

Dear 12-Year-Old Me: Broad Interests Leads to Broad Opportunities

Koya Katayama



What is your dream for the future? Whatever it may be, you will be doing research in graduate school—a school you can attend after graduating from university—eleven years from now. Since you might not yet know what research really is, I'm not sure whether this news will make you happy or not. Therefore, in this essay, I will explain what I'm doing as a graduate student, why I chose to do research, and offer you some advice. I hope this essay will help guide your future journey and spark your interest in research or science.

I will explain what I'm doing in graduate school, which might be what you most want to know. There are two main responsibilities for graduate students: first, to conduct their own research, and second, to communicate their findings to other researchers or to the public. As for my own research, I study the evolution of biological populations—a collection of different organisms—using mathematics. Evolution is the process by which a biological population adapts to a changing environment. For example, suppose that you spread agricultural chemicals on your farm every year. Once the chemicals are applied, only insects that can tolerate them will survive. Because reproduction is somewhat random, some descendants of the survivors may

happen to be more tolerant than their parents. These stronger descendants are then more likely to survive the next application of chemicals and leave behind more offspring. In this way, every time you spread agricultural chemicals, the number of tolerant insects increases, which is an example of evolution. My research focuses on predicting how biological populations evolve in response to environmental changes. Although real populations are complex, once we simplify them, we can describe them using mathematical equations. This allows us to transform the biological problem into a mathematical one. By applying mathematical techniques, we can then solve these equations. Through this process, I derived a formula for predicting how biological populations evolve. After conducting my research, I shared my findings with others by writing a paper to inform other researchers of my results. I also attended several conferences and gave presentations about my research.

Next, I will describe the path I took to become a graduate student, which may help you when deciding your future career. Since I was about your age, I had vaguely considered becoming a researcher, because I imagined that researchers can explore what interests them. However, I did not decide what field to pursue until I became an undergraduate student. When I entered university, I chose physics as my major. Physics—which you may not be familiar with—is the study of the mechanisms behind natural phenomena such as the traveling of light and sound through air, the flow of heat from hotter to cooler objects, earthquakes, and even the motion of planets. I found physics fascinating because it explains all the phenomena in the universe by using mathematics. When I entered graduate school, I asked myself what I truly wanted to study. I realized that I wanted to study biological phenomena using mathematics, since biology is one of the most familiar and mysterious areas of science

to me. That is why I am now studying mathematical biology.

As a graduate student, I'd like to tell you that going to graduate school can be valuable even if you don't plan to become a researcher. Research is a unique activity in that you can clearly feel your personal contribution to the world. In many jobs, people work together on large projects, and it can be difficult to recognize the impact of your individual efforts. In contrast, in research, your own thoughts and discoveries are directly reflected in your papers. Furthermore, you can receive responses to your research from other researchers. While sharing your findings with the world comes with great responsibility, receiving positive feedback can be deeply rewarding. In fact, one of the most gratifying moments in research is when another researcher finds your work interesting. Experiences like this can help you build self-confidence, which will make it easier to take on new challenges in the future—even if you don't become a researcher.

Before closing this essay, I'd like to offer one more advice: having a broad range of interests can enrich your life. For example, if you are interested in and familiar with flowers, you will notice them while walking on the road, pause to observe them, and perhaps even make a small discovery. On the other hand, if you are not interested in flowers, you might not even pay attention to them. In this way, curiosity expands your perspective. In research, of course, having a wide range of interests is important because it broadens your field of study. However, having diverse interests also broadens your horizons, just like observing flowers along the way.

I've explained what I'm doing now, why I chose this path, and shared some advice with you. No one can say for sure whether it was the right decision for me to become a graduate student, since no one knows what would have happened if I had

not entered graduate school. Anyway, I'm confident that being a graduate student is where I'm meant to be right now. Whatever you choose to do in the future, it is important to follow what truly interests you. If you have broad interests, your options will be broad as well. Research is just one way to satisfy your curiosity on your own.

A part of the graph is taken from [いらすとや](#). I also used icons in PowerPoint.

I used ChatGPT and Grammarly to improve the language or grammar.