Reshaping Engineering Learning from a Social Design Perspective

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CDIO Syllabus

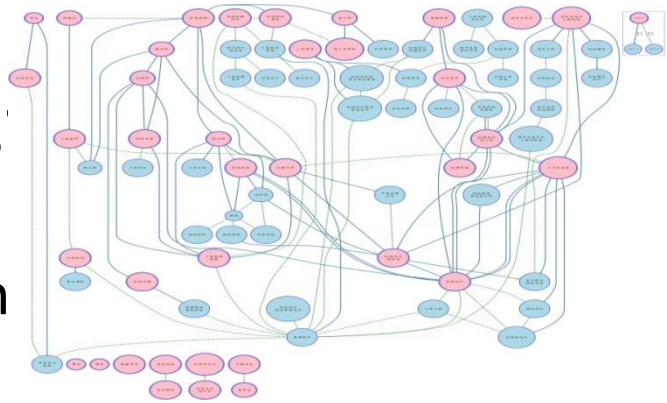
4, Conceiving, Designing Implementing and Operating Systems in the Enterprise and Environmental Context

4.1 External, Societal and environmental context
4.2 Enterprise and business context
4.3 Conceiving, systems engineering and management
4.4 Designing
4.5 Implementing
4.6 operating

products, processes, projects, system, software and materials

How do we find what to “do”

Frustration with Pedagogical Strategies



Top-down policy from Ministry of Education an other government agencies, through funded projects, examples in Taiwan:

- Problem-Based-Learning, PBL
- Multi-dimensional curriculum map
- Project-Based-Learning
- Industry collaboration

Employment Competitiveness (Higher Ed, 2013)

Bifurcating into Research / practice orientation in curriculum

Citizen Core Competency (Advisory Office, 2011)

Ethics, Democracy, Science, Aesthetics, Media

Encouraging Integrating the Core Competency into Technical Courses

Interdisciplinary / New Issues (Advisory Office, 2007)

Science, Technology and Society (STS),

How do we mobilize the Engineering faculties and students?

Important Questions

Within Engineering

- What are the engineering/engineers like in our country, university, college and department?
- What are the industries that are related to our fields and how are they operating?
- What is the engineering culture?

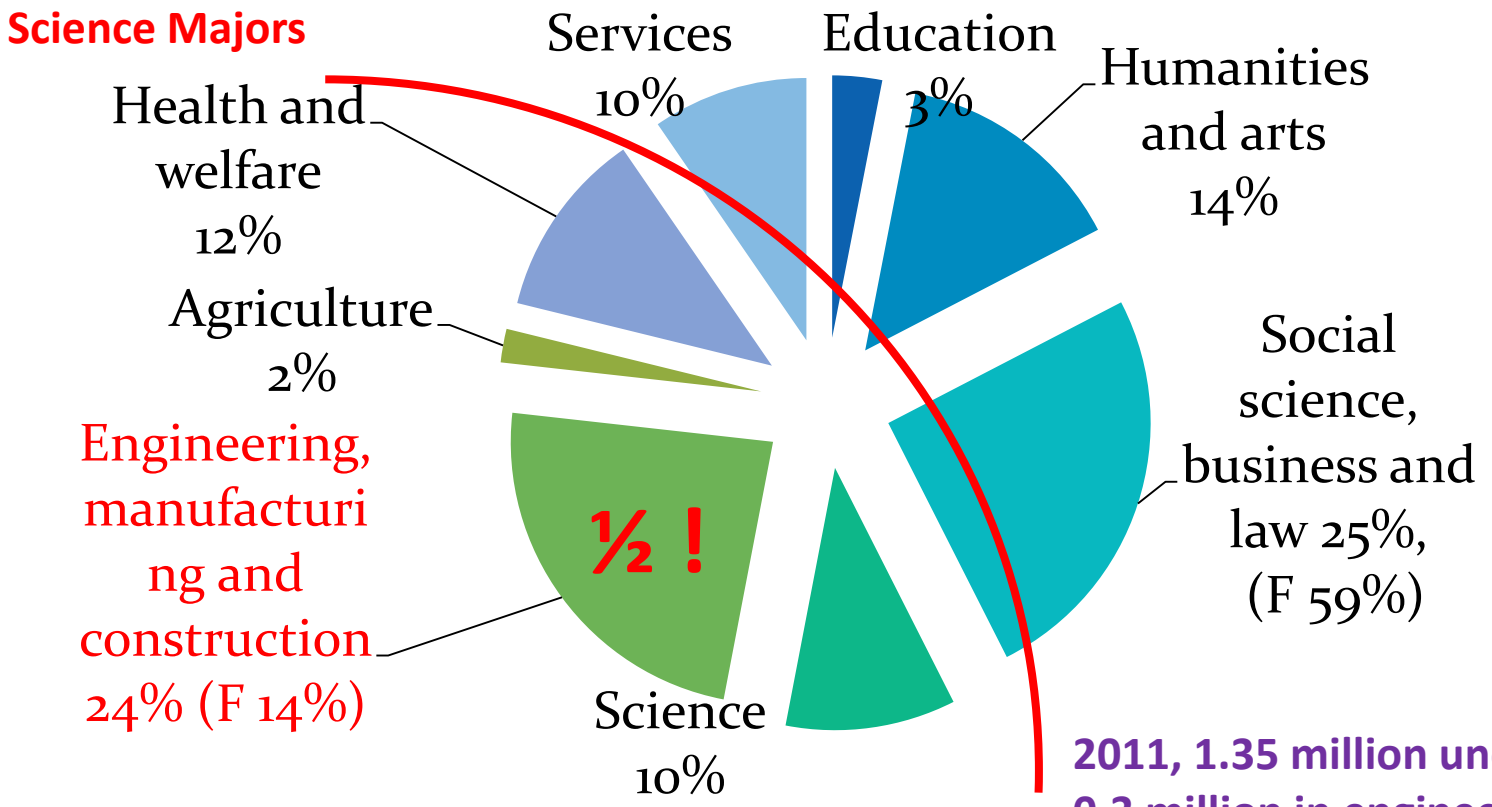
Putting **Engineering Practices** in a social context

How are we going to contribute to a better society using our engineering practices?

— pressing issues and visionary actions for our society

live stream created by student protester http://tw.pikolive.com/event/longson3000

the Overwhelming Presence of Engineering in Higher Education / Science Education @ Taiwan



More than 80% of venture capital

Social design

Within the design world, social design is sometimes defined as a design process that contributes to improving human well-being and livelihood

The term social design is also increasingly used to describe design of the **social world**. This definition implicates a perception of a man-made reality, which consequently can only be changed by man, and *is* changed by man all the time. In this view social design is inescapable, it is there whether people are aware of it or not.
The social reality is created as a result of the sum of all our individual actions

~Wikipedia

designing a social world in engineering schools for spontaneous development of

technical competence and

understanding of the real world problems.

Like coding:

Hardware — Physical Environment

Software — Engineering Context

Programmer — Resources (theorems, research methods, studies, people) from all fields, e.g. Education, Sociology, History of Science, Science Philosophy, Anthropology, Science Technology and Society (STS)

Actions

- Carefully Created Workspace —

  facilitate (to make easy) more discussions and team works, for students and faculty members

Kanazawa Institute of Technology, KIT

Subscribing Local News papers—encourage and support students to stay connected with their local community and industries

Actions

- Carefully Created Workspace —

  facilitate (to make easy) more discussions and team works, for students and faculty members

- Community-Based Engineering Projects —accessing the needs from the citizens or communities, and communicating outside our comfortable domains

Intelligent mobility aids for the elderly

discuss ideas and innovation with people from different disciplines, inside and outside of engineering with social awareness

Intelligent robotic mobility aids maybe intimidating and not financial friendly for some people.

http://history.n.yam.com/cna/computer/201109/20110907669996.html

Longtail Boats in Thailand

Perspective from scholars:

- Noisy for bird-watching, leisure purposes
- Concerns about fuel consumption
- Low propulsion efficiency

Perspectives from locals:

- Masculinity from the locals' point of view
- Easy to maneuver in shallow water and swampy area with flourishing water plants
- Embedded in Thai culture of mechanization

Japanese Comic book by 倉科遼

about storied of 3 generation in a family teaming up to provide housing solution for different needs

http://i.imgur.com/W0ggN.jpg

Actions

- Carefully Created Workspace — facilitate more discussions and team works, for students and faculty members

- Community Based Engineering Projects —accessing the needs from the citizens and communication outside our comfortable domains

- Innovative Classes, Extra-Curriculum Activities, and Engineering Ethics and other inter-disciplinary courses that reflects

Shipmodel Contest

- Student-ran domestic/international contest
- Conceptual competition, and goal driven competitions
- Presentations and communication skills with the judges and peers
- Judges from academia, industries and younger generation engineers

100+ teams
800~1000 people involved

Wooden Sailboat Building

Community's plan in recreate ancient boats joined with modern sailing trainers, supporting the wooden boat building class,

- No experiences from the faculty and students about boat building and carpentry
- Translating, interpreting English manuals through discussions, making sense of the theorems previously learned

- Expanding teams,
  - + wooden boats builders,
  - + science education

International Affairs

- Foreign students in campus for short term visits and studies
- Local students plan and host visiting programs
- Regular training and work meeting outside of classroom
- Looking for opportunities that motivates students to improve, with pressure and honors— Taiwan International Boat shows

Science, Technology and Society

STS Teaching Projects

In Engineering School

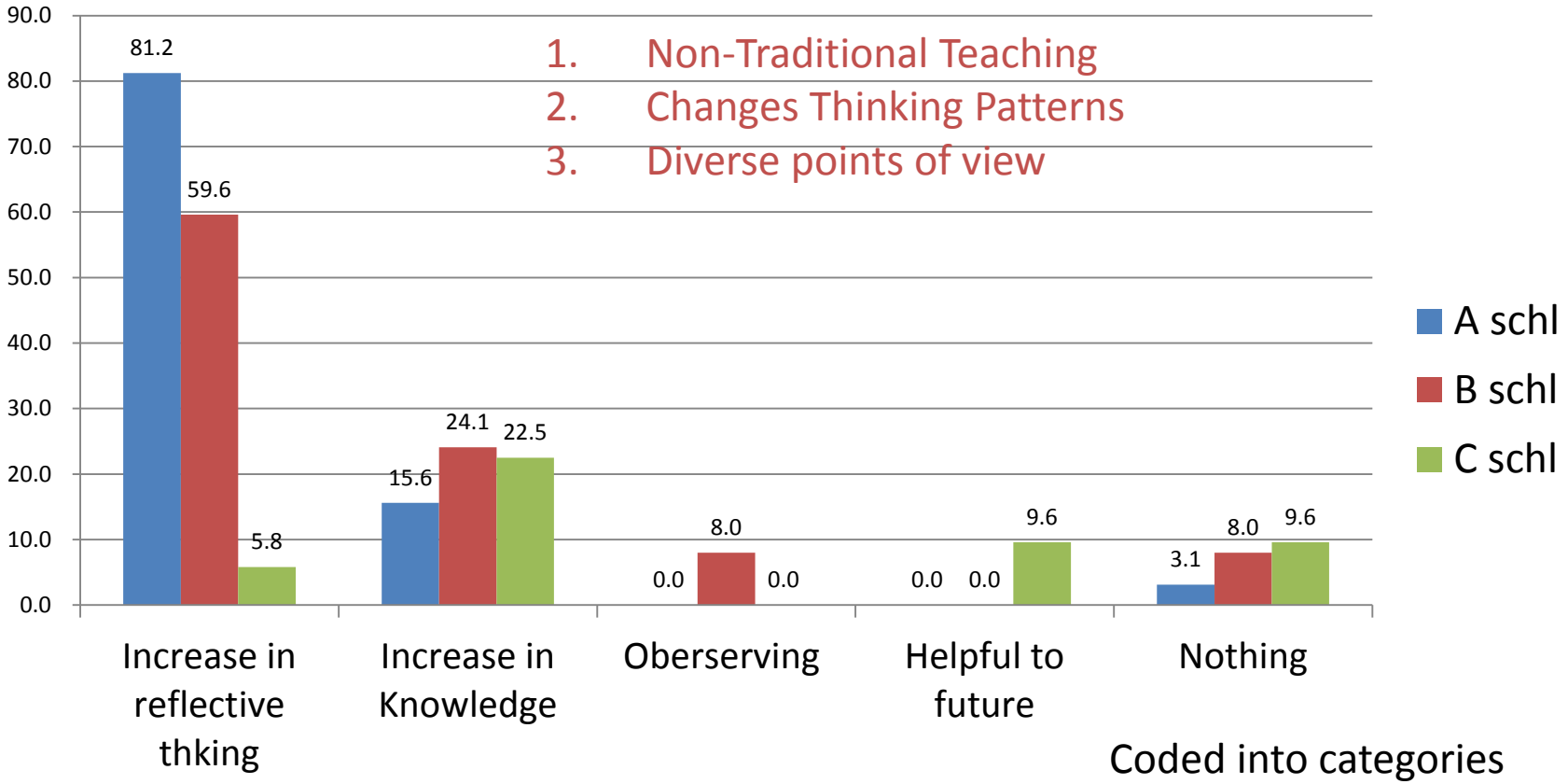
NCTU 交大	STUT 南台	NCKU 成大	NKMU 高海大	Others
STS, Control Technology and Society	Intro. to STS, Engineering Ethics, Engineering and Society, History of Technology	Intro. to STS, Engineering Ethics, Environmental Ethics, Philosophy of Technology, History of Engineering	STS, Engineering, Ethics and Society, Technical Society and Taiwan Industry, History of Marine Industry	

STS
Ethics
History
Society
Philosophy

Engineering Education Reform through STS

Any changes or inspirations?

— students' self-reflection, coded



Integration of Gen. and Professional Competence

	B, Eng., Ethics & Society	C, Eng. & Society, special topics	Kanazawa Ins. of Tech.
Key Topics	• Expert System/ Power • Science Communication • Historical View • Appropriate Technology	• Risk Evaluation, Management, Communication • Appropriate Technology	• Ethical dilemmas • Ethic tests and guide
Goal	Sensitivity, Diverse perspectives, holistic thinking and practice	Cultivate the core competence of Eng. Design STS as a tool for Design Engineer	Forster students who can think, make wise decisions, and act
Individual	→ STS scholars Inter-disciplinary courses by individual faculty members	Individuals with open minds were recruited as seeds. Mostly stay as Eng. researchers	Applied Ethics Center for Engineering and Science (ACES)
Institutionalization	• STS research Center • Two courses in dept. • Will promote as college electives	• Eng. Ethic / Eng. & Society as mandatory courses for all dept. in Eng. • Regular Teacher's enrichment workshops	Ethics across the curriculum: Intro. To Eng.; Japan Studies; Sci. and Eng. Ethics; Design courses; Micro-Insertion

https://genderedinnovations.stanford.edu/

Gendered Innovations

in Science, Health & Medicine, Engineering, and Environment

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SCIENCE
HEALTH & MEDICINE
ENGINEERING
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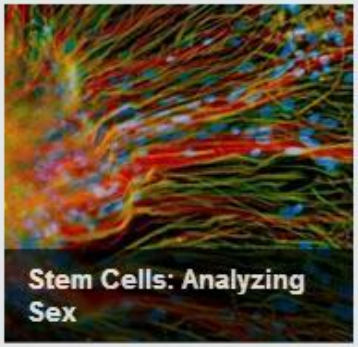
FEATURED CASE STUDIES



Why Gendered Innovations?

"Gendered Innovations" employs methods of sex and gender analysis to create new knowledge.

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学会声明－東日本大震災に際して

東日本大震災に際して

このたびの震災で被害を受けられた皆様にお見舞い申し上げるとともに、亡くなられた方々に哀悼の意を表します。また、福島での原子力発電所事故には、深い憂慮を示すものです。

科学技術社会論学会は、今から10年前の2001年に発足しました。現在進行中の複合的な事態は、科学、技術、社会の関係の研究を対象とする本学会に、大きな課題を突きつけるものと考えます。原子力はもとより、防災、医療などの面でも、科学技術に関わる組織、集団、制度、コミュニケーションのあり方を見直す必要が浮き彫りになってきています。今回の震災は、携帯電話やインターネットが本格的に普及して以来最大規模の広域災害であることも特徴であり、高度技術社会の功罪も吟味される必要があります。

本学会では、年末の年次大会･総会（2011年12月3，4日に京都大学にて開催）を目標として、今回の震災が社会および私達の学会に提示した課題を整理し、社会的な議論を喚起するための活動を展開して参ります。まず、6月中旬に開催予定の学会シンポジウムで開かれた討議の場を設け、12月の学会創立10周年の記念シンポジウム(計画中)では、これまでの学会の活動を振り返り、科学技術社会論が今回の災害のような課題に直面していかにあるべきかの検証を行う予定です。

2011年4月10日　会長　中島秀人

ニュースブログ最新記事

- 日本学術会議ニュース･メール　**　No.441　**　2014/3/20
- 科学技術振興機構　科学技術コミュニケーション推進事業
- 日本学術会議ニュース･メール　**　No.440　**　2014/3/7
- 合評会「JJSC 第14号を読む会」開催案内
- STS Network Japan2013年度　春のシンポジウムのご案内
- 日本学術会議ニュース･メール　**　No.439　**　2014/2/28

4S
EASTS
APSTSN

Further Work

- More Engineering Study, collaborated between engineering and social science, humanity scholars
  - Knowledge construction in industry and academia
  - Curriculum study
- Connecting with the outside world
  - Communicating across disciplines (not only in Engineering), and social classes
- Contextualize engineering in a modern society and the changing environment
  - Engineering Ethics, Science Technology and Society and others

Co-Constructing
Social Norm in Engineering