

Korean women' experiences with science activities and their needs for Science programs

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This paper reports the results of the survey of 1,104 mothers of elementary and middle-school students and 174 female science teachers and researchers in Korea to assess their level of understanding of science technology in general and their experiences and needs for science programs. It was found that Korean mothers were neither substantively understanding science technology, nor had sufficient opportunities to participate in science programs or activities. Especially, female science teachers and researchers wanted to have more opportunities to participate in the activities related to science culture popularization. .

Key words: women, scientific culture, science programs

1. Introduction

Recent development of new technology such as Bio-tech has increased the need of women's understanding of science technology. For instance, the development of bio-technology may affect women's life especially including conception and childcare. Therefore, the necessity of enhancing women's understanding the science technology and culture is increasing. Women should not be just consumer but critical user of science technology in order to understand the relation between their lives and science. Now is the time to encourage more women to participate in the expansion process of scientific culture and activity programs with the comprehensive understanding of science technology, taking into account the fact that the science technology is more engaged with everyday life and that people influenced by it are not all experts. To that end, multi-faceted measures need to be explored by enhancing general women's understanding of the changes in science technology and its cultures and also by supporting female experts in science and technology field so that they can contribute to the scientific advance.

2. Research Questions

- 1) How's the Korean women's understanding of and interest in knowledge of science & technology?
- 2) What are the experiences of Korean women concerning science activities?
- 3) What elements should be called for programs for scientific culture?
- 4) How active are they regarding the participation in relevant programs?

3. Method

A self-administered survey was used in the study. Questionnaires were distributed to two groups. One group was mothers with elementary and middle school students and 1,104 mothers responded to the survey. The other was female experts such

as teachers, researchers and university professors in the science and technology field and 174 female experts participated in the questionnaires.

4. Research Results

4.1 Korean Mothers' Understanding of Science Technology

<Table 1> when they needed science-related knowledge or had questions about it

| Responses | % |
|---|-------|
| When their children asked about science-related questions | 32.2% |
| When they came across news about new technological knowledge or findings | 29.1% |
| When they realized they were not aware of commonly-used scientific knowledge or terms | 17.8% |
| When they felt inconvenience since they don't know how to use electric appliances | 12.0% |
| When they purchased computers and home appliances | 8.9% |

<Table 2> what they would do in order to acquire scientific knowledge they need

| Responses | % |
|---|-------|
| Looking up relevant books or searching it on the internet | 42.8% |
| Reading newspapers and watching TV programs | 21.2% |
| Asking family members | 16.6% |
| Asking friends or experts | 13.0% |
| Making no particular efforts | 6.4% |

* As the age is younger, respondents tend to acquire necessary information through books or the internet.

○ Respondents were asked why they think that science is difficult.

- Only 4.0 percent answered that they don't think that science is difficult, meaning that many women feel that science is difficult. 43.5 percent responded that it is due to their short experience for science-related learning, meaning that women have fewer opportunities to access science and technology.
- Other responses include 25 percent for the reason that they don't think science is closely related to their daily life and 23 percent for those who think science terminology is too difficult to understand.

* As the age is older, respondents tend to think that science is difficult, which signifies the need for programs that would help women feel familiar with science.

4.2 Experiences with Science Activities

4.2.1 Mother Group

<Table 3> Science-related experiences for the past year (multiple responses)

| Responses | % |
|--|-------|
| TV or radio programs regarding science/nature | 90.5% |
| Newspapers, books, and magazines carrying science articles | 84.4% |
| Visiting science center or museum | 62.9% |
| | 59.3% |

- On the other hand, 79.9 percent answered that they had never participated in any kinds of science education programs such as lectures and science camps, meaning that many women have little experience with any educational programs in which they can acquire knowledge.

* The participation rate showed differences depending on the age of respondents. Mothers over 30 years old recorded relatively high rate in the experience with science centers or museums, while those in their 20s more tended to participate in science lectures, camps, and various events hosted by schools and science organizations. It can be thought that such differences were caused by the age of their children.

<Table 4> Major motives of mothers' participation in science-related events and activities

| Responses | % |
|---|-------|
| For educating their children | 72.1% |
| For spending time with their family and friends | 13.7% |
| For satisfying their own interest | 13.4% |
| Others | 0.8% |

○ Respondents were asked how much they understand science events or activities they took part in.

- Only 4.2 percent answered they could not understand at all, and the respondents who said little difficult or mostly understandable are 47.5 percent and 48.3 percent respectively.

* The level of understanding showed no relation with the age of respondents, but close relation with education level. Mothers with high school diploma or less tend to experience a significant difficult in understanding, signifying the need to develop science programs reflecting the education level of parents.

<Table 5> Reason of difficulty in understanding science programs they took part in

| Responses | % |
|---|-------|
| Because they had no chance for real science experiments or experience | 41.9% |
| Because there were too many scientific terms or explanation | 25.1% |
| Because they had not heard scientific explanation before | 13.7% |
| Because the explanation sounded boring and stiff | 11.8% |
| Because they had no enough explanations | 7.5% |

* The age of respondents showed no relation to their level of understanding, but the reasons of their difficulty in understanding science programs they took part in showed differences depending on the education level of respondents. Those with middle school diploma or less said that it was because they had not heard scientific explanation before (41.7 percent), while those with high school diploma or more said that it was because they had no chance for real science experiments or experience (41~44 percent). Such result signifies the need to make each scientific explanation or program composition different according to the education level of parents.

○ when they were asked how much helpful those science activities were to them, the rate of respondents with 'Not helpful at all' was 27%. Most respondents seemed positive, saying that it was partly or very helpful. However, it is necessary to pay a careful attention to those who answered that the programs were not helpful at all, considering that their motives for participating in science-related activities could be weakened in the future.

4.2.2 Expert Group

○ When asked whether expert group had participated in activities to expand scientific culture, 37.9 percent said yes, while 62.1 percent said no. The participation rate of school teachers recorded 31.3 percent, far lower than that of university professors and researchers, 43.6 percent.

<Table 6> Type of activities

| Responses | Teachers | Researchers/Professors |
|---|----------|------------------------|
| Science-related organization activities | 30.4% | 32.8% |
| Planning of scientific culture events or exhibition | 39.1% | 18.8% |
| Writing books or science articles | 18.8% | 21.7% |
| Educating or lecturing the general public about science | 4.3% | 17.2% |
| Advising to government policies | 4.3% | 12.5% |

- The group of school teachers is most active in participating in the planning of events or exhibitions, accounting for 39.1 percent, while the group of university professors and researchers is most active in science-related organization activities (32.8%). It was found that school teachers had relatively fewer chances for lecturing or policy advising (4.3% respectively).

○ Respondents with no experience were asked of the reason of why they had not participated in.

- The rate of respondents with 'due to not enough time' was 47.9%. And 'due to not enough appropriate opportunities' was 40.7%. School teachers found it more difficult to spend enough time for such experiences than professors and researchers do, while researchers and professors said that they had not many appropriate opportunities. In this regard, if opportunities in accordance with their needs or capabilities are properly offered, the participation rate of women experts is likely to increase.

○ When those expert group were asked about the barriers they had experienced during their participation in science-related organization, 29.7% found it difficult to develop programs, 28.4% pointed out a financial problem. 24.3% said that little interest of the general public was hard to deal with, while 13.7% pointed out the problem of minority group of female members in the science-related organizations.

4.3 Demands of Programs Related to Scientific Culture

○ Respondents were asked to choose from the list of four sectors which they believe most necessary area to develop scientific culture programs targeting women.

<Table 7> Program area with high priority

| Areas needed | Mothers | Experts |
|--|---------|---------|
| Scientific knowledge regarding everyday life | 46.7% | 47.1% |
| Scientific knowledge for children education | 41.3% | 23.3% |
| Social issues involving science | 8.3% | 15.7% |
| Training program to nurture distributors of scientific culture | 3.7% | 14.0% |

- Both groups paid their most attention to programs for explaining science in everyday life in a relatively easy manner. While mothers showed a great attention on children education, experts also pointed out the need of various lecture programs related to social issues and training programs to nurture distributors of scientific culture as well.

4.3.1 Demands of Programs for Scientific Knowledge of Daily Life

○ Respondents were asked which subject would be most necessary, if the programs for explaining science of everyday life in relatively easy manner are established.

- “Health, disease, and understanding of human body” is selected as the most necessary subjects by both mothers (56.4%) and experts (53%). The next necessary subject is concerning machines and equipments, such as home appliances or vehicles, which could enhance the conveniences of everyday life. In this case, the number of experts who selected this answer was relatively higher (25%) than that of mothers (16.1%). As the age of mothers was younger, more number of mothers chose this subject. The number of mothers who selected the “effect and storage of foods” accounted for 14 percent, while that of experts accounted for 11 percent.

4.3.2 Demands of Programs Related to Social Issues

○ Respondents were asked which subject would be most necessary to women in general, if educational programs on social issues involving science are established.

- Unlike answers to other questions, results of this question revealed a clear difference between the two groups. Of mother group, 41.1 percent selected “food security issue on genetically modified organisms”. It seemed that such high rate was strongly influenced by the position of women in families as householders. On the other hand, experts chose environmental issues, such as air pollution and nuclear development, reaching 41.7 percent of the total.

4.4.3 Demands of Programs to Nurture Distributors of Scientific Culture

○ Respondents were asked which element would be most necessary, if programs on “training for distributor of scientific culture” are established. The responses were as follows, showing differences between the two groups.

- Of mother group, 50.6 percent viewed that training instructor who can teach scientific knowledge in an easy and interesting manner is most needed. Also, 43.8 percent of experts chose this as well. In particular, 59.2 percent of school teachers thought it most critical and necessary element.

- The next important element that mother group chose was the "education of guide for easy explanation in science centers or museums"(16.1%), while fairly large number of experts chose "civic group activities or voluntary service education in relation to scientific culture"(22.5%).

4.4.5 Intention of participation of science programs

- Questions were given to identify the intention of mothers' participation and experts' contribution using their expertise, if such programs related to scientific culture are established.
- Of all mothers surveyed, 90 percent responded positively. In particular, those in their 30s showed most active attitude, which was probably due to their children's age. Of expert respondents, 83 percent answered that they would be able to make a contribution, using their expertise. Though the figure is lower than that of mother respondents, the result is encouraging in general.

5. Conclusion and Discussion

The survey result shows that due to the nature of mother group, the most influential motive for their participation in science-related experience or activities is closely related to the education for their children. However, mothers often found science very difficult, since they haven't taken enough opportunities regarding science while their growing up, or through their daily life. One of the reasons that made women feel difficult in understanding science is that it was impossible to carry out experiments or directly experience relevant activities. Therefore, what are needed is the programs that would enable women directly and simultaneously see, feel, and experience science, rather than only keep providing theory in classrooms.

Of female expert respondents, only 36.5 percent answered that they had participated in activities for spreading scientific culture. The participation by school teachers is in particular low due to not enough time, indicating that women are in a difficult position to actively participate in external programs, while carrying out education and learning activities simultaneously. Since professors and researchers have pointed out the lack of appropriate opportunities, various channels that would allow female experts to take part in several activities for expanding scientific culture are needed.

The most necessary subject targeting women in scientific culture programs was the scientific knowledge closely related to daily life, which both mothers and experts regarded important. Regarding other necessary subjects of scientific programs, experts answered that various programs are almost equally important, while mothers tended to show a strong interest in child education only and didn't pay much attention to other programs. In this regard, it is found that plans in order to diversify the interest of parents are also needed, and that during the process, the role of experts are very important.

Finally, when asked about their intention to participate in scientific culture programs, 90 percent of mothers answered positively, while more than 83 percent of expert respondents answered that they would be able to make a meaningful contribution to the programs by using their expertise. Therefore, if more various programs are established in the future, the possibility to encourage women's interest in science technology and participation will be heightened.