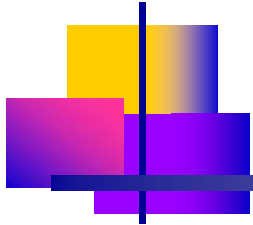


Engineering Education Instructed by Innovation Center for Research and Engineering Education in Utsunomiya University

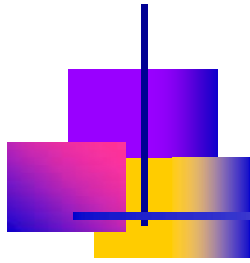


H. Sugiyama, S. Watanabe, J. Takaki,
A. Irie and H. Hasegawa

Innovation Center for Research and Engineering Education
Utsunomiya University
Japan



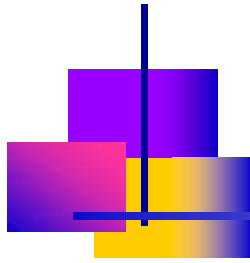
Innovation Center for Research and Engineering Education



Purpose

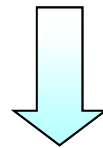
The purpose of this presentation is to give you overview of operations for Innovation Center for Research and Engineering Education, which is abbreviated to ICREE.

- Social background in Japan
- Organization of ICREE
- Problem-based learning for freshman
- Lecture for the latest industrial topics
- Internship program
- Project-based learning for graduate student
- Instruction and support for project proposed by student
- Contribution to local society
- Conclusions

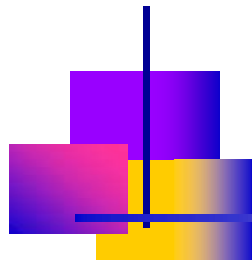


Social background in Japan

- Japan has no natural resources.
- Engineering industry contributes greatly to financial basis of Japan.
- The number of students who wish to go on engineering college decreases gradually linking with declining of birthrate.
- Japan is now facing challenges due to declining of birthrate.
- The status of engineer in Japan is relatively lower compared with the other jobs.

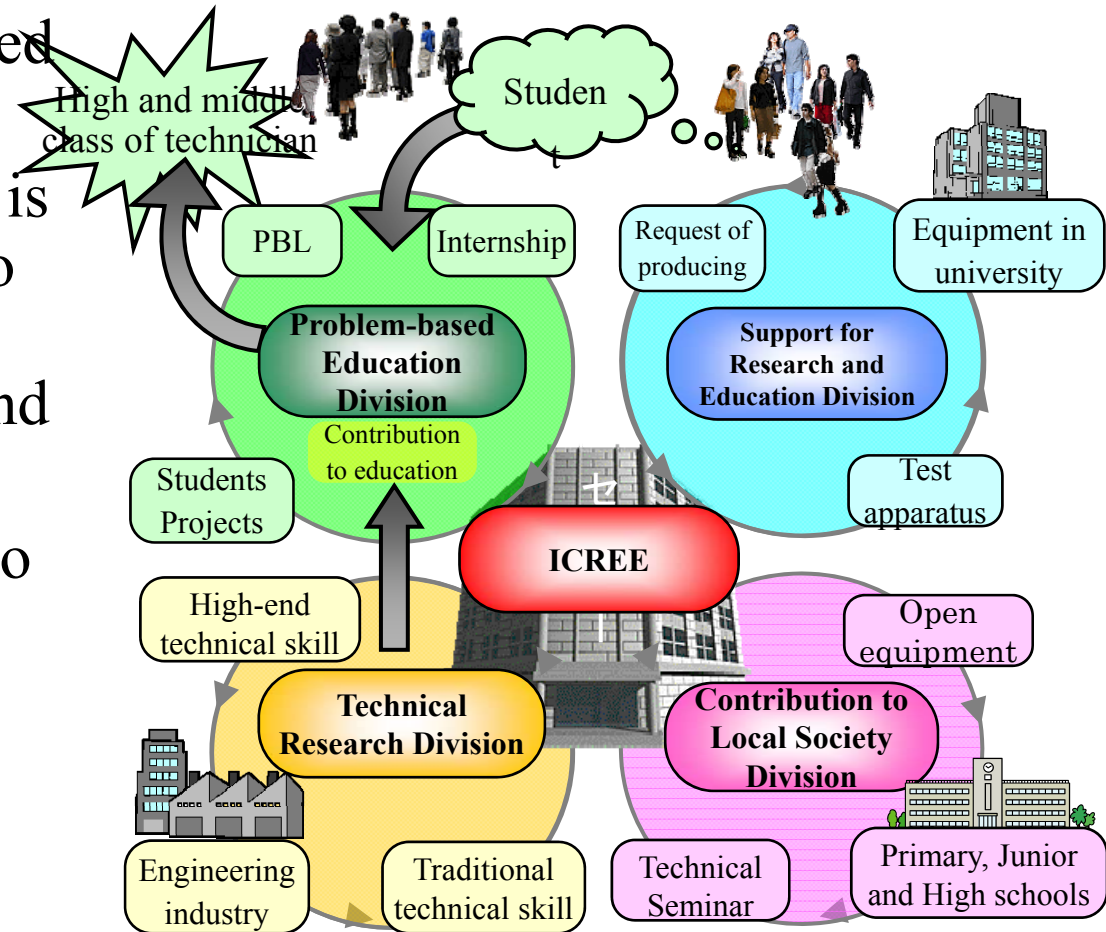


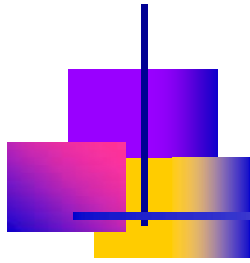
- Ministry of Education recognized the necessity of foundation of innovation center for engineering education.



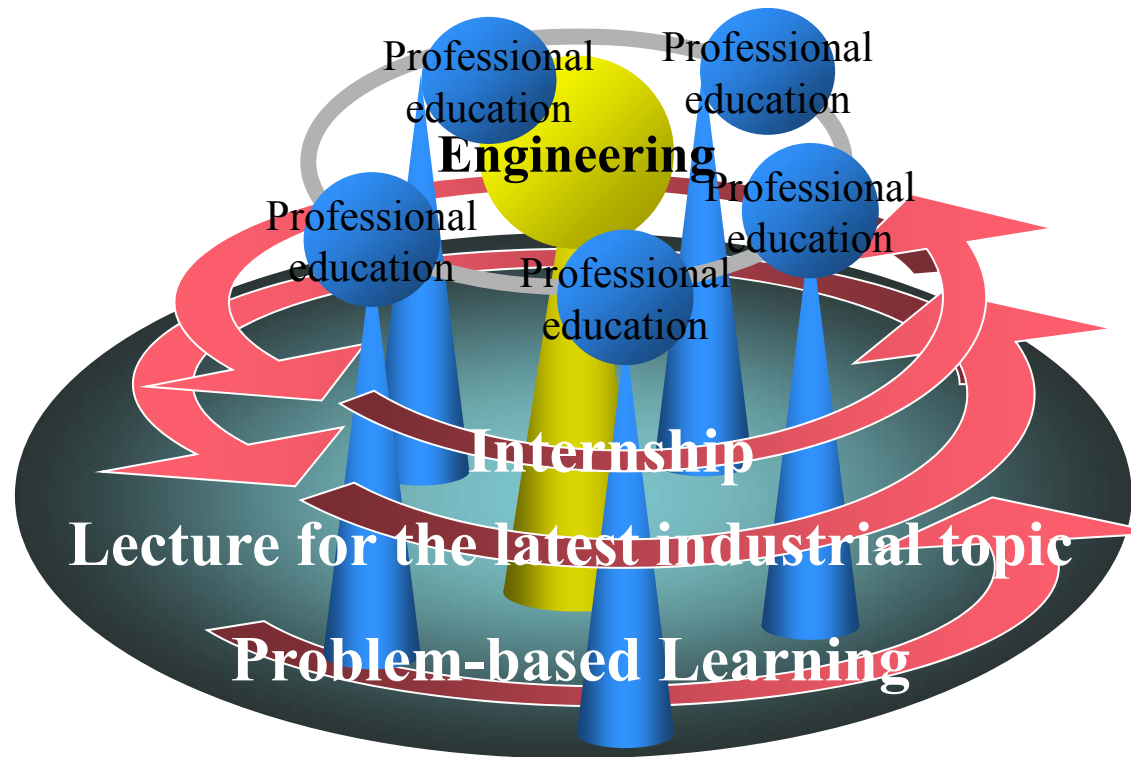
Organization of ICREE

- ICREE has been founded since 2002.
- The mission of ICREE is to instruct students who obtain the sense of originality, creativity and motivation.
- ICREE is organized into four major divisions.

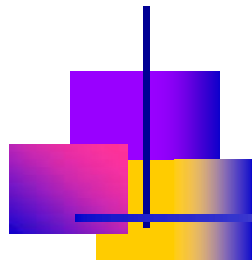




Educational system of ICREE

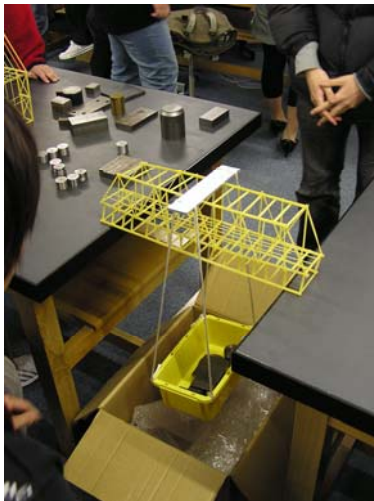
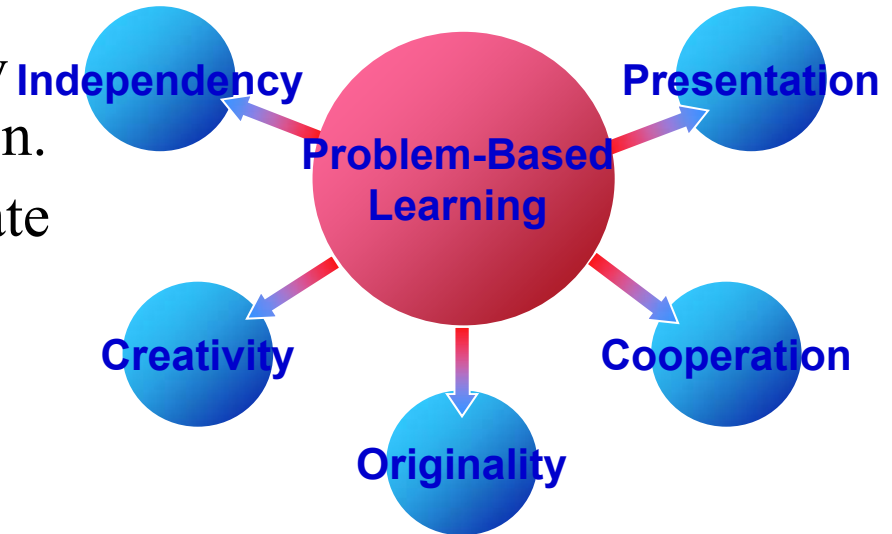


- These educational systems are introduced step-by-step linking with professional subjects like a spiral staircase, which system is called “spiral” educational system.
- Spiral educational system makes students understand the reason why you have to learn the engineering knowledge.

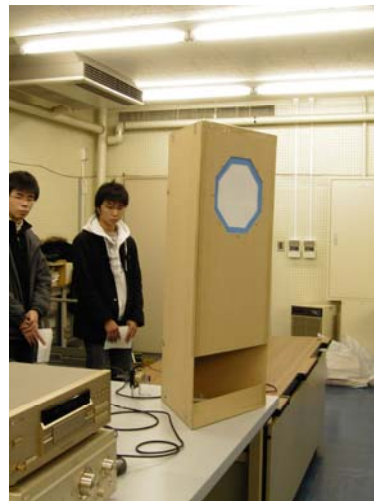


Problem-based learning for freshmen

- PBL is introduced as compulsory subject for all about 450 freshmen.
- The aim of this PBL is to stimulate self-awareness as engineer.
- Students grapple with given problem through discussion and research.



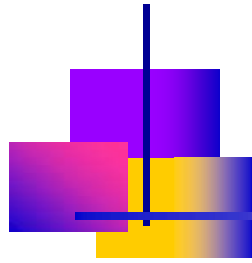
Spaghetti bridge



Original speaker



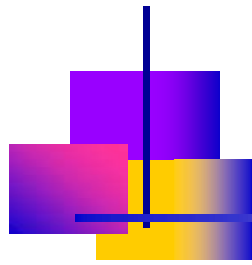
Radio without power source



Lecture for the latest industrial topics for sophomore

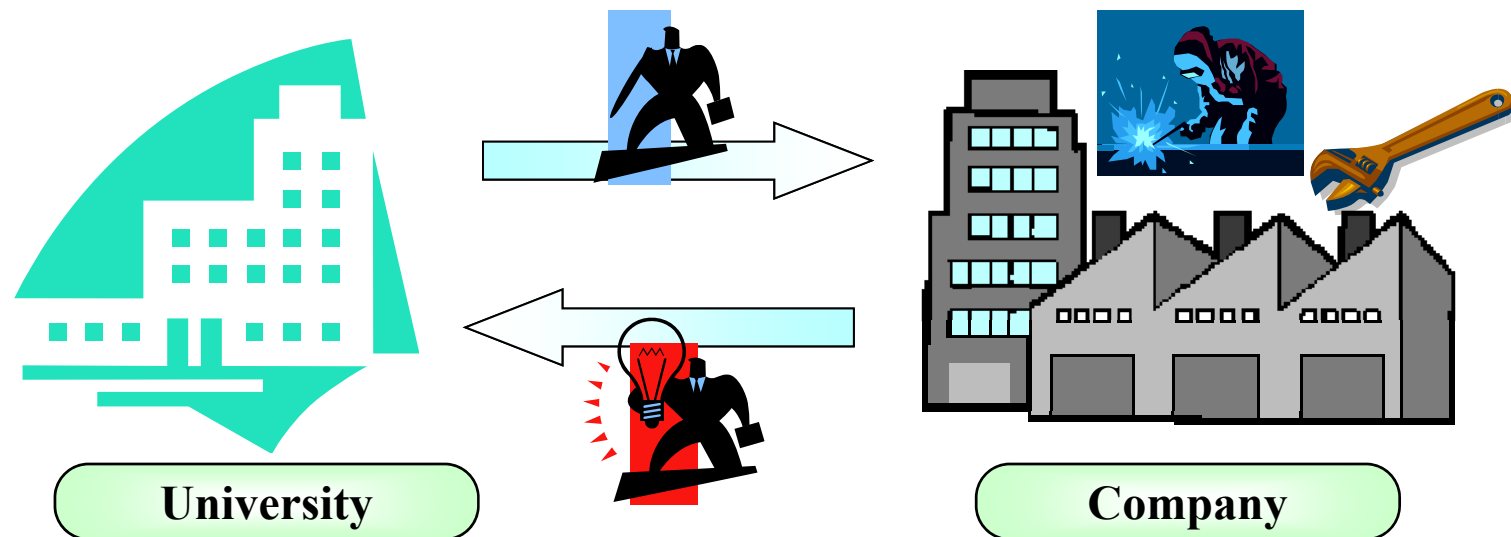
- About fifteen Engineers of companies are invited to give a talk to sophomore on the latest industrial topics.
- Mutual face-to-face communication between engineers and students is so important that invited lectures are graduated students of our university.
- Students are able to have an glimpse of innovation activities in the company.

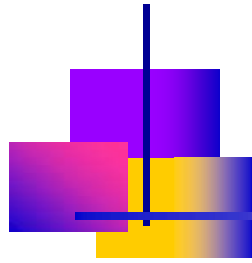




Internship program for junior

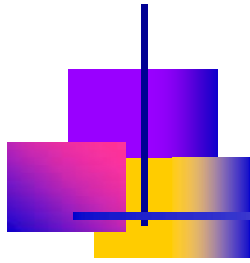
- Internship program is useful for students to learn directly the management and duties of company.
- It is also a good opportunity for the company to let students understand an attraction and discipline of the company.
- After students finish internship program, they have to submit the report and present personal experience.



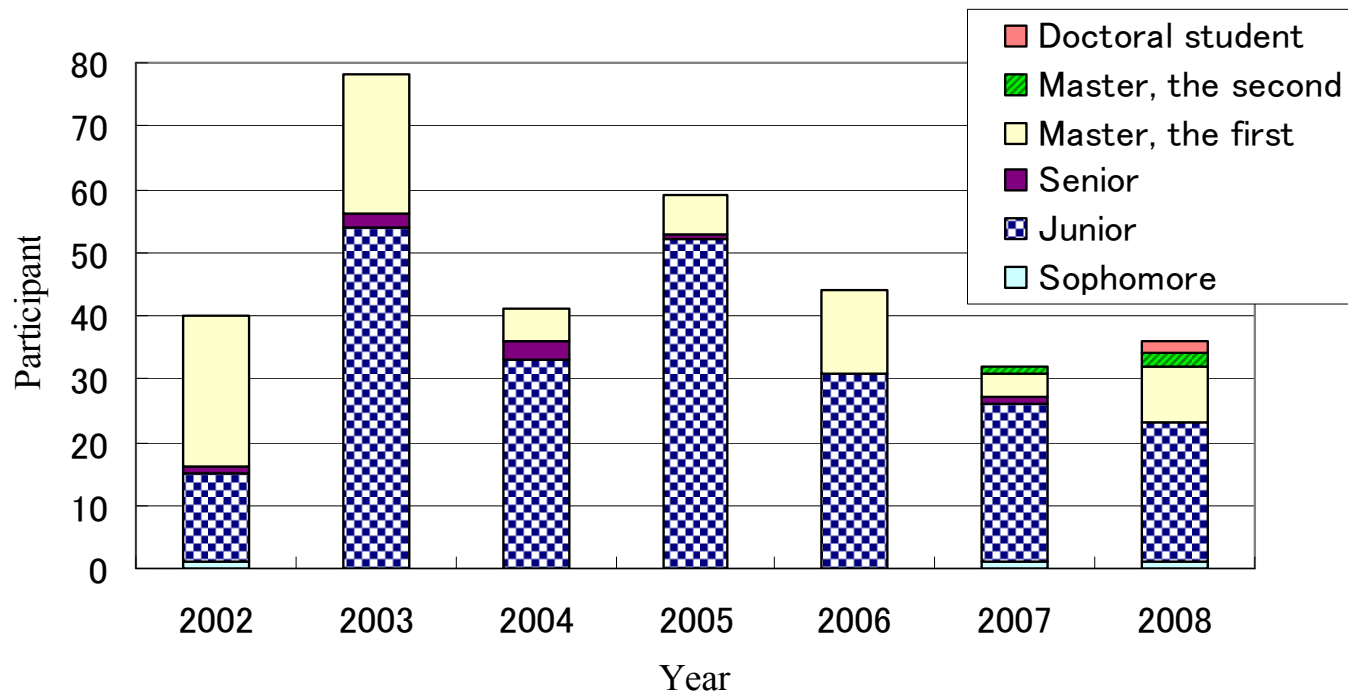


Classification of internship program

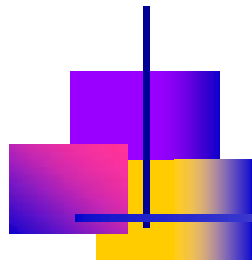
Type of internship		Content	Period	Grade
Experience-based internship program		Students experience actual work of company with employee. They can learn directly relationship between school work and actual work.	From 1 week to 1 month	Undergraduate, Master
Problem-based internship program	Problem-based internship program	Students tackle problem proposed by company by means of professional knowledge of engineering and technical skills.	From 2 weeks to 1 month	Master
	Mutual internship program	Doctor students carry out research work with company by using professional knowledge and skills. It is required to solve the problem proposed by company.	1 month and over	Doctor



Number of participant of internship program



- Participant decreases gradually for some years to come.
- It is necessary to advertise the advantage of internship to not only students but also faculty member.



Support for projects presented by students

- It must be hard for students to firstly organize projects by their own efforts, because they have not enough financial support and place to work.
- ICREE have not supported financially but also give advices technically to projects proposed by students.
- ICREE has presented educational system to give a credit students engaging in projects.



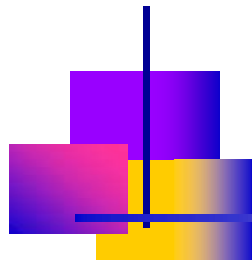
Formula-SAE project



Autonomous vehicle project

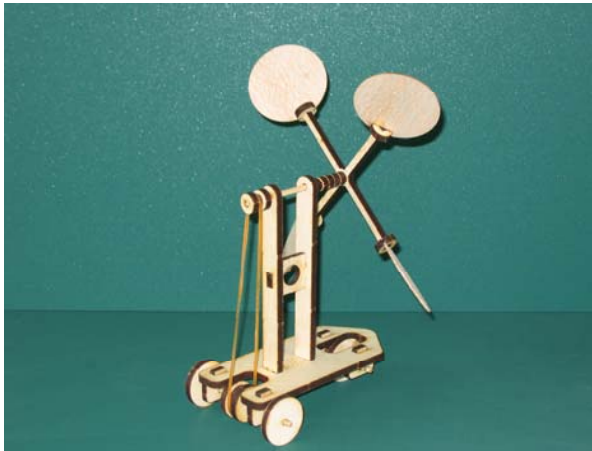


Electrical car project

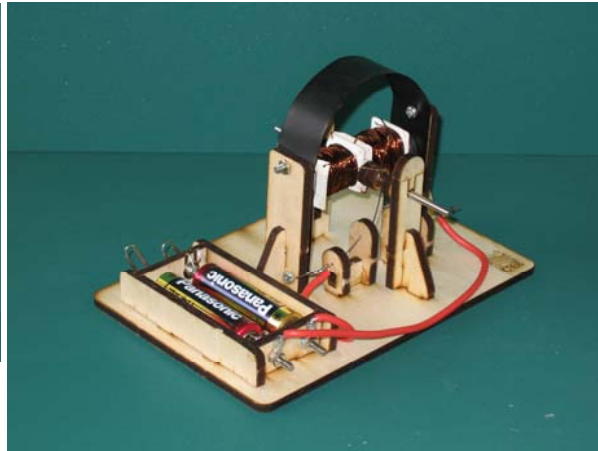


Contribution to local society

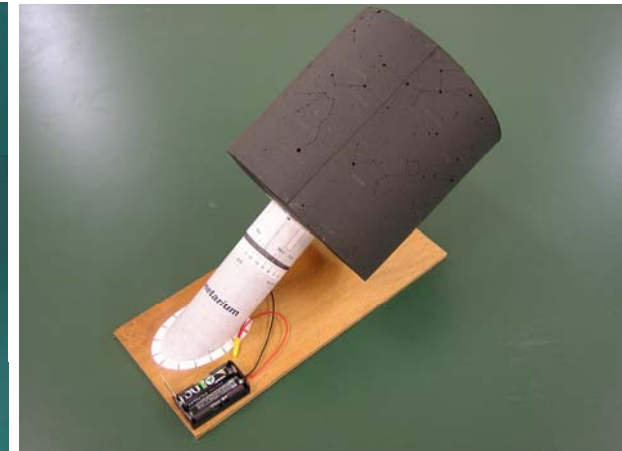
- ICREE have contributed to local society by instructing students of primary school how to build up commercial radio kit, planetarium, electronic robot and so on .
- Total number of participant is about three hundred primary students every year.
- Teaching materials have been developed by ICREE.



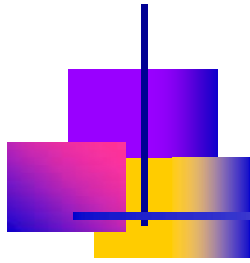
Wind car



Motor kit

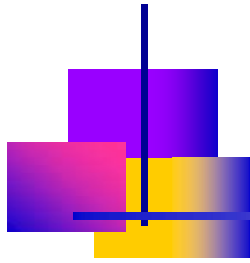


Planetarium



Conclusions

- ICREE has instructed students systematically linking with professional subjects, which is called as “spiral” educational system.
- Problem-based learning of ICREE is distinctive educational system because it is carried out for all freshmen as a compulsory subject, not optional subject.
- In order to execute continuously and effectively sophisticated engineering education, it is required to improve and change educational systems considering social situation.



□ Thank you for your attention ! □