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Understanding things deeply and more deeply

Kazuya Ando

When can you say you have understood something? When it comes to learning physics, we are at risk of developing a false illusion of having understood it if we can follow the development of formula. Or you may take for granted what's written in your textbook or what your teacher says. Can you say these are signs of correct understanding?

In the famous book "The Feynman Lectures on Physics," Richard Feynman, quoting the physicist Paul A. M. Dirac's remark, says this: "What it means to really understand an equation – that is, in more than a strictly mathematical sense – was described by Dirac. He said: 'I understand what an equation means if I have a way of figuring out the characteristics of its solution without actually solving it.'" In other words, understanding physics means that you understand what will occur under a given condition, even without actually solving the equation that describes that particular phenomenon. You may say, "This is the solution I've calculated!" Alas, it doesn't mean you've understood the problem.

At schools, each student is required to solve a problem – a problem the route to the correct answer of which is known – within a prescribed period of time. To achieve it, students may not need the kind of "understanding" as defined by Feynman or Dirac. But things are quite different when it comes to research work and the real world; in most cases, one is always required to work out a solution for an uncharted problem. We researchers investigate into unknown phenomena using every possible method, collecting hints for the solution. We don't even know if a route to the solution is reachable or not. These problems are far more difficult than school examination problems, the solutions of which can be found somewhere if you try to. That said, we are blessed with a huge pyramid of wisdom built by our predecessors, and with colleagues who are willing to make up for our shortcomings or lack of knowledge. In our pursuits, time limits don't matter. In order to open up the horizon of next-generation science and technology under these circumstances, it's imperative that we understand things deeply and more deeply.

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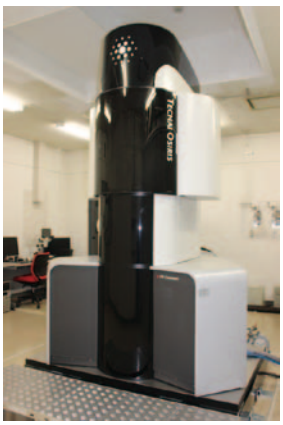

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Editor's postscript

Dr. Ando is so young (30 years of age) that he is almost indistinguishable from students when he is wearing a sweater (as in the front cover photo) and mingling with them in the lab. Indeed, he has an intimate atmosphere around him. As I heard the interview going on, I imaged Dr. Ando as being exactly the same personality as he appeared – he responded to the interviewer in a natural and openhearted manner.

The title "Understanding things deeply and more deeply" in the above column seems to have something in common with "Lectures on Anti-Sociology" that he introduced in the "My favorite books" page. It looks like a motto Dr. Ando values most. The column touched my heart, inspiring me with a new way of thinking. Did it touch your heart, too?

(Manami Matsubayashi)

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