4th Sunday in every month.
Representative	Mr. Toshifumi Tanaka (High school teacher)
Establishment	1994
Attendant fee	Free
Others	This meeting received a subsidy of the Board of Education in Nara Prefecture in 2001 only.

* The Youngsters' Science Festival was started in 1992. Since then it has been evolved into a nation-wide event with every prefecture covered in 2000. A total of 1300000 young people have taken part in the YSF. YSF helps the youth to develop their interest in science and technology, translating today's dream into future's reality.

** The Toray Science Education Prize is an award to commend junior and senior high school teachers who have given creative and innovative lessons in science with good results.

conference's main activity is a workshop. The workshop leader introduces newly developed teaching materials for science education. The concept behind this conference is that expert teachers teach beginner teachers. Over the years, this concept has changed slightly, and the members discuss new teaching materials that the representative introduces and develop teaching materials by themselves. As a result, they improve their teaching materials by working together. As the representative is a high school physics teacher, the teaching materials are mainly for physics. Sometimes the participants go to the field to study biology and earth science.

The representative paid the teaching material fee and management fee personally. He has won the Toray Science Education Prize several times. He also makes a presentation, which has to be pre-approved by judges, at the Youngster's Science Festival in Tokyo every year.

A representative at the Three Musketeers Science Conference made the following comment.

At first, my colleagues recommended that I organize the private science education conference. They told me that I have a lot of knowledge and am good at making teaching materials. They asked me to teach the young teachers about science and teaching skills. Therefore, I decided to organize this conference. The procedure for making teaching materials is introduced in educational journals in science education, but many teachers have trouble creating the materials based on the journal instructions alone. They need someone to show them how to make the items. Now the objectives of this conference have changed slightly. One objective is to improve my teaching materials, and the other is to advertise my science teaching materials in Nara Prefecture. My development of teaching materials has improved through discussion with members. Of course, many members attend the Youngster's Science Festival in Tokyo after discussing the teaching materials they developed in this conference.

Based on the above comment, the need for private conferences is clear. Certainly there are workshops in official conferences, and there are opportunities for expert teachers to teach beginner teachers in science education. However, the number of activities at official conferences is small, and it seems that the atmosphere is tense because supervisors attend. The representatives'

strong motivation is felt. Motivation is very important to enhance ability. There is no reward for attending private conferences. It is considered that the representative's strong motivation helps him to manage this private conference in science education.

The comments of some participants in the Three Musketeers Science Conference are as follows.

My objective for participation is to gain science knowledge. I am an elementary school teacher, and I am not good at teaching science because of my limited knowledge. I hope that I'll improve my science teaching skills for my students. I sometimes consult with the representatives about science classes in the elementary school. The representative has taught me how to do experiments safely. I have revised the teaching materials introduced in this conference for elementary school, and I tell my colleagues at school what I have learned at this conference. The members often teach me how to use the computer and software. I can hear the ideas of high school students, which is useful for me when I teach science to an elementary school student. I think that the more advanced my ability is, the more advanced my students will be in science education.

I always try to create original teaching materials for science education. In this conference, I have shown the members my teaching materials, and the members have pointed out areas that should be revised. I show the materials to my science students and to my science club in my high school. The teaching materials that I develop are for physics. Of course, when chemistry teaching materials are introduced in this conference, I pass on the information to chemistry teachers at my school. They are happy to learn. After developing and revising my teaching materials at the conferences, I can apply to the Youngster's Science Festival in Tokyo.

Based on their comments, it is clear that the participants hope to enhance their ability to teach science. It seems that the conference atmosphere is relaxed as the number of participants is small and there is no inspector or teacher consultant. The participants' objective is clear. If it were not clear, not many teachers would be

motivated to attend the private conferences because they receive no compensation. Moreover, the teachers not only try to improve their teaching skills, but also they hope to help their colleagues in science education. In order to acquire knowledge, one needs good advice. Since there are more private conferences than official in-service training sessions, it is guessed that the private conferences offer more opportunities to acquiring valuable information and skills.

3. Example 2: Sony Science Teachers Association, Nara Branch

Table 4 shows the activities of the Sony Science Teachers Association, Nara Branch. The main activity of this private conference is the study of lesson plans. The members are elementary school teachers and lower secondary school teachers.

The national convention about science education in elementary school will be held in two years in Nara Prefecture. There are many demonstration classes by the teachers in Nara Prefecture and presentations in the national convention. When we attended this private conference, they had studied the lesson plan in the elementary school.

The Sony Science Teachers Association, Nara Branch, was originally established with the help of the Sony Foundation for Science Education. A report of the private conference in Miyazaki Prefecture⁹ is about the conference's relationship to the Sony Foundation for Science Education. It is supposed that this kind of private conference exists in most prefectures in Japan. These private conferences are related to the award given by the

Sony Foundation for Science Education.

The following discussion took place at a conference of the Sony Science Teachers Association, Nara Branch.

I went to observe the demonstration of an elementary science class at the national convention. I think that the level of the demonstration was very high. In my prefecture, a national convention in science education will be held in 2 years. I think that the level of science teaching in my prefecture is not high. In order to succeed at the national convention in science education in my prefecture, we must do the demonstration science class aggressively.

I agree with you. I heard that preparations for the national convention in 2 years are not proceeding. We must play an important role in the Nara Prefecture elementary school science education conference.

From this discussion, it seems that the participants are aggressive and confident in their ability to teach science education. Participants at the private conference (the Sony Science Teachers Association, Nara Branch) seemed to become leading participants at the official conference (Nara Prefecture Elementary School Science Education Conference). Though this discussion represents the activity condition in every point, it is guessed that the private conference members in science education play an important role as official conference members in science education. The official conference is compulsory, and the private conference is not compulsory. It is considered that private conference

Table 4 The content of the Sony Science Teachers Association Nara branch

The number of activity	6 per year
The content of activity	General meeting
	The study of lesson plan "Pendulum" "Conduction of heat" "Electromagnetic" "The property of water solution"
Member	Elementary school teachers, Secondary school teachers. 60 members
Activity time	9:00 - 16:00 Saturday
Representative	Mr. Yoshinobu Fujimoto (Elementary school teacher)
Establishment	1987
Attendant fee	¥3500 per year
Others	Activity contains sometimes a field study.

members' motivation is high and their ability to teach science is high. The science education conference of the Sony Science Teachers Association, Nara Branch, takes place in a hotel and lasts for 2 days. At this conference, the participants discuss and improve science lesson plans all day long. Such sessions cannot be held at the official conference for science education. The participants in the private conference can exchange ideas and information to their hearts' content, which seems useful for enhancing their teaching ability.

The comments of some participants in the Sony Science Teachers Association, Nara Branch, are as follows.

Thanks to this private conference, I was able to get ideas about how to present a science lesson in elementary school. As there is no teacher who is good at teaching science in my school, I am always worrying about science class. There are many expert science teachers in this conference, so I can ask questions in this conference anytime. I deeply appreciate this conference. The members frankly discuss lesson plans in this conference. This is very useful for us because we can directly use the information in our school.

I was able to get information about a new course of study in this conference. At my school, none of the teachers are interested in science, so I cannot discuss a new science curriculum or a new course of study. Therefore, this conference is very helpful for me. Moreover, because there are secondary school science teachers at this conference, I can gain background knowledge about the content of science classes in the elementary school and the relationship between the teaching materials used in elementary school and secondary school. We sometimes go on field trips, so I can remember the names of the plants and observe the strata.

Based on their comments, it is clear that the participants are glad to have an opportunity to study. It seems that there are few elementary school teachers who are good at teaching science under the current conditions. Though many teachers want to know about teaching materials, methods of conducting experiments, and teaching methods for science, they may not be able to find

expert science teachers who can help them. This kind of private conference provides a good chance for teachers to work together to solve their problems. The existence of private conferences helps to improve science education.

As both elementary and secondary school teachers participate in private conferences in Nara Prefecture, the participants can think about the relationship between what is taught in the elementary and secondary science curricula. This opportunity does not exist at official conferences in Nara Prefecture. As the participants stated, elementary school teachers can learn how the content of science classes in elementary schools relates to the content of science classes in secondary schools. Likewise, the secondary school teachers can gain useful information about what is taught in science classes at the elementary level.

4. The teaching ability of private conference participants

Although it is very difficult to measure teaching ability, we will attempt to discuss it in light of certain criteria.

The first is the Toray Science Education Prize, which was established in 1969 to promote the development of science education in secondary schools. About 10 members or groups receive the prize in Japan each year. The main criteria are teaching materials that are developed by the contestants. Only two teachers from Nara Prefecture, both participants in private conferences, have received the award since 1991. One teacher is a representative of the Three Musketeers Science Conference, and the other is a member of the Modern Age Physics and History Conference and the Salon de Science. Their winning entries were "An electromagnetic experiment using a precise digital balance scale" and "A simple spectroscope by CD," respectively.

The second award is presented by the board of education in Nara Prefecture. The board of education selects the award from among reports submitted every year. Five science education teachers have received the award in Nara Prefecture since 1991. Three of the teachers are members of private conferences. One teacher is a member of the Sony Science Teachers Association, Nara Branch, and the Salon de Science. Another is a representative of the Mr. Hagiwara Circle. The third teacher is a member of the Three Musketeers Science Conference, the Modern Age Physics and History

Conference, and the Salon de Science.

Finally, in 2001 and 2002, teachers were selected to be the presenter at the Youngster's Science Festival in Nara Prefecture. In 2001, of the 59 exhibitors, 16 were members of a private conference. In 2002, 16 of 47 exhibitors had participated in private conferences. In addition, many members of the planning committee of the Youngster's Science Festival in Nara Prefecture were members of private conferences: 7 of 21 in 2001 and 11 of 21 in 2002.

In these ways, participants at private conferences actively prove their teaching ability. There are also many examples of the members of private conferences playing important roles in official conferences. It seems that attending private conferences helps them to enhance their teaching ability or their strong teaching ability leads them to establish private conferences. In either case, it is considered that private conferences are effective for improving teachers' skills in science education.

Recently, the number of newly appointed science teachers has decreased in Japan because of a decline in the number of births. Moreover, many teachers have been interested in the new integrated course of study. As a result, the number of younger science teachers who participate in official and private conferences has decreased. Most teachers worry about the future of official conferences and private conferences in science education. This is a big problem to be solved. Private conferences in science education are a unique Japanese method of providing on-going teacher training. We hope that teachers in other countries will be interested.

Conclusion

In summary, the major characteristics of private conferences in Nara Prefecture are as follows. Most private conferences include participants from two or three kinds of schools. There is a wide range of activities at private conferences, but there is no demonstration class. In addition, at private conferences, the participants discuss science topics actively and they can obtain needed information. Finally, the private conferences play an important role in enhancing science teachers' instructional skills.

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【要 約】

本研究の目的は、奈良県における私的研修会の実態を調査することである。結果は以下の通りである。

- (1) 奈良県には 8 つの私的研修会がある。
- (2) 私的研修会の活動はおよそ年 10 回であり、会員は、60 名より少ない。
- (3) 参加者の学校種は、多くの私的研修会で 2 か 3 である。
- (4) 私的研修会は休日に行われ、いかなる報酬も得ていない。会員は、自発的に参加している。
- (5) 私的研修会の活動内容は幅広いが、公開授業は含まれていない。
- (6) 私的研修会の参加者は活発に討論しており、参加者は、会の中で知りたい情報を得ることができる。
- (7) 私的研修会は、理科における教師の力量形成に大きな役割を果たしている。

