

# A Novel Method of Introductory Education for Tribology through Problem-solving Game Activity: How Do You Win the Hearts and Minds of Children and Young People Who Will Bear the Future?

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It is said that it may become more difficult to secure researchers who will lead the next generation due to the decrease in the young population in recent years. In order to secure the next generation researchers, it is necessary for children and young people to be interested in science and engineering. The key here is how to amusingly show them the various academic aspects of tribology, which is complex and mysterious. Therefore, the author energetically strives to promote introductory educations for an enlightenment of tribology to the next generation using a novel education method that incorporates problem-solving game activity.

**Keywords:** education method, educational material, teaching practice, active learning, problem-solving game

## 1. Introduction

Research activities on tribology will definitely continue and develop in the future. Human resources will be needed to sustain the research activities. However, it may become more difficult to secure researchers who will lead the next generation due to the decrease in the young population in recent years. To solve the problem, the author energetically strives to promote introductory educations for an enlightenment of tribology to children and young people by using a novel education method that incorporates problem-solving game activity.

## 2. Aim and effect of incorporating problem-solving game activity into education

Children and young people could be turn away from science and engineering when they feel poor at learning the science subjects. If your way of teaching is wrong, you may instill a sense of difficulty into them. Therefore, the key is how to amusingly show them the various academic aspects of tribology, which is complex and mysterious. The author has designed a novel education method that incorporates problem-solving game activity, and developed various educational materials [1]. By this method, participants can immerse themselves in solving various problems (puzzles, quizzes and experiments) in a fun and exciting format like acting as a main character of a story. They get to learn the theory behind the teaching aids efficiently and pleasantly. Also, by doing activity on their own, they can develop their own way of thinking. Furthermore, they can develop their communication skills and social skills because they get to work in groups.

## 3. Introductory education for tribology

As introductory educations for tribology using the novel education method, two educational materials (two story lines) have been developed as shown in Fig. 1 [2]. The goals were following: (i) To be known the word “tribology” and to understand its meaning; (ii) To experience the mystery of friction and gain interest on it; (iii) To make them feel that friction experiments are fun and think about science through the activity; (iv) To experience the existence of surface asperities and

tribological phenomena by measuring surface roughness and performing friction experiments; and (v) To understand the contribution of tribological improvements to both the economy and the environment. The learning process can be naturally changed from passive learning to active learning through the experience of friction experiments as shown in Fig. 2. From the feedbacks received after the events, it was found that the novel method could ignite participants’ interests in science even more and greatly benefit them in the future.



Figure 1: Graphic image of the introductory education events for tribology.



Figure 2: Photographs during activity on sliding friction experiment (left) and rolling friction experiment (right).

## 4. References

- [1] Hase, A., “Introduction of “Problem-solving Game Activities” into Science Education,” Proc. of 2016 International Conference of EASE, Tokyo, 2016, 26O2K-1, A0045.
- [2] Hase, A., “Science Education for the Future of Tribology: New Educational Material to Introduce Tribology to Young Generation,” Proc. of the World Tribology Congress 2017, Beijing, 2017, id497848.