



工学教育を考える



辻 文 三

環境地球工学専攻教授

新制大学が発足してから50有余年が経過した今日、わが国の科学技術の在り方が、またそのことに基礎をおいている工学教育の在り方が大きく変化しようとしています。この背景には様々なことがあると考えられますが、社会・経済が国際競争時代に入ったことによるグローバルスタンダード設定の流れが教育分野にも及ぼうとしていること、科学技術の高度化・先端化が進む中で、正の面に加えて負の側面が顕在化してきていること、少子・高齢化社会において、地球環境問題を念頭に置いた新たな豊かさとは何かを考え、そのことと整合する創造的な科学技術の在り方を提示する必要があること、高度情報通信機器やシステムの急速な発達に伴い、知識や知恵の創成や継承方法が変化していること、また、直接的には社会の人々が大学の教育・研究機能に置いていた信頼性の喪失が生じていること、などがあるのではないのでしょうか。

工学教育に関するグローバルスタンダードの流れでは、技術者資格の国際的相互承認の動きに連動して、それぞれの学科における教育プログラムが、国際的に通用する技術者の卵を生み出すに必要な条件を備えているかどうかの審査を受けることが求められています。その条件が満たされておれば教育の質が保証された認定プログラムとして公表されることになります。本学でも情報学科の計算機科学コースは積極的に米国の ABET やわが国の JABEE による試行を行なっています。これらの動きに対する対応は、各学科またはコースとなりますが、工学部としては共通的基本条件を整えるべく、工学倫理の開講や FD の推進を実行しようとしています。

科学技術の在り方を模索し、また新たな学術領域を開拓することについては、本学は従来から積極的でした。工学が関係している組織では、数年前からエネルギー科学研究

科、情報学研究科を相次いで創設し、また現在は、地球環境学研究科や桂新キャンパスにおけるインテックセンター構想など、次々と新たな提案を行なっていますが、これらの内容は前回のレターで荻野工学研究科長が述べられていますので、ここでは省略します。

大学に対する信頼性喪失の問題は、欧米諸国に比してわが国では遅れて顕在化してきました。大学は時には象牙の塔と揶揄されてきましたが、それらは個々の問題に関連してのことで、システムとしての透明性を確保し、社会に向かって情報を公開することは、わが国ではこれまであまり要求されませんでした。教育・研究の現場は良識により運営されており、他の人々が口をさし挟めない聖域であるとの意識が教官には強かったのです。また、学生諸君も、自らの教育を受ける権利に対して、どのように勉学し、どのように成長してきているかを、社会に向かって公表する義務が生じるなど考えたことも無いでしょう。しかし、教育・研究の実態を組織的に自ら点検・評価し、また専門的評価機関による外部評価を受け、その結果を社会に向かって公表することが要求されるようになりました。工学部では現在学生による授業評価を実施しています。そこでは、各学科のカリキュラム全体と個々の授業や演習の多面的な評価がなされますが、同時に評価する学生の勉学態度も自己評価しなければならなくなっています。これらの結果が纏まれば、それを資料に教官によるシンポジウムを行ない、そのことを FD として位置付けるという新たな試みが、新工学教育プログラム実施検討委員会の荒木光彦委員長の提案で実行されようとしています。

このような動きの中で注意すべきは、教育は文化であるという認識です。様々な問題が、盆と正月が一緒にきたような慌しさで押し寄せてきていますが、これらはある種の理念や哲学の具現として生じているわけで、形式を整えれば良いというものではありません。教官としては、新たな分野の創造や未知現象の発見の喜び、そのことを通じて人類の知識や知恵の山の構築に貢献する、と言う明示的なことだけでなく、それらの仕事を通じて自らを高め、そのことを通じて教育にフィードバックするという本学の伝統を失わないように心がけることが必要です。

University of Science and Technology of China



Yong ZHOU

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University of Science and Technology of China (USTC) is a comprehensive university consisting of colleges of science, engineering, management science, and humanities. As one of the important national centers for higher learning and for scientific research and technological development, USTC shoulders the great responsibility of educating high-level talent for the country and promoting national economic progress. Under the leadership of Dr. Guo Moruo, the first president and also the first president of the Chinese Academy of Sciences (CAS), USTC was founded in Beijing, the capital of China in 1958, and moved to Hefei, Anhui Province in 1970. As the first comprehensive university established by the central government of the People's Republic of China since 1949, USTC has effectively contributed to the demanding world of science and technology by cultivating personnel equipped with a high level of specialized knowledge and professional skill. It strives not only for simultaneous improvements in teaching and research, but also for the promotion of social communication among various researchers and fields.

At present, the campus of USTC covers an area of 1,370,000m² with a total construction area of more than 650,000m². USTC consists of 10 colleges, 24 departments, and a special class for the Gifted Young (SCGY), which allows those before the age of fifteen to begin their college course based on their outstanding academic performances. The university offers 40 Bachelor degree programs as majors, 59 Master degree programs and 39 Ph.D. degree programs for graduate students. Twenty-nine specialties in 9 fields can be pursued in post-doctoral studies. Among the national key fields of study in the university are Pure Mathematics, Computational Mathematics, Condensed Matter Physics, and Solid State Mechanics. The Departments of Mathematics, Physics and Mechanics have been selected by the State Education Commission as training centers for research personnel. The National Synchrotron Radiation Laboratory (NSRL), the only facility dedicated to

synchrotron research in China, is the first large-scale scientific research project built in a university supported by the Central People's Government. The NSRL receives special recognition from the CAS for its significant achievements in the fields of advanced technologies in China. The State Key Laboratory of Fire Science is the first key laboratory in China for studies centered on fire mechanisms. Superconductor research of USTC is held in high esteem by the international community. The university has a total number of 3890 staff, including teaching staff of 1830. Of these, 10 are members of the CAS and the Chinese Academy of Engineering Sciences (CAES). 446 are professors and 970 are associate professors which include senior engineers.

The university's excellence in education stems from the wealth of the initiative, diligence and vitality of its faculty. The number of students enrolled in the university programs currently totals 10540, including 640 Ph.D. students, 1430 Master's students, and 8470 undergraduates. Since 1977, USTC has consistently maintained a freshman class with one of the highest average entrance exam scores in China.

Ranked among the top five universities in China, USTC has an excellent reputation at home and abroad for being an important scientific research center. In line with the overall plan of the university, USTC strives to promote international academic exchange and cooperation in scientific research. USTC has invited a number of celebrated scholars from abroad to deliver lectures and conduct scientific research in cooperation with USTC. Since 1978, many cooperative and exchange programs have been developed with around 50 universities and scientific research institutions in 16 countries and regions. The cooperation involves such notable fields as environmental safety, energy and transportation, properties and applications of materials, advanced production engineering, and electronic and information technology. More than 110 foreign professors have been invited to USTC as honorary and guest professors. Among them many world-celebrated scientists, including Nobel laureates, such as Dr. C.N. Yang (physics in 1957), Dr. T. D. Lee (physics in 1957), Dr. S.C.C. Ting (physics in 1976), Dr. Y.T. Lee (chemistry in 1986), have been awarded honorary professorships or honorary doctoral degrees.

The spirit of national reform and open policy along with the rapid pace of economic development has brought about new opportunities for the university. As one of the nine universities which enjoys the support of the Chinese government at the threshold of the 21st century, USTC is now entering "its third stage of development." USTC is aiming to achieve the status of one of the world's best universities in this century. With an eye on the development of specialties and the training of talent, the university will continue to develop its teaching, scientific research and social service fields. USTC is determined to sustain its leadership at home and its prestige worldwide in line with its mission: "To Build a Global University and Educate the Brilliant Minds of the World."





Jong-Oh KIM

Lecturer
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Hi everyone. First of all, briefly let me introduce myself. Five years ago in April 1996, I came to Japan from Korea as a foreign research student with some of the great dreams shared by other foreign students like myself. After studying three years, I got a chance to work as a faculty member in environmental engineering. Now, as a teacher who experienced the foreign student's life, I'm in charge of foreign student education in the faculty of engineering.

When I was asked to write an article for this newsletter, I considered it a good opportunity to offer advice to foreign students. In this regard, I would like to suggest two things as an "old hand" as well as an instructor of foreign students in order to help you achieve successful research results and have a satisfactory stay.

One concerns the need to cooperate smoothly with laboratory members. Up to now, I have heard of some difficulties arising between foreign students and their laboratory colleagues. It is common and natural to be discontented and experience conflict in social life. However, when such a situation comes my way, I think of the old maxim: "Put yourself in the other's shoes."

Though you may think this is old-fashioned and odd, I think it helps a lot if you can remember this when you are new and unfamiliar with the setting. After all, genuine mutual communication and understanding are everyone's goals and initial reactions should not impede good future relations.

At times, as the coach in my lab, I have to reproach a foreign student for his carelessness. This often makes me recall my own student days. Once you put yourself in the director's or the other person's position, then you may learn what responsibility and difficulties that person is facing, and understand more of how a scientific team works. Please try and remember this maxim whenever you are discontent with another person.

Another point I wish to make is the importance of becoming acquainted with the Japanese way of thinking and laboratory rules. Some foreign students may have complaints about this. However, just as people have their own personalities, there are unique rules and different backgrounds to each lab. Also, remember that you chose Japan from among the many countries in the world. Therefore, you should acquaint yourself with the work situation's rules as soon as possible. If you are interested, you will soon find what makes your lab interesting, unique and different from others. This certainly will make your life in Japan more pleasant. On the other hand, I am quite sure that the best and shortest way to understand the Japanese way of thinking and rules is to make Japanese friends. In this way, you will get accustomed to another culture and gain a great deal of knowledge before you realize it.

Finally, it is said that the experience one gains in a foreign country has a great influence on the rest of that person's life. The value of having a healthy mental outlook as well as having many beautiful memories and academic achievements while in Japan is a worthwhile pursuit.



金 弘 己

建築学専攻
博士課程3年

私は伝統的町並の保存の研究をしており、日本の伝統的町並が残っている地方に調査もしくは見学に出かけることが多い。その度に思うのは、伝統的町並が残っている地域の近くには大体温泉があるということである。たまに温泉へ行くこともあり、特に、寒い冬になると温泉へ行きたくなる。なぜならば、日本の冬の気温は韓国ほど低くないが、湿度の高いせいかととても寒く感じるからである。日本へ来て8年になろうとしているが、留学一年目は住まいが木造のアパートだったので、暖房をつけても部屋の温度はあまり上がらず、足の指がしもやけになるほど非常に寒かった記憶がある。

韓国では温泉の数は日本ほど多くないが、何カ所か有名なところがある。子供の頃、両親に連れられて温泉へ行ったこともあるが、私の記憶にはただ熱くて息苦しかったことしか残っていない。また、韓国では、温泉はお年寄りの方が行く所だというイメージが強いので若者には人気のない観光スポットである。しかし、日本へ来て驚いたのは、まず数え切れないほど温泉が多いこと、混浴や露天風呂が存在すること、若い女性にも人気があることであった。最初、私は全ての露天風呂が混浴で人から見られる場所にあるという先入観があって、温泉には行かなかった。だいぶ時間が経ってから私が間違った情報を持っていることに気づき、温泉に行くことになった。それは、日本に来て5年が過ぎた真冬の露天風呂であった。それまでには日本人はなぜ温泉を好むのか不思議だったが、実際に入ってみてその気持ちが多少分かるようになった。特に、露天風呂は自然と一体となった気分を味わうことができ、安らぎを感じさせられる。湿気の多い日本で寒さを乗り越えるには温泉が最適であり、体の芯から暖まってくるので心身の疲れを取るにも温泉に限る。お湯に浸かれるのは寒い冬を乗り越える日本人の一つの知恵であろう。

私は、自分の研究分野を通して日本文化に触れ、共感を覚えることができ、日本に対するイメージも「経済大国」から「温泉天国」へと変わってきている。



鞍馬の町並み

Intellectual Life and Enjoyable City Life in Kyoto University



Khalil EL-HAMI

Post-doctoral Researcher
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Department of Electronic Science and Engineering

The SPI Department (Department of Engineering Science), where I got my Ph.D. in 1996 (established in 1975) is one of the seven scientific departments within the CNRS (Centre Nationale de la Recherche Scientifique) in France. It mainly develops interdisciplinary research programs linking numerous different disciplines: material science, physics, chemistry, information technology and electronics. Starting from new conceptual bases the research teams adapt, assemble and transform expertise in a variety of domains.

Through such collaboration, it can carry out the innovative research needed by society. The department's research fields are grouped into Scientific and Technological Orientations (OST), corresponding to precise thematic bases around which the scientific community structures itself. The cooperation between CNRS and Japan is old. The first agreement was signed in 1973 with the Japan Society for the Promotion of Science (JSPS). In 1990, further agreements were signed between CNRS and AIST/MITI, STA and JST.

The VBL (Venture Business Laboratory) in Kyoto University, where I have been working since July 1998 as a Post-doctoral researcher, was established for creative research projects with funds from the Japanese Government in 1995. Directed by Professor Kazumi Matsushige, the responsibility for research and development in VBL is shared amongst all the facilities of Kyoto University (KU). The Department of Electronic Science and Engineering specifically collaborates with VBL. Among the objectives of VBL is the promotion of creative research and its practical application to generate new businesses. It also is to invite researchers with advanced professional ability and venture spirit. One of VBL's roles also is to provide graduate school facilities for education and research in various subjects in material science including new materials.

Since its establishment, research in VBL has been distinguished by its ever-increasing technological stature. To create companies such as Kyoto Instrument (KI) and Technology Licensing Organization (TLO) a high rate of R&D activities is greatly required. In turn, those companies contribute to the changing needs of the electronic industry. I had two possible choices of location to continue my scientific research work after obtaining my Ph.D. in France: Japan or the United States. I chose the former because it attracted my attention for various reasons. I was impressed by the diversity and high quality of research conducted at KU-VBL, a place where creativity, originality and enjoyment are always present. Another is that I am interested in continuing my research work in Material Science Engineering in the field of the Ferroelectric Polymer ultra-thin film for Nano-technology Devices.

Ultra-thin films of P(VDF/TrFE) have successfully been used to write memory bits via local polarization by an electric field imposed by the Scanning Probe Microscopy tip between a gold-coated cantilever and a conductive substrate. Therefore, with this technique, recording-mark patterns are written in (PVDF/TrFE) copolymer. "Miniaturize,

Speed up and Reduce Costs" is the slogan and purpose of our studies in VBL.

Recently, I start to study a new promising subject: "Polymer Nano-Composites based on Carbon Nanotube". Thin films of copolymer guest/host carbon nanotube have been carried out in VBL as nano-composite material. The known copolymer P(VDF/TrFE) was used as the host matrix and the guest carbon nanotube was SWCNT and MWCNT types.

Besides the intellectual life, Kyoto also affords its inhabitants a chance to enjoy a beautiful city, one which is considered a pearl among Japanese cities. Prof. K. Matsushige guaranteed my accommodation in a traditional Japanese house situated in Ichijoji, Sakyo-ku. With sliding rice paper "shoji" on two sides and "tatami" flooring, the atmosphere is different from a European house. Despite the diminutive size of the tatami rooms, it is surprisingly relaxing and comfortable.

Kyoto certainly is a tourist's dream—full of beautiful old houses and temples and surrounded by green, unblemished mountains. The kanji characters everywhere have a wonderful impact. I feel as though I might as well have parachuted to the dark side of the moon. Kyoto is small enough so that you can get almost anywhere on a bicycle, yet large enough to enjoy the full spectrum of museums, universities, prestigious historical monuments, galleries, theaters, gardens and a wonderful new symphony hall.

Whenever I have spare time in weekends, I participate in some activities, such as the Asobokai association, of which Mr. Kiyoshi Shibao is the President, and Europe-Japan Interface. The Europe-Japan Interface, of which I am the organizer, arranges cultural and social events between Europeans and Japanese. Special places to visit, and restaurants where participants can enjoy Japanese food are scheduled on the first and third Sunday of each month. These meetings offer people precious opportunities for cultural exchange.

PS :

I want to share some of my impressions with people who are planning to visit Kyoto, Japan. The following report contains my opinion and my personal impressions. I appreciate any kind of comments. If you do not agree with this information, or you have different opinion, please drop me an e-mail (khalil@vbl.kyoto-u.ac.jp) or a note in VBL office.

For people from outside Kyoto, I invite them to visit VBL to show you what we are able to do.

Nomenclature: AIST/MITI: Agency of Industrial Science and Technology, STA: Science and Technology Agency, JST: Science and Technology Corporation.



Year-end Party with VBL Members (Dec. 2000)

国際交流日誌 (平成12年10月24日～平成13年3月27日)

平成12(2000)年

- 10月24日(火) 国立シンガポール大学 Ling, Chung Ho 副工学部長、Ng, Kim Choon 助教授、ナンヤン工科大学 Soh, Chee Kiong 教授、研究科長表敬訪問及び JSPS-NUS 拠点大学交流事業協議 (23日(月)～25日(水))
- 30日(月) 平成12年度特別コース研究留学生入学式
- 11月1日(火) 工学研究科・工学部国際交流委員会
- 22日(水) 工学研究科・工学部国際交流委員会
- 12月2日(土) 新入留学生研修旅行(明石海峡大橋)
- 7日(木)～8日(金) 特別コース研究留学生見学旅行(和歌山方面)

8日(金)～10日(日) 荻野研究科長及び関係者一同「総合工学」拠点大学交流事業最終セミナー参加のため国立シンガポール大学を訪問

平成13(2001)年

- 1月31日(水) 工学研究科・工学部国際交流委員会
- 31日(水)～2月2日(金) マラヤ大学 Mohd. Ali Hashim 工学部教授、Abdul Rani Abdullah 理学部助教授及び Yusoff Musa 研究相談担当部門副管理者、JSPS-VCC「環境科学」拠点大学交流事業協議
- 2月28日(水) 工学研究科・工学部国際交流委員会
- 3月1日(木) 特別コース研究留学生見学旅行(校方方面)
- 8日(木) 平成11年度特別コース研究留学生修了式
- 27日(火) 工学研究科・工学部国際交流委員会

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