

# Secondary School Science Teachers' Perceptions of the Educational Programs Offered by Science Museums

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**Abstract:** This study examines secondary school science teachers' use of science museums in their teaching and their perception/evaluation/utilization of the educational programs in Korean science museums. We found that teachers do not use science museums in close connection with their formal education; therefore, the students' experiences usually are minimal or are personal experiences. The main reason for this infrequent use of science museums is not because of their insignificant educational effects, but because of the lack of external and administrative support systems. Science teachers want the museums to have structured/organized programs such as science camps or experiments and a lending program which would provide experimental equipment and exhibits relevant to the school science curriculum. 90% of teachers who answered the survey wanted to participate in developing and managing the educational programs of science museums. The educational programs would be used more effectively in relation to formal science learning if the science teachers, who are science education professionals, participated in managing and planning the educational programs of science museums.

Key words: science museum, museum field trip, museum programs, science teacher

## I. Introduction

Many people associate science learning with a formal science curriculum, but children's science learning also takes place outside the classroom and the effects of this informal science learning are both powerful and tightly held (Wellington, 1994). Learning outside of school is certain to be of growing importance in relation to the formal curriculum; these programs should not be seen as competing, but as supplementing the school's programs. For example, Dierking & Falk (1994) and Falk & Dierking (2000) review studies that have found improved understanding of school science concepts such as force and motion as measured using pre-tests and post-tests of knowledge, following museum field trips. Braund (1991) found that home-initiated activities in the environment, such as bird-watching and wildlife walks with parents, have an influence on pupils' performance on animal classification tasks. Parvin (1999) and Parvin & Stephenson (2004) found an improvement in pupils' (and teachers') knowledge of industrial processes after visits to industrial sites, and this

learning was not ephemeral. Wellington (1990) has noted that the contribution of informal learning in science and technology to the future supply of scientists and technologists, and therefore to the advancement of science itself, has been wrongly neglected.

Among many resources that offer informal learning, science museums have evolved into unique educational institutions that offer learning opportunities that are difficult to duplicate in a traditional school settings (Semper, 1990). Science museums, places of continuing education for both students and adults, are able to: (a) improve scientific literacy as well as knowledge of science and technology (Henriksen & Frøyland, 2000; Henriksen & Jorde, 2001; Koster, 1999; Semper, 1990); (b) increase understanding of the nature of science (Lee *et al.*, 2005); (c) strengthen students' interest and motivation (Wellington, 1990); and (d) improve creativity, perception of STS and career awareness (Choi & Chang, 2005; Chang & Choi, 2006a, 2006b; Choi & Kim, 2005).

A modern museum is no longer a series of quiet rooms where treasured objects are put on display. The science museum not only displays the national

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collection of science, technology and medicine, it also plays a role in educating and communicating contemporary science to its visitors (Ruggiero, 2000) and enables citizens to have a positive relationship with science (Rennie & McClafferty, 1996) because it provides an integrated and STS approach to science (Chang, 2006). This contrasts with textbook science, which focuses on the understanding of science concepts.

In developed countries, science museums are taking an active role in expanding learning outside of the classroom, leading more students to study science at a higher level and as a career (Braund & Reiss, 2006) and reinforcing national pride and national identity (Song *et al.*, 2002). In Korea, National Science Museum will be constructed next year which is reflected by increasing interest in the educational effects of science museums. Furthermore, we have more than 350 science museums and centers which support students' extra-curricular science activities in Korea (Song *et al.*, 2004).

Internationally well-known science museums offer varied educational programs in order to make their educational contributions more effective. For example, those exhibitions which are relevant to the school science curriculum induce students to revisit museums. These museums also run professional organizations which include scientists, science educators, curators, designers, and so on (Yoo & Chang, 2004).

When Lee *et al.* (2004) examined the educational programs of internationally well-known natural history museums, they found that museums offer mobile museum exhibits, after school activities, workshops, lectures, science festivals, research projects, field trips, student-internships, lending programs of their collections, camps, demonstrations, publications, and so on, to educate both students and citizens. The educational programs at science museums are the same as those at natural history museums; they include offering worksheets for field trips, in-service programs for exhibits, educational programs on recent science and technology, guides that relate museum programs to the school curriculum, and contests for teachers which is aimed to make science teachers develop field trip teaching-learning materials (Song *et al.*, 2002; Chang, 2006).

Most visitors to science museums in Korea are students who visit museums on a field trip led by teachers (Yoo & Chang, 2004). Hence, we need to consider the relevance of exhibits or educational programs to the school curriculum. In addition, we have to make an effort to include science teachers in the development and management of museum program and exhibits. Since science teachers are science education professional, they know students' interest, knowledges and demands as well as school science curriculum. Therefore, if they are willing to participate in managing and planning educational programs of science museums, their ideas for developing and improving museum programs would presumably make them more valuable and instructive. Internationally well-known science museums already try to make science teachers participate in their management and development, which makes museum programs have greater relevance to formal science teaching and used more effectively for the formal teaching and learning.

Therefore, in this study we examined the perceptions of science teachers about their current use of museums in their teaching, educational effects of science museums, preferred educational programs and teacher activities, and their opinions for active use of educational programs at museums. We aimed to see the possibilities of their active using and their willing to participate in managing and developing museum educational programs by these questionnaires.

## II. Subject and Research Method

### 1. Subject

The subjects of this research were secondary science teachers in Kyunggi area who participated in a professional development program for their 1st grade licenses. We distributed 296 research questionnaires, and 257 teachers responded (response rate: 86.8%). The responses (categorized according to teachers' gender, school, career, degree and major) are shown in Table 1.

### 2. Developing questionnaires

Questionnaires used in this study requested personal information, present uses of science museum in their teaching, perceptions of the educational effects of

**Table 1***Subject*

		number	percent (%)
gender	male	66	25.7
	female	187	72.8
	no response	4	1.6
school level	middle school	111	43.2
	high school	140	54.5
	no response	6	2.3
career	3 year	79	30.7
	4 year	109	42.4
	5 year	44	17.1
	6 year	11	4.3
	7 year	4	1.6
degree	8 year	1	0.4
	no response	9	3.5
	bachelor	176	68.5
	above master	63	24.5
major*	no response	18	7.0
	physics	53	20.6
	chemistry	60	23.3
	biology	75	29.2
	earth science	67	26.1
total	no response	2	0.8
total		257	100.0

\*2 teachers had a double major in the science field.

science museums, preferences for educational programs and teacher activities, and suggestions for active use of educational programs (Table 2). The questions asking about the present use of science museums in their teaching are adapted from the studies of Choi *et al.* (2002), Jeung (2002), Kim (2004) and Song *et al.* (2002), which concern the perceptions of visitors on museum field trips and the educational programs of museums. The questions involving teachers' perceptions of the educational effects of science museums were adapted from the results of other investigations of the effects of science museums on cognitive and affective domains of visitors (Chang, 2006; Chang & Choi, 2006a, 2006b; Choi & Chang, 2005; Choi & Kim, 2005; Dierking & Falk, 1994; Falk & Dierking, 2000; Henriksen & Frøyland, 2000; Henriksen & Jorde, 2001; Lee *et al.*, 2005). The questions about teachers' preferred educational programs and teacher activities at science museums involved examining museum programs through their web pages, and then looking at analyses of the educational programs at

**Table 2***Categories and types of the questionnaires developed in this research*

Category	Type of questionnaires
Personal information	5 multiple choices
Present use of science museums in their formal education	6 multiple choices
Perceptions on the educational effects of science museums	8 Likert scales
Preferred educational programs of science museums	2 multiple choices, 1 open ended
Preferred teacher activities in science museums	1 multiple choice, 1 open ended
Opinions for active use of educational programs offered by science museums	1 multiple choice

both science and natural history museums (Choi, 2004; Choi & Chang, 2005; Lee *et al.*, 2004).

Considering teachers' lack of understanding about the kind of educational programs in museums, all questions were developed as multiple choice questions or Likert scale questions except those asking the reasons for the respondents' answers. The development of these questionnaires and the examination of museum web sites was done by three science education professionals who had experience with research related to science museums.

As a pilot study, three secondary science teachers were asked to answer developed questionnaires and then items and choices were revised in response to the results of their answers. The revised questionnaires were re-examined by two science education professionals for evaluating content validity who did not participate in developing the pilot questionnaires. Results were analyzed by SPSS statistics program using multiple responses analysis and descriptive analysis.

### III. Results

This study examined secondary school science teachers' use of science museums in their teaching and their perception/evaluation/utilization of the educational programs of science museums. Results are as follows:

1. Teachers' current use of science museums in their teaching

The category of teachers' use of science museums in their teaching consists of six questions which ask about their experiences using science museums in their teaching, opinions about post-field trip activities, and the reasons why they did not want to use science museums in their teaching.

For the question asking if they had experiences using science museums in their teaching, 39.3% of the respondents answered that they had used science museum field trips as a teaching strategy and 58.4% of them had not used science museum field trips in their science teaching yet.

Most teachers who have used science museums in their teaching gave club activity and homework for vacation as the highest and second highest answers to the question about the examples of use of science museums in their teaching (Table 3). These results show that the secondary school science teachers are not actively using science museums in their science teaching when we consider the situation that most science museums are located in metropolitan areas. However, elementary school teachers used science museums in various ways, such as vacation homework, discretionary classes, enrichment/supplementary

**Table 3**  
*Response for the question concerning which cases the teachers use science museums in their teaching (multiple responses)*

response	number	pct of responses	pct of cases
Club activity	78	54.2	73.6
Vacation homework	31	21.5	29.2
Enrichment / supplementary course in relation to regular science classes	6	4.2	5.7
After school activity	5	3.5	4.7
Home-study task for Saturdays-off	5	3.5	4.7
School course for Saturdays-off	3	2.1	2.8
Discretion class	3	2.1	2.8
Other	13	9.0	12.3
Total	144	100.0	135.8
151 missing cases, 106 valid cases			

courses related to regular science classes and club activities (Choi *et al.*, 2006). The reason for the difference between elementary teachers and secondary teachers can be inferred from the fact that elementary teachers have more flexible school programs than secondary school since they teach all the subjects for one class in the elementary school.

The most common response to the question of what teachers do for a post field trip activities was 'reflection paper writing' with 49.6% of respondents (pct of cases is 53.3%, pct of cases will be omitted after this), followed by 'no specific activity' (18.6%), 'discussion' (16.8%), and 'evaluation and feedback for field trip work sheet' (13.3%) (Table 4). However, most of the respondents answered 'evaluation and feedback for field trip worksheet' (41.9%) and 'enrichment/supplementary course with relation to regular science classes' (30.1%) for a proper post-field trip activity (Table 5), which were rarely used in their actual teaching. The opinion of 'no specific post activity is needed' was just 1.5%, which is second highest in their actual teaching. These results show that the teachers did not endeavor to make field trip experiences meaningful in their teaching for many reasons, even though they fully knew what should be done.

As previously stated, 39.3% of our respondents possessed experience using science museums in their teaching; however, only 7% of these teachers responded that they used science museums actively in their

**Table 4**  
*Responses to the question about what teachers do for post-field trip activities (multiple responses)*

response	number	pct of responses	pct of cases
Reflection paper writing	56	49.6	53.3
No specific activity	21	18.6	20.0
Discussion	19	16.8	18.1
Evaluation and feedback for field trip worksheet	15	13.3	14.3
Enrichment / supplementary course related to regular science classes	2	1.8	1.9
Others	0	0.0	0.0
Total	113	100.0	107.6
152 missing cases, 105 valid cases			

**Table 5**

*Responses to the question asking what constitutes proper post field trip activities (multiple responses)*

response	number	pct of responses	pct of cases
Evaluation and feedback for field trip worksheet	111	41.9	45.9
Enrichment / supplementary course related to the regular science class	80	30.1	33.1
Discussion	52	19.6	21.5
Reflection paper writing	18	6.8	7.4
No specific activity	4	1.5	1.7
Other	0	0.0	0.0
Total	265	100.0	109.6
15 missing cases, 242 valid cases			

**Table 6**

*Reasons why teachers do not actively use science museums in their teaching (multiple responses)*

response	number	pct of responses	pct of cases
No science museum nearby	74	19.1	58.7
A lot of courses in school curriculum	70	18.1	55.6
Too many students to lead	55	14.2	43.7
No time to go to the museum	41	10.6	32.5
Complicated bureaucratic procedures for science museum field trips	29	7.5	23.0
No information for science museums	26	6.7	20.6
No relevance to school science learning	21	5.4	16.7
Poor facilities or contents at science museum	21	5.4	16.7
Anxiety about incidents during field trips	20	5.2	15.9
No benefit for students	15	3.9	11.9
No interest of teacher him/herself about museum field trips	11	2.8	8.7
Other	4	1.0	3.2
Total	387	100.0	307.1
118 missing cases, 126 valid cases			

teaching. As shown in Table 6, the main reasons why teachers do not actively use science museums in their teaching were: 'no science museum nearby' (19.1%),

'a lot of courses in school curriculum' (18.1%), 'too many students to lead' (14.2%), most of which were related to specific circumstances. However, there were some reasons that related to the level of the content at science museums and relevance with school curriculum, such as: 'no relevance to school science learning' (5.4%), 'poor facilities or content at science museums' (5.4%), 'no benefit for students' (3.9%), and so on. Other answers included: 'stereotyped exhibitions', 'poor facilities', 'exhibits not for education but for interest', 'no repair of broken facilities', 'not being up to the standards of high school students', and so on. These results show that we should be more concerned about maintaining and repairing facilities, and also making the content of science museum more relevant to the school curriculum.

## 2. Secondary school science teachers' perceptions of educational effects of science museums

The researcher developed eight Likert scales to examine teacher's perceptions of educational benefits of science museums referring to numerous studies (Chang & Choi, 2006b; Choi & Kim, 2005; Dierking & Falk, 1994; Falk & Dierking, 2000; Henriksen & Frøyland, 2000; Henriksen & Jorde, 2001; Koster, 1999; Lee *et al.*, 2005; Semper, 1990; Wellington, 1990) on the educational effects of science museum field trips.

As shown in Table 7, teachers gave the highest grade to the question of 'science museum field trips are beneficial for arousing interest in science (3.98

**Table 7**

*Teachers' perceptions of the educational effects of science museum field trips*

Science museum field trips are beneficial for...	average
school work and understanding scientific concepts.	3.40
developing creativity.	3.17
understanding scientific development and recent science and technology.	3.35
understanding the relationship between science, technology and society.	3.29
developing career awareness.	2.98
understanding the nature of science.	3.09
life-long education.	3.36
developing their interest in science.	3.98

points)' and next in order were 'school work and understanding scientific concepts (3.40 points)', 'using science museum as a place for life-long education (3.36 points)', 'understanding scientific development and recent science and technology (3.35 points)'. These results allow us to infer the purposes for which secondary science teachers want to use science museums. Furthermore, for the items given low ratings, we can infer some of the weak points of our science museums.

### 3. Science teachers' preferred educational programs at science museums

The teachers wanted to use science museums in the future for: 'club activity' (36.2%), 'home-study task for Saturdays-off' (18.0%), 'homework for vacation' (14.2%), and so on (Table 8). However, only 6.1% of the teachers wanted an 'enrichment/supplementary course relating to regular science classes'. Considering the results of Table 6, we can attribute the results not to the insignificance of the educational effects of science museums, but to the difficulties of inflexible management of the curriculum in secondary school compared to elementary school.

As shown in Table 9, the first choice of teachers who wanted to use science museums was 'structured/organized programs such as museum tours, science camps or experimental activities' (28.4%), and the

**Table 8**

*Teachers want to use science museums in the future for: (multiple responses)*

response	number	pct of responses	pct of cases
Club activity	153	36.2	63.0
Home-study task for Saturdays-off	76	18.0	31.3
Homework for vacation	60	14.2	24.7
School course for Saturdays-off	52	12.3	21.4
Discretionary class	37	8.7	15.2
Enrichment/supplementary course related to regular science classes	26	6.1	10.7
After school activity	14	3.3	5.8
Other	1	0.2	0.4
Do not want to use in any way	4	0.9	1.6
Total	423	100.0	174.1
14 missing cases, 243 valid cases			

**Table 9**

*The educational programs of science museums that teachers wanted to use (multiple response)*

response	number	pct of responses	pct of cases
Structured/organized programs such as museum tours, science camps or experimental activities	173	28.4	67.8
Mobile museum which allows teachers to borrow exhibits or equipment for experiments from the museum	124	20.3	48.6
In-service programs (e.g. teaching methods for museum exhibits and educational programs, new science and technology, etc.)	114	18.7	44.7
Science museum field trips related to school curriculum	110	18.0	43.1
Pre- or post-activity for field trips and offering worksheets	88	14.4	34.5
Other	0	0.0	0.0
Do not want to use any program	1	0.2	0.4
Total	610	100.0	239.2
2 missing cases, 255 valid cases			

second choice was a 'mobile museum which allows teachers to borrow exhibits or experimental equipment of museums' (20.3%) Only one science teacher did not want to use any programs offered or potentially offered by museums.

When considering this result as it relates to previous results of Table 3, teachers want science museums to offer educational programs suitable for their purposes, such as club activities or home-study tasks for Saturdays-off, and so on. This is because most teachers have difficulty relating museum field trips to their formal education due to their heavy responsibilities; therefore, they just want students to finish their learning during field trips.

The rank in Table 9 coincides with the result of Choi *et al.* (2006)'s survey of the perceptions of elementary school teachers, except for the fact that the choice of 'science museum field trips related to school curriculum' was ranked second in that research.

This difference is probably due to the more flexible management of curriculum in elementary schools than in secondary schools. They nevertheless perceive that museum exhibits and experimental equipment are useful in school education because 'mobile museums which allow teachers to borrow exhibits or experimental equipment of museum' ranked second in this survey.

53 teachers responded to a subjective question which asks them to state why they want to use specific programs. Teachers who wanted structured programs responded with reasons such as: 'students can experience good quality programs through structured programs (7, 2.7%)' and 'teachers are not able to understand all contents offered at museums (5, 1.9%)'; those who wanted experimental activities or science camps responded with reasons such as: 'learning by direct and actual experiences is important and effective (6, 2.3%)' and 'there are expensive facilities at science museums which schools cannot afford to have (8, 3.1%)'.

Teachers who wanted mobile units from museums stated that 'it is difficult to go to the museums (2, 0.8%)' and 'there are expensive facilities in science museums which schools cannot afford to have (2, 0.8%)'. The reasons for wanting in-service programs included: 'to develop my abilities as a teacher (1, 0.4%)', 'to understand recent developments in science and technology (2, 0.8%)' and 'to guide students better after learning about exhibits and educational programs through in-service programs (3, 1.2%)'. Teachers who wanted to participate in science museum field trips which are related to school curriculum cited such reasons as: 'they help students understand difficult scientific concepts which are hard to explain in classroom (3, 1.2%)', and 'to enhance students' interest in school science (11, 4.3%)'. The reasons for wanting pre- or post-activities in conjunction with field trips and provision of worksheets were 'to make field trip experiences more meaningful for example, to minimize students simply walking through exhibits (1, 0.4%)', 'to give them an opportunity to explore and learn scientific principles from exhibits (1, 0.4%)', 'to make science museums for places of learning (2, 0.8%)' and 'to stimulate them to study autonomously (1, 0.4%)'.

#### 4. Teacher activities in which science teachers want to participate

Teacher activities that science teachers want to participate in included: 'teacher associations at science museums' (19.4%), 'managing structured programs' (18.7%), 'developing pre- or post-activities and worksheets' (18.4%), 'developing structured programs' (18.2%), and so on. 10 percent of these teachers did not want to participate in any activity (Table 10). This result shows that 90% of teachers who answered these questions wanted to participate in various programs offered through science museums, such as developing and managing the educational programs at these museums. Such programs would be more effectively designed in relation to formal science learning if science teachers participated in managing and planning the educational programs at science museums since they are science education professionals. In other words, this participation would make educational programs at science museums have greater relevance and more positive effects on formal science education. Accordingly, we need to look for ways to enable teachers to participate in developing and managing educational programs in science museums.

**Table 10**

*Teacher activities in which science teachers wanted to participate (multiple responses)*

response	number	pct of responses	pct of cases
Teacher associations at science museums	81	19.4	34.3
Managing structured programs (e.g. museum tours, camps, experiments, etc.)	78	18.7	33.1
Developing pre- or post-activities and worksheets	77	18.4	32.6
Developing structured programs	76	18.2	32.2
Developing museum exhibits	39	9.3	16.5
Other	25	6.0	10.6
Do not want to participate in any activity	42	10.0	17.8
Total	418	100.0	177.1
21 missing cases, 236 valid cases			

Thirty-six teachers answered an open-ended question which asked the reasons why they wanted to participate in certain activities. Regarding participating in or managing teacher associations at science museums, they wanted to 'make science museums as places for sharing information about science, teaching experiences and using museum resources (2, 0.8%)', 'to develop effective programs for students (1, 0.4%)', and so on. Teachers who wanted to manage structured programs stated that 'the most popular programs are ones that students can experience (2, 0.8%)', 'to develop students' interest in science by performing experiments (2, 0.8%)' and 'to make science museums as an effective learning place (3, 1.2%)'. Their stated reasons for developing pre- or post-visit activities and worksheets were: 'we need activities which are related to school education (1, 0.4%)' and 'to review museum field trip learning (1, 0.4%)'. Reasons for wanting to assist in developing structured programs included: 'most teachers want structured programs for field trips (5, 2.0%)' and 'students will show their interest for structured programs (4, 1.6%)'. Their cited reasons for wanting to develop museum exhibits were: 'to participate in developing teaching-learning resources which students cannot experience in school (1, 0.4%)' and 'to develop out-of-school science learning materials (2, 0.8%)'.

#### 5. Teachers' opinions on the active use of educational programs at museums

As shown in Table 11, to promote more active use of educational programs at museums, teachers wanted 'greater diversity in programs' (20.0%), 'a flexible school schedule' (15.1%), 'disposition of science education professionals for science museums' (12.3%), 'educational programs for different age' (11.9%), 'in-service programs in conjunction with museum educational programs' (10.7%), 'worksheets for field trips' (10.7%), 'publicly available information about science museums' (10.2%), and 'regular change of exhibits and programs' (9.3%).

### IV. Summary and Further Study

This study examined secondary school science teachers' current use of science museums in their

**Table 11**

*What is needed for active use of educational museum programs with relation to formal education (multiple responses).*

response	number	pct of responses	pct of cases
Diversity in programs	114	20.0	67.5
Flexible school schedule	86	15.1	50.9
Disposition of science education professionals for science museums	70	12.3	41.4
Educational programs for different age	68	11.9	40.2
In-service programs with museum educational programs	61	10.7	36.1
Worksheets for field trips	61	10.7	36.1
Publicly available information about science museums	58	10.2	34.3
Regular change of exhibits and programs	53	9.3	31.4
Other	0	0.0	0.0
Total	571	100.0	337.9
88 missing cases, 169 valid cases			

teaching and their preferences for educational programs in museums to make educational programs more closely related to formal education.

Forty percent of these teachers had experiences using science museums in their teaching, but most of them had minimal or only personal experiences with no relevance to formal education. This result is not due to these museums' insignificant educational effects, but because of a lack of external and administrative support, such as difficulty fitting field trips into school schedules, lack of proper museums, poor facilities or content at science museums, stereotypical exhibitions, and so on. We can infer from our results on teachers' perceptions of educational effects of science museums that they want to use museum field trips and would make an effort to make field trip experiences more meaningful to their students. These teachers wanted more structured programs at museums so that students could experience good quality of programs and exhibits lending services via mobile museum which schools cannot afford to provide themselves. These programs would make it easier for students to experience science museums which they are not likely to visit. They wanted to develop



their abilities as teachers and to learn how to use museum resources in their teaching by taking in-service programs. In addition, they wanted museums to offer them pre- or post-visit activities in conjunction with field trips, and worksheets which would make field trip experiences more meaningful.

This study has limitation to be generalized since the subjects of this research were only from the secondary science teachers in Kyunggi area who participated in professional development program for first grade license, but we can make some suggestions from our research results.

First, we should be more concerned about improving quantity and quality of science museums in Korea. It was more difficult for teachers to conduct field trips when there was a lack of science museums nearby, no information on the existing science museums and their exhibits, and no exhibits relevant to school science. If we could provide science exhibits and educational programs for children in their own communities even in locations where there is not a large science museum, teachers could use these facilities in their teaching without assuming the burden of taking a group of students on a science museum tour to a distant location.

Second, we need more science education professionals at science museums who can plan and manage museum programs which teachers want to use. Internationally well-known science museums host organizations of professionals which include scientists, science educators, curators, designers, and so on, and try to offer various educational programs in their museums (Yoo & Chang, 2004). Since many science teachers expressed an interest in participating in teacher activities related to science museums, we need to make an effort to include them in developing and managing museum programs. Museum programs will then have greater relevance to formal science education when reflecting teachers' ideas for developing and improving museum programs would presumably make them more valuable and instructive.

Most of educational activities on science field trips in Korea entailed merely viewing exhibitions; therefore, we need to improve programs in museums more instructive and beneficial (Kim, 2004). However, there is a growing interest in educational effects of

science museums. The results of our research demonstrate that many science teachers in Korea do have an interest in utilizing and managing museum programs; thus, we anticipate that science museums will use the counsel of Korean teachers more effectively and meaningfully in the future.

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