

Encouragement of girls to choose science courses

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**Collaborative Organization for Research in Women's Education of Science, Technology,
Engineering, and Mathematics (CORE of STEM)**

Ochanomizu University



**理系女性教育開発共同機構
CORE of STEM**

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CORE of STEM, Ochanomizu University

Ochanomizu University

- One of 2 national universities for women
- Originally founded in 1875 as Tokyo Women's Normal School, Japan's first institution of higher education for women
- Highly specialized education to develop women leaders
- Kindergarten, Elementary School, Junior High School, Senior High School are attached

CORE of STEM

- (**C**ollaborative **O**rganization for **R**esearch in Women's **E**ducation **of** **S**cience, **T**echnology, **E**ngineering, and **M**athematics)
- Collaborative organization with Nara Women's University
- Established in 2015
- Mission
 - ✓ Encouragement of girls to choose science courses
 - ✓ Fostering female leaders who will work actively worldwide in STEM field

Comments for the encouragement of girls to choose science courses

- from discussion and survey results -

A. Girls are apt to make a realistic choice.

- Self-confidence is important for girls.
- Girls are apt to have feeling of anxiety.
- Circumstances where girls freely think and decide is required.

B. Girls are more influenced than boys by family (especially mother) and schools.

- Public idea especially on roles of male and female should be improved.
- Gender stereotypes: STEM for male, non-STEM for female.
- Mothers' opposition make it difficult for girls to choose scientific courses, but mothers' supports encourage the choice.
- Parents having non-STEM background are apt to expect for their children to choose non-STEM courses.

C. Education from early stage is important.

- Merits of the choice of scientific courses should be emphasized from elementary and secondary school ages.
- Education from early stage is important to guide girls to science field.
- Experiences/experiments of electricity, mechanics, programing, and robot at elementary and junior high school age promote choice of scientific courses.

D. Role models

- Role models at various levels should be offered.

E. Boys and girls tend to have curiosity and understand things differently.

F. Choice of STEM/non-STEM and majors is influenced by strong or weak subjects.

Activities of CORE of STEM

– For the encouragement of girls to choose science courses –

- a. Symposia for female secondary school students**
- b. Science seminars for female elementary and secondary school students**
- c. Science seminars for families**
- d. Science seminars for parents**
- e. Booklets introducing research studies at universities**
- f. Supplementary teaching/learning materials in physics for female high school students**
- g. Development of teaching methods for improving girls' interests and curiosities**

a. *Symposia for female secondary school students*

Outline

- Presentations are given by young females having science background on schooldays through working lives including their job dreams.
- Presentation + panel discussion + tea party
- Main targets female junior and senior high school students and their parents.

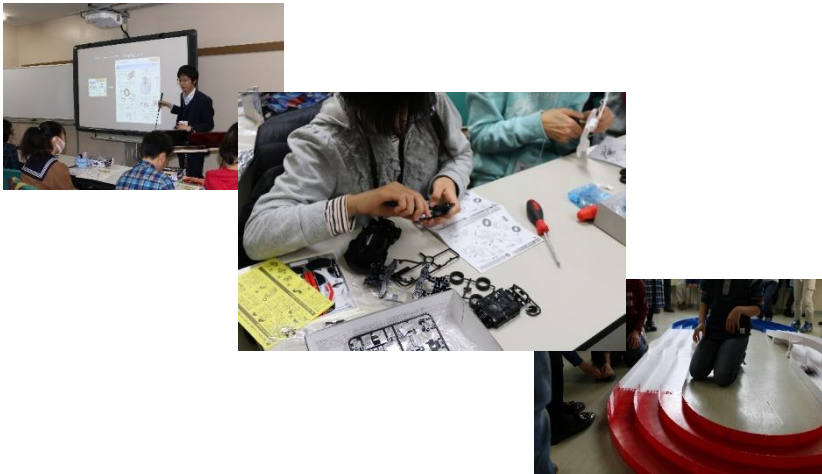
Results

- Junior and senior high schoolers and their parents can have better understanding on the life after they choose STEM as their majors.



b. Science seminars for female elementary and secondary school students

Manufacturing seminar – Making mini 4WD car model



Experimental seminar

- Power generation and energy conversion
- Electronic circuit



Programming seminar – Moving a robot by programming



Female students, who usually do not have such experience, can experience them and study the mechanisms.

c. Science seminars for families

Observation meeting of cicada molting

Outline

- Observation of cicada molting for kindergarten children and their families

Results

- Parents, especially mothers, as well as children were interested in the animals' grow and change, and it gave an opportunity to talk about science among families.



Experimental class on power generation

Outline

- Lecture + experiments on electric generator, motor, optical communication, etc.

Results

- Mothers with non-STEM background enjoyed the experiments.

d. Science seminars for parents

Learning through experience on math and physics

Outline

- **Prior study + experience at science museum**
- **Participants are parents of kindergarten children.**

Results

- **Mothers who had been poor at science and/or math at school age could enjoy them at the seminar.**
- **Many of the participants wanted to come back to the museum and enjoy with their children.**

e. *Introductory booklets on research studies at universities*

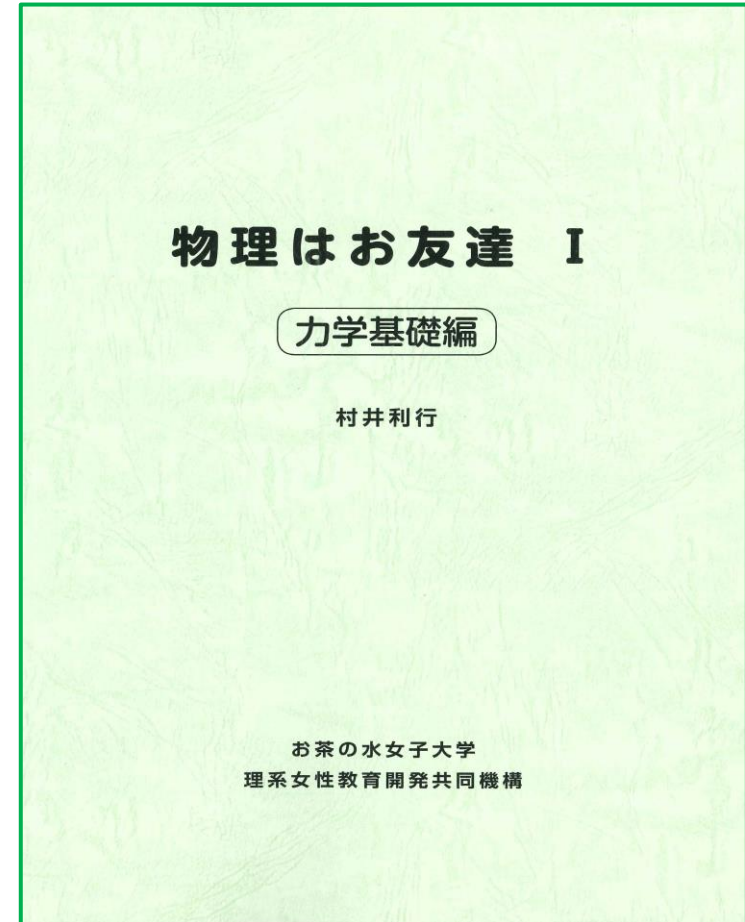
- Life science
- Math and information science
- Physical and material science
- Applied science and engineering
- Earth science



f. *Supplementary teaching / learning materials in Physics for female high school students*

Based on teaching experiences of the attached high school

“Physics is my friend I. Force, motion, and energy” has been developed.



Collaboration with teachers of the affiliated schools

- ✓ Panel discussions in the symposia for junior and senior high school female students are facilitated by teachers of the affiliated schools.
- ✓ Supplementary teaching/learning materials “Physics is my friend” are being developed.
- ✓ Science seminars for families are being developed.
- ✓ Science seminars for parents are being developed.
- ✓ Teaching methods for improving girls’ interests and curiosities are being developed.

Summary

| | A. Realistic choice with confidence | B. Parents' influence | C. Education from early stage | D. Role models | E. Girls' characteristics | F. Influence of subjects students are good/poor at |
|--|-------------------------------------|-----------------------|-------------------------------|-----------------------|---------------------------|--|
| a. Symposia for junior and senior high school female students | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | | |
| b. Science seminars for female elementary and secondary school students | | | <input type="radio"/> | | <input type="radio"/> | <input type="radio"/> |
| c. Science seminars for families | | <input type="radio"/> | <input type="radio"/> | | | |
| d. Science seminars for parents | | <input type="radio"/> | <input type="radio"/> | | | |
| e. Booklets introducing research studies at universities | <input type="radio"/> | | <input type="radio"/> | | | |
| f. Supplementary teaching/learning materials in physics | <input type="radio"/> | | | | <input type="radio"/> | <input type="radio"/> |
| g. Collaborative development of teaching methods with affiliated school teachers | | | | | <input type="radio"/> | <input type="radio"/> |