

# Sharing Knowledge with the Next Generation

By Laura Abbott

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Takashi Hibiki had to navigate his path to a PhD and a distinguished academic career all by himself. None of his professors in Japan offered guidance, and he lacked a well-equipped laboratory.

“Earning a PhD was a very big mountain, like Mount Everest,” Hibiki says.

To overcome difficulties, Hibiki developed his abilities to work efficiently, productively and systematically. He salvaged lab equipment from a junkyard; circumvented deficient and distant research facilities; and built an analytical model for productively creating all-important journal papers before the personal computer made numerical calculation, literature survey, paper writing and figure drawing easy.

Today, current and former Purdue College of Engineering graduate students are better for Hibiki’s travails and learnings – and his generous sharing of knowledge and advice. A professor of nuclear engineering at Purdue since 2006, Hibiki resolved early in his university teaching career (previously in Japan) to provide PhD students “lifelong mentoring.”

“I’ve dedicated myself to offering students the opposite of my experience and sharing my skill of working efficiently,” Hibiki says. “Students are my top priority. No matter how busy I am, I always make time for them. I have a no-appointments policy and like to meet face to face. While they may not encounter the hardships I endured, they need encouragement and guidance from a trusted advocate.”

## Award from students

Purdue students recently recognized his contributions with the 2017 Outstanding Graduate Student Mentor Award from the Nuclear Engineering Graduate Organization. The plaque states: “His philosophy on how to work efficiently has profound effects on students’ productivity and achievement. Through conversations about research integrity and career aspirations, Professor Hibiki inspires students to a higher standard every time they open a new research project.”

Hibiki presents an impressive role model. Among highlights, along with classroom teaching, he was associate head of nuclear engineering and NE Graduate Committee chair through June 1, 2017. Hibiki has

received 10 national or international scientific awards – most recently, the 2017 Award for Eminent Achievements in Nuclear Science and Technology from the Atomic Energy Society of Japan (this organization’s highest honor). He also is a Fellow of the American Nuclear Society and an Osaka University Global Alumni Fellow (a rare honor for a professor in a non-medical school).

A prolific writer, Hibiki has authored 221 journal papers, 186 conference papers, one book and five book chapters. He holds the second-highest Google Scholar ranking for journal-paper citations (with more than 10,000 of them) in the nuclear engineering category, and a paper he wrote is ranked No. 1 in citations for all papers published in the International Journal of Multiphase Flow since 1974.

## Outstanding numbers

His motivation, advice and hands-on support have helped students climb the doctoral summit and pursue accelerated career trajectories.

Numbers tell part of the story. Hibiki has minted 10 PhD students in 10 years. Five of the 24 students he has coached at Purdue (including eight international visiting students) have become assistant professors. He stays in touch with students and junior visiting scholars living in the U.S., Japan, China, South Korea, Spain, Taiwan and Thailand. His protégés also have compiled imposing honors; for example, four former students have received awards from the Atomic Energy Society of Japan.

In addition to shepherding current and former Purdue students, Hibiki provides what he calls “invisible mentoring.” Among these voluntary activities, he guides 10 junior scientists and engineers who are struggling to establish their early careers. Hibiki offers his “secrets,” such as how to find research projects, expand human networks, and write a good proposal. He also shares his experience and tips in Q&A format in an annual seminar for Osaka University sophomores, titled “For your future success: things to be done when you are an undergraduate student.”

### **Tips: Work harder, more productively**

Hibiki’s students learn these academic, career and life lessons:

- Work harder than anyone else.
- Be more productive than your peers.
- Think deeply before writing or taking other action.
- Set your goal at the outset – and work strategically to meet it.
- Get involved in diverse projects to develop an interdisciplinary mindset.
- Choose your research projects carefully.
- Become prolific at publishing first-class journal papers.
- Be responsible for your research results in terms of accuracy and integrity.
- Consider your contribution to our society and world.

He goes above and beyond to nurture students’ progress. For instance, Hibiki helps mentees develop research topics; write proposals; plan, organize and fund their research; and produce papers, including writing (sometimes in a non-native language), editing, and creating figures. His students commonly triple the typical paper output of others.

“Mentoring never stops,” Hibiki says. “I want my students to be very successful, so I continue doing all I can to advance their development.”

Hibiki emphasizes that “3 times harder work and 3 times more efficient work results in 10 times achievements,” and “your success is proportional to your achievement.”

His protégés have listened. One of them accomplished the unusual feat of obtaining an assistant professorship at a top U.S. university without postdoctoral experience, and another secured a similar position with only one year of postdoctoral experience. Yet another student was appointed an assistant professor in Japan.

In one of many examples of how he makes a difference, Hibiki solved a student’s problem in three hours, enabling the student to write the one additional journal paper required to earn a PhD. For another student, he wrote a four-page recipe for producing meaningful research results equivalent to five papers.

With a penchant for counseling former students who return home to developing countries, he has visited them to gain insight and lend a hand. After finding that one such mentee lacked sufficient research facilities and software support at a Thai university, Hibiki helped formulate a theoretical research project that didn’t require a lab or computational power – enabling the former student to produce two journal papers in six months. Hibiki also has made personal donations to ease international students’ transitions to life back home.

## Enduring impact

Students say Hibiki’s mentoring has had profound, lasting effects.

“I have learned so much from you scientifically, professionally, and personally,” wrote Caleb Brooks, PhD (Purdue, NE 2014), now an assistant professor at University of Illinois at Urbana-Champaign, and one of the 2017 AESJ award winners. “I could not have found a better advisor for my graduate work or a better mentor for my professional development. Your scientific capability and achievements have set you apart, but I believe it is your caring, good-willed nature that will continue to distinguish you for many more years. Your instruction and encouragement have helped me achieve more than I thought possible.”

“Your passion toward research has motivated me to work harder and inspired me to set a higher goal,” wrote another 2017 AESJ award recipient, Shuichiro Miwa, PhD (Purdue, NE, 2012), now an assistant professor at Hokkaido University in Japan.

Another former student wrote: “The things I learnt from you will affect my entire life. ... I will always try my best to be successful, anywhere and anytime, as I used to be your student. This is your legacy!”

## Shaping future generations

Hibiki’s recipe for molding future generations:

- Make students your first priority.
- Be accessible – face to face if possible.
- Always respond quickly.
- Work hard to give the right direction and provide correct answers, to help students and build their trust.
- Emphasize contributing to our society and world.

He compares effective mentoring to the Japanese tradition of perpetuating the Shinto religion’s Ise Grand Shrine, constructed of Hinoki cypress wood without any nails.

“Every 20 years, they rebuild the shrine to transfer knowledge to the next generation,” Hibiki explains. “The shrine could be sustained for 100 years, but if they waited that long, nobody would know how to build it again. This process has been going on for more than 1,300 years.”

He adds, “Likewise, technology transfer from senior professors to students and junior scientists is indispensable for sustainable research activity.”

Reflecting his mentee’s comment, Hibiki says: “Students are a professor’s legacy. Their success is my success.”

(<https://engineering.purdue.edu/AAE/academics/Courses/Engr/AboutUs/News/Spotlights/feature/feature/sharing-knowledge-with-the-next-generation>)