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SCIENCE AND TECHNOLOGY STUDIES

from Keio's Faculty of Science and Technology

Initiating creative collaboration between humanities and sciences

Koichi Mikami

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and Liberal Arts

This issue features Associate Professor Koichi Mikami, whose research, informed by Science and Technology Studies, explores the possibility of "science and technology to be done in collaboration with experts in humanities and social sciences."

The Search for a New Way of Approaching Science and Technology

Guiding experts toward "creative collaboration" in science and technology

"We tend to think of science and technology as the work of scientists and engineers only. But I want to find a way to change that and let experts in humanities and social sciences to take part in their making," says Mikami. He began to envision this 'new' paradigm through his research in Science and Technology Studies. Having joined Keio University, his journey to realize this vision has already begun.

What is "Science and Technology Studies"?

In 2018, the news that gene-edited twins were born in China took the world by storm. People criticized the birth of these twins whose genetic information had been altered to prevent HIV infections. Could the scientist responsible guarantee the children's future health and safety? Is it even ethical to edit someone's genome in the first place?

"I can understand why some people felt that might be justified as a form of medical treatment. However, this does not mean that it is okay on a societal level to edit the genomes of fertilized eggs," explains Koichi Mikami, a specialist in Science and Technology Studies at Keio's Faculty of Science and Technology. "Science and Technology Studies" or "STS" is a field that examines the intersections between science, technology, and society, and Mikami's research focuses particularly on life sciences and biotechnology.

In the past, science was thought to be a discovery of "the truth." This meant that no matter who did the "science," the results (and conclusions) would be the same. However, after being forced to recognize the enormous influence that scientific advancement can have on society due particularly to the Second World War, people started discussing what science is and how scientists should behave. Such discussion led to "Science Studies." As the field broadened to include questions about technology, the name was changed to "Science and Technology Studies." With this expansion, the field also began to consider how scientific discoveries impact society. When scientists began sequencing the entire human genome in the 1990s, many people expressed concerns about the magnitude of the ethical, legal, and social implications (ELSI) that this achievement might yield through identifying a person's future diseases or other information.

"Historically, the role of humanities and social sciences has been limited either to put a stop to scientific and technological progress, or to assist it from the sidelines." (Figure 1)

Values about science and technology are culturally dependent

Mikami first became interested in the relationship between science, technology, and society in 2005 when he studied abroad in England as a Master student.

"It was around the time when hybrid cars were beginning to appear on the market. In Japan, they were hailed as a next-generation eco-friendly vehicle. In England, though, some people were saying that diesel cars were better. Up until that point, I had thought that values of science and technology were universal, so learning about national differences in technological preference was fascinating." Hybrid cars work well in Japan's driving culture where people are constantly starting and stopping their cars in towns. In England, where drivers can leave their engines running for long time on straight rural roads, however, diesel engines were considered more efficient.

That made Mikami want to do research on different national and cultural values attached to science and technology. He

The old view of ELSI 1

The old view of ELSI 2

Fig.1 Ethical, Legal, and Social Implications (ELSI)
Because experts in humanities and social sciences would undertake ELSI analysis to point out social problems with science and technology, they were often thought of as standing in the way of further progress (The first old view of ELSI). On the other hand, ever since the Human Genome Project, scientific research has been presumed unstoppable, so people in humanities and social sciences have been needed to support, from the sidelines, scientific advancements to be accepted by society (The second old view of ELSI). In contrast, Mikami hopes to build a mechanism in which scientists can work alongside experts in humanities and social sciences (The view of ELSI to be instituted).

especially wanted to look into a topic in which these differences would be most stark, such as biomedicine. At the time, "regenerative medicine" was a huge topic of discussion, so he chose it as his focus. Mikami explains, "People tend to stick to things that they are familiar with when it comes to caring their bodies. This means that cultural influences or patterns from one's upbringing will be quite evident." Mikami came to this conclusion after conducting a survey on his fellow international students, many of whom asked their family to ship not only medicine but even toothbrushes from Japan, rather than purchasing these items locally in the UK.

Revealing the truth about regenerative medicine through interviews

Mikami's research methodology involves interviewing as wide a variety of people connected to his chosen topic as possible. This includes researchers, people belonging to government agencies, or companies (Figure 2). When doing this, he first investigates presentations being given at academic conferences so that he can list up interview participants that best reflect general research trends for the given field in each country.

In his research on regenerative medicine, Mikami was surprised to find that the goals of the science changed drastically based on a person's perspective on a medical system. "iPS cell-based therapies likely hold a strong appeal with a Japanese audience because the cells are taken directly from an individual and therefore enables regenerative medicine to be personally tailored.

Personalized regenerative medicine is not as popular elsewhere. In the UK, there is an emphasis on standardization,

The view of ELSI to be instituted

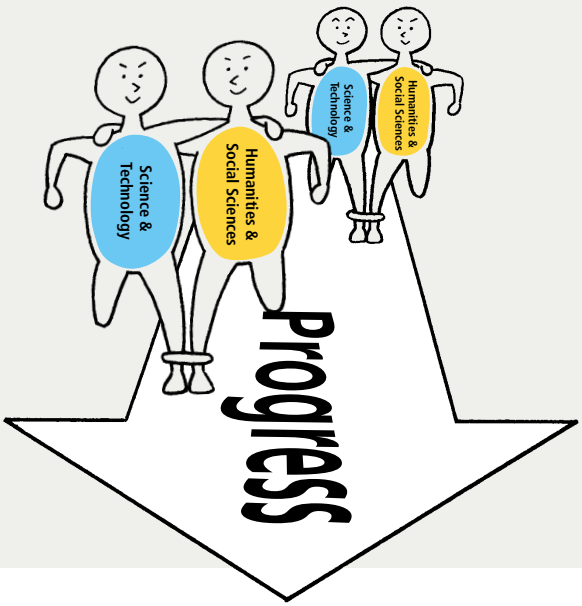
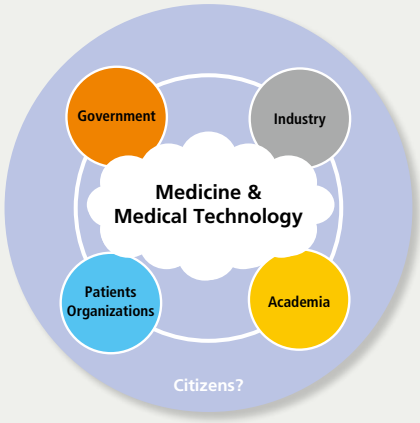


Fig. 2 Parties participating in scientific and technological research
When science and technology make progress, the academic community, governments, and corporations are often heavily involved, but input from the public tends to be very little. In contrast, Mikami's research suggests that in medicine and medical technology, segments of the public, namely patient organizations, have been heavily involved too. Particularly for rare diseases, as the number of their patients are very small, these organizations play vital roles in advancing their research. However, little attention is paid to input from other ordinary citizens.

Rare diseases as a special case

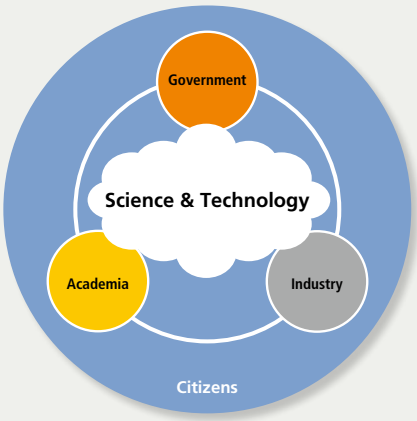


which allows for mass production so that medical care can be delivered at low-cost for the largest number of patients across the country. This has made the trajectory of stem cell therapy popular there instead." Mikami's findings helped him see clear distinctions between the attitudes in Japan and the UK. The experience of studying about iPS cell-based therapy then led Mikami to research the challenges of rare diseases and the role of patient organizations in addressing them.

The humanities and social sciences should be co-creators in science and technology

As Mikami was working on his research, he came to a realization. "When I approached and asked someone to talk about what they do, they sometimes responded as if I were about to judge their work. This is because up until today, experts in humanities and social sciences have only been involved as third-party observers in science and technology, arbitrating whether something was 'good' or 'bad' once the research was complete. I thought that this has to change." In 2019, when Mikami became a faculty member at Keio University, he was given the chance to bring about this change. Mikami meets regularly with a group of researchers who specialize in different areas of science, such as biology, chemistry, and informatics in order to foster new scientific projects in artificial cells, molecular robotics, and others.

Industry, Academia, Government, and the Public



In this effort, Mikami uses his background in humanities and social sciences to gather a wide range of viewpoints and information about scientific research being conducted and try to organize them into a roadmap for the group, thereby facilitating productive discussions about the future direction of the projects. "I've taken it upon myself to be a go-between for these projects. I think it's vital that people are able to debate the types of needs and issues a project might face so that science and technology can be integrated successfully into society. Experts with different academic backgrounds often have different ways of thinking and doing research, so the meetings are full of stimulating discussions."

When this team's projects lead to new discoveries in the future, Mikami says "I want to be involved in research studying how the scientific knowledge or technologies produced can be meaningful in society. Each and every one of us, myself included, is working individually on research that we find fascinating. Coming together as a group without changing that is when we will truly achieve 'creative collaboration,' or what is sometimes called 'co-creation.'" The results that this will bring about will make significant change in the relationship between humanities, social sciences, science, and technology.

Mikami is also passionate about educating students at Keio University. "The Faculty of Science and Technology is full of students who will be future researchers or who work at companies using their specialized knowledge. It's worrying if these people are convinced that they 'are doing everything right.' I will be thrilled if my classes can be the inspiration for them to look at science and technology from diverse perspectives and see it as a complex practice in society." This is Mikami's motivation as he goes up to the class podium every day.

(Interview and text writer: Akiko Ikeda)

To broaden your horizons, you must first look within

Koichi Mikami has spent his career exploring the ways in which science, technology, and society are interwoven, listening to people's unique perspectives on how science and technology impact their lives. While he now believes that scientists and engineers should work alongside experts in humanities and social sciences, it took a combination of various experiences to persuade him of this idea.

I understand that you attended both a junior and senior high school that was affiliated with Waseda University.

Between junior high, high school, and college, I spent 10 years at Waseda, all in all. When I was a high school student, a university professor came to my school and gave a lecture for us. I remember that I was surprised when I asked the professor a question after the lecture and he answered, "That's a great question. Why don't you do research about that?" I realized that, unlike what I had learned in high school, what is taught at university would often leave "unknowns" that you had to think about by yourself. And the professor was affirming about that. It was like I discovered a whole new world.

I was particularly interested in the idea of "poverty" and questions like what it really meant and whether capitalism was actually a "good" thing.

When you first enrolled as a college student, you were majoring in Economics, correct?

In the loosest definition of the word, yes. The study of economics seemed like the path towards realizing the better world. At the time, I thought that without money or "capital," you couldn't do anything to change the world, so I enrolled in the Faculty of Economics so that I could study how money is circulated. As I learned more, I realized that economics uses models to simplify almost everything. It doesn't take into consideration culture or preferences much. It doesn't really matter if you are thinking about Japan or England, you just assume that we are all the same. It didn't fit with my interest at all.

Actual consumers are distinct from one another. They hold different values and want different things, and we all know that from our own experience. Over time, my focus began to shift toward business theories that took consumer needs more seriously.

So what made you arrive at your current specialty, sociology?

At first, I was learning to become a business consultant, but I heard that without the degree of MBA, you couldn't find any real job opportunities. This is when I decided to join a master's program at Oxford University's Saïd Business School.

Around this time, as I mentioned in my research introduction, I became interested in studying the culturally-informed attitudes people had towards hybrid vehicles. I had to find a dissertation supervisor to pursue the idea, so I did a bit of research. I found out about Steve Rayner, a professor who specialized in climate change issues, and contacted him. He then suggested that I read something written by his mentor, the cultural anthropologist, Dame Mary Douglas. I remember when I had a meeting with Steve a few days later I tried to explain with my terrible English how the way people perceive society shapes cultural practices and other points that had caught my interest.

What kind of a person was Steve?

Steve was very meticulous when it came to research. He would let you know straight out if you were making sense or not. When I first started my dissertation research, I was very nervous because I had no idea whether it was going well or not. Steve helped me overcome this. He always treated me as a research colleague even when I was still an inexperienced student.

Is this around the time you started to think about becoming a researcher?

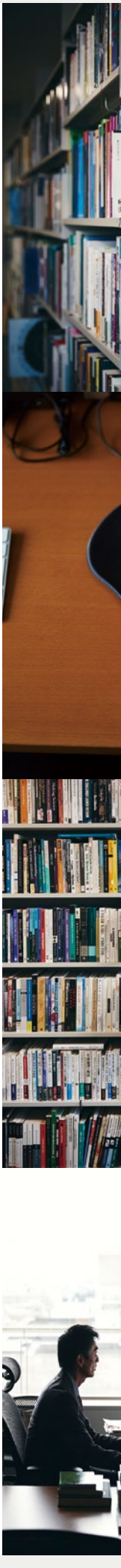
I ended up having to abandon my research on hybrid cars since interviewing drivers as an international student with subpar English skills proved too difficult. Desperate to think of another topic I could pivot to, I started to look into what items Japanese students had brought with them from Japan while studying abroad. I found out that a lot of them had brought medicine and toothbrushes. Even for daily necessities, when something was related to their bodies, people would stick with things that were familiar. In other words, there was a profound cultural link. This formed the basis of my master's thesis.

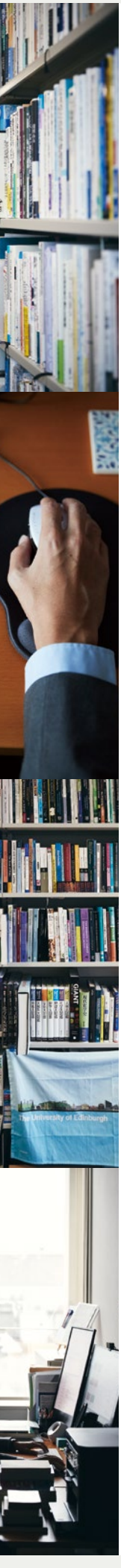
My study was very well received by both Steve and other professors on my dissertation committee. Knowing I had found an interesting topic and that I had effectively communicated it with other people filled me with joy, so I decided to continue my research.

How has your research unfolded since then?

I went back to study with Steve, this time as a doctoral student studying regenerative medicine. When I graduated, I found a job back in Japan, so I moved back here. However, I knew that Science and Technology Studies was much more active in the West, so I was determined to move back abroad one day.

In 2014, I found a research position at the University of Edinburgh related to studying rare diseases. That was exactly the topic I was interested in at the time, so I spent three years doing case studies on rare diseases in the US and Europe where this type of research is thriving. This time around I brought my family along as well. My daughter, who turned five when we were there, attended an elementary school in Edinburgh which turned out to be an invaluable intercultural experience for both her as a student and me as a parent.





It's clear that you enjoy your research, but what do you do to relax?

I have been playing football since I was a kid. I still play futsal for fun once or twice a week. My son started to take an interest in football when he entered elementary school, so recently we kick a ball around in a park or go to watch professional football games together on weekends.

What kind of place is Keio University compared to all your experiences thus far?

Scientific and technological progress can't be thought of only on their own terms, but also in terms of what they mean within society at large. This is the type of thinking I would like to see incorporated into a student's university experience. Students here have the opportunity to be exposed to diverse cultural values through foreign language and liberal arts classes, which I think is a great thing.

For me personally, I actively reach out to my colleagues who conduct very interesting research in Yagami Campus. This is where I hope to produce a successful model of "co-creation" between science, technology, social sciences, and humanities. From there, I would love to see this model spread to and inspire other universities and researchers. I am excited about what I have been able to start here at Keio and what the future might hold.

◎ Some words from students . . . ◎

● I feel like the connection between scientists and the general public has been missing, and that science and technology are just going off on their own. I took Professor Mikami's class because I felt like discussing the social responsibility of science/scientists with other students of my age is important. I enjoyed the fact that it takes a step back from science and tries to consider the role of science and technology in modern society from a perspective rooted in the humanities and social sciences.

Even when some form of science or technology has overwhelming support from most people, Mikami asks us to try to maintain a middle ground and show respect for opposing opinions. That helped me be more aware of my own values and biases.

(This is a paraphrased summary based on speaking with four students.)

(Interview and text writer: Akiko Ikeda)

For the full text of this interview

https://www.st.keio.ac.jp/en/kyurizukai/

"Knowing that I had found an interesting topic and that other people understood me and felt the same way made me decide to become a researcher."

Koichi Mikami

Mikami specializes in Science and Technology Studies, and his research focuses on governance of life sciences and biotechnology.

In 2004, Mikami graduated from the School of Political Science and Economics at Waseda University. In 2010, he completed his doctoral program at Said Business School, University of Oxford. He received his D.Phil. (Oxon) a year later in 2011. Mikami has worked as an Assistant Professor at the Center for the Promotion of Integrated Sciences at the Graduate University for Advanced Studies; a Research Fellow in the Science, Technology and Innovation Studies group at the School of Social and Political Science, University of Edinburgh; and a Specially Appointed Lecturer at the Science Interpreter Training Program of the Komaba Organization for Educational Excellence, University of Tokyo. In 2019, Mikami joined the Department of Foreign Languages and Liberal Arts, Faculty of Science and Technology, Keio University as an Assistant Professor. He began his current position in 2022.

My graduate student experience at Oxford University

Oxford is a wonderful place to study, and the experience of being a member of its colleges is really special. I studied at Green Templeton College which was established in 2008 through the merger of two colleges. It was the first time in Oxford's long history, and I was privileged to serve as the president for its Graduate Common Room during the process.

Valuing international connections

I spent three years at the University of Edinburgh, and continue to work with my colleagues there even today. As Science and Technology Studies is still a relatively minor area of research in Japan, the interaction with them is often stimulating and encouraging. I try to develop an international network of scholars with shared research interests.

Koichi Mikami's ON and OFF

Connecting the past to the future

Meeting my supervisor

I greatly respect my supervisor Prof. Steve Rayner, not just as a researcher but also as an individual. A few years after I completed my D.Phil., I brought my family to see him and he was very happy about it. Sadly, he passed away in 2020. One of my goals is to measure up to the standard he set.

Is football a universal language?

I still play football whenever I have a chance to do so. When I couldn't speak English much, I learnt a lot from the communication with the friends I met through playing football. My son recently started it too. I want him to be better at it than myself so that he can make new friends no matter where his life takes him to.

Living abroad with my family

My family was with me during my time in Edinburgh. My children don't seem to remember much about it, but we had a lot of experiences we couldn't have in Japan. I hope that when they grow up, they will go abroad to explore different cultures by themselves. Then, they may look back on and enjoy the pictures from these times.

私の本棚
My favorite books

The Impact Agenda
This book is relatively new and was published in 2020. It covers important topics such as how we can/should evaluate scientific research. In Japan, there is a debate on whether science should be "useful," but in the UK, the keyword they use is "impact." While it doesn't necessarily give us answers, the book is packed with helpful lessons about how society may advance science.

Laboratory Life
This book is an anthropological study focusing on a laboratory as its field site. It created a new line of research in the study of science and technology, and is now considered a classic. To many, "scientific research" sounds like the work in a different world from theirs, but this book reminds us that it is undoubtedly a social practice that is done by human just like us. A Japanese translation was published in 2021, so I hope that it reaches a larger audience.

Science fiction novels
Advances in science and technology have had an enormous impact on people's lives. I'm sure that there are a lot of people who also feel anxious about what might happen in the future as a result. Science fiction is known for giving us ways of thinking about the future of science and technology, expressing our fears through vivid stories. Reading famous sci-fi novels can also be a perfect way to relax when I need a break from work.

Books about the history of science
The history of science is the study of how science has evolved over time in relation to the various social environments it has been situated in. History is not really my area of expertise, as my research focuses on modern science and technology, but the more I learn about it, the more interesting it becomes. I always recommend Principe's *The Scientific Revolution* and Furukawa's *Kagaku no Shakaishi* to my students as an introductory guide to the subject.

Human Choice and Climate Change
This was the first book that my supervisor Prof. Rayner suggested I read. The chapter I read was one by a British anthropologist, Dame Mary Douglas, called "Human needs and wants." It argues the importance of understanding people's needs and wants from the perspective of social structures. It's really important to me on a personal level, because it made me think I wanted to pursue an academic career for the very first time.

What is "wasted" time?

Koichi Mikami

During the COVID-19 pandemic, I was thrown into a situation where all of my university courses needed to be done online. Just like many other university lecturers, I had to make videos for classes every week. At one point, we were told to divide them up into short and categorized segments for students' ease. I also heard that some students speeded them up when they watched. There are probably students now who wish they could fast-forward the real-life 90-minute lectures just as they did with the videos then.

This experience reaffirmed my sense that scientific development has a profound effect on our sense of time. There have been times when I see my kids watching videos on the Internet over and over, replaying their favorite parts or skipping over sections, and that made me a bit worried. It's so unlike my childhood when we were always thinking about our favorite TV programs waiting for the special time of the week that they were broadcasted. If you missed it for any reason, it was just gone. To them, however, the control they have must be the natural thing in the world. Yet, seen by anyone who knows another way of life, it's easy to realize just how much our perception of time has changed.

I'm not saying that this type of change is necessarily a bad thing. In fact, I can easily imagine that there are a lot of people who would say it's good since people can use their time more efficiently. I don't deny their arguments off the top of my head. However, "being efficient" is premised on the idea of "eliminating waste." That's why I want people to reflect on what they assume to be "wasteful" in such thinking. Even if something is not necessary at this very moment, isn't it possible that when you think about it in the longer term, or look back at it one day, you'll actually find it valuable? Also, like my previous example, isn't there a possibility that "wasted" time actually help you appreciate the thing you've been waiting for all the more?

When we follow discussions on science and technology, we frequently see "improvement on efficiency" and "optimization" mentioned as their goals. However, there are many instances where this is an assertion based on a particular value system and that may deprive us from experiencing the true richness of our life. Perhaps, if using our time well did not just mean getting rid of "waste" but meant finding the value in the midst of such waste, our lives can be much richer than mere optimal ways of life.

理 工 学 Information

KLL-ONE: Student Business Contest

The Keio Leading-edge Laboratory of Science and Technology (KLL) actively creates startups, invests, and provides support to students and faculty in the Faculty of Science and Technology during the early stages of their initiatives so that they can implement and circulate their ideas in society. KLL provides "short-term intensive support" for those who are creating new business ventures so that the educational resources and research findings obtained within the Faculty of Science and Technology will "be able to come to fruition in the future as startups."

KLL-ONE is an inter-student business competition organized by KLL to discover and foster student entrepreneurs. The event has been held annually in December since 2019 and allows students to give presentations on their research within the KEIO TECHNO-MALL. In 2022, six different teams participated. KLL provided support for participants as they put the final touches on their presentations. At the event, they pitched their business plans to a large audience, revealing their strategies and ideas on how to solve social issues.

KLL-ONE:
https://sites.google.com/view/kllincubation
You can also check out past contests!
(Website written in Japanese)

Editor's postscript

This feature has introduced Associate Professor Kochi Mikami and his research on science and technology studies. We hope that these collections of articles prove useful to a wide readership.

Associate Professor Mikami began working in the Faculty of Science and Technology's Department of Foreign Languages and Liberal Arts in April 2019. While it was less than a year later that the COVID-19 pandemic began, he said that he is excited about the future projects that will be made possible through further collaboration with researchers in the Faculty of Science and Technology. We look forward to how Associate Professor Mikami brings about his envisioned "co-creative" workplace here at the Faculty of Science and Technology, where scientific and technological progress also produces results in the humanities and social sciences.

(Yurina Tomohisa)

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