

The Education of Scientific Ethics of Science Research in Senior High School, a Pioneer in Japan

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1. Introduction

In 2006, as soon as I started teaching science research, I felt it was the necessity of education of scientific ethics. At that time, Scientific Ethics that was not yet implemented nationwide was offered as a school setting subject. I authored textbooks. For example, during the research of the sarcophagus, the following problems occurred. When summarizing the study of the sarcophagus for the ancient Great King in the premises of the school, in order to realize the size of the sarcophagus, the pictures of the students lying inside were taken and posted. When students applied for this paper to Japan Science and Engineering Challenge, students were pointed out that this picture is ethically problematic. After that, the STAP cell problem was reported, and this led to active social debate about ethical consideration for scientists. In the new School Curriculum Guidelines for high schools implemented since 2021, a new subject Exploring the Science is set up. In this textbook, a certain amount of paper will be devoted to scientific ethics. Since research activities such as Science Research are being conducted at senior high schools, education of scientific ethics is essential.

2. Specific guidance contents and method

Scientists are required to learn expert knowledge and skills as necessary qualities and qualities, but even widowed people, basic knowledge and ethics for science are required. Of course not only for students who intend to become scientists and engineers in the future, students who do not regard scientists or engineers as future occupations, to judge correctly about various problems occurring in society or about to happen. It is necessary to train the consideration that learns the knowledge that can be done and enables objective judgment as an individual.

Learning about scientific ethics begins before the search activity begins in earnest, and it is carried out simultaneously with the research until the exploration activity finishes. After studying basic ethics, students are divided into groups of 4 to 5 students, and group work is conducted on the themes set by the students themselves. Teachers do not teach as much as possible and try to watch the students' voluntary discussions. Ethics is fostered by mutual discussion between students and the sharing of problems found newly from there, and it is not something that teachers can unilaterally teach. This group work is divided into three times a year. The result of the discussion will be released in the form of oral presentation for the first time, poster presentation for the second time, presentation of thesis for the third time. The thesis is written by each student in a theme corresponding to the course of each student. All the recital are published for teachers and students of other schools, guardians and local residents. In addition, the papers compiled by the students are collected as student research papers and distributed free of charge.

Scientific ethics classes are conducted in the form of team teaching by multiple faculty members.

Continue checking with multiple different eyes until comment, in cooperation with science, mathematics, civil engineering, information, Japanese language, English, etc. centering on writers, in order to capture natural science in everyday life and connection with society, from educational contents to students.

3. Evaluation of Scientific Ethics

As education of scientific ethics progresses, the attitude of students to listen to news changes obviously. Students will be seen from critical viewpoint on the press and they will be judging things from a compound eye viewpoint. The teachers are paying attention to the contents and remark method which they had casually until now, and obviously the teacher's own ethics and human rights awareness are improving. Evaluate comprehensively with concrete evaluation items such as how participation in group research every class, and behavior at the poster session, etc.

Keywords: Science Research, Scientific Ethics, Group Work, Team Teaching, Compound Eye Viewpoint