Experiences of a Blind Computer Scientist

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June 27, 2006

The Early Years.

Today, I am mostly going to talk about my personal experiences as a blind student. I was born in Korea. I have been blind from the age of six. I attended a school for the blind from elementary to high school, as most blind children do in Korea. At the school for the blind, I learned how to read and write Braille, how to use a white cane and how to type using a typewriter, as well as all the subject matter that other sighted students learn in regular schools. In terms of accessibility, it was a near perfect place to take classes. All textbooks were provided in Braille even before semesters started, and I could turn in the answers to homework in Braille.

School for the Blind.

When I started preparing for the college entrance exam, the school for the blind was not an ideal place at all. At that time, in all high schools for the blind in Korea, two thirds of classes were related to massage and acupuncture with which most blind people in Korea make their living today. What I learned from school was not enough for college preparation, so I had to study hard after school. Reference materials for the preparation were not provided by the school, so I had to buy some reference books available in Braille from Braille transcription service agencies, and their price was almost 15 times higher than the printed versions. And also, I recruited volunteers to read additional materials face to face. My favorite subjects were math and English. I considered entering science fields such as physics, but teachers told me that most colleges have a requirement that students with eyesight below a certain point cannot apply for the departments in science and engineering fields. Most teachers advised me to study special education to become a teacher in a school for the blind. But it didn't sound like fun to me at that time. Some other teachers and some blind college students encouraged me to study other subjects saying that we need to show the world a blind person can do as well in various fields as sighted people and to create a new path for the younger blind students to follow. I simply believed them, and decided to study English which was a popular subject at that time in Korea, not knowing what to do with it in the future. Fortunately, I did pretty well on the college entrance exam, and then I became an undergraduate in a large university full of sighted students.

The University.

There was only one other blind student among 20 thousand university students. It was a big change in various ways. I had to commute instead of staying in a dorm. Classrooms were hard to find at first, because there were so many buildings and the layout of the rooms in the buildings were quite complex. The university didn't have any support system for the blind, so I had to recruit volunteers to read books, which became a routine after the first semester. It wasn't easy to prepare for all these things, but as a result, I met a lot of nice people, and without their help, I don't think I could come this far. It was after finishing my first semester at college that I began to learn about the computer. I learned how to use it to write reports more easily. Before then, I used a typewriter, but it was painstaking to write a long report with it. There was no way to check what I wrote by myself, so I had to fully concentrate on writing so

that I didn't forget what I had written. I tried writing first in Braille, and then typing it on the typewriter. It was better, but I had to fully concentrate on it anyway, because there was no way to edit Braille documents on paper. Then, I heard that a basic screen reading software for Korean running on DOS was developed, so I started learning how to use the screen reader and a word processor program. The screen reader had only four features: read the character from the keyboard, read the character that the cursor moves to, read the current line where the cursor is located, and read the entire screen, but writing on a computer was much easier and faster even with these small number of features. Around the same time, Braille translation software and Braille embossers became available. OCR technology was another breakthrough for me, because I could just scan a book, let somebody edit OCR errors, translate the text into Braille, emboss it and read it. The turn-around time was greatly reduced using these technologies. I was fascinated by these technologies, so I enjoyed trying newly available technologies to find out whether it suits best to my needs or not. Then, I learned C programming language to write a program to clean up and format scanned text for Braille translation. I enjoyed the logical process of writing a program.

Entry in to Computer Science.

Because of my enjoyment with the computer and programming, I took a couple of computer science classes such as data structures and introduction to computer science. I did well in these courses, and with all my computer knowledge, I could help my sighted colleagues to solve their computer problems. I began to think that computer science may be a subject worth investing my life. I thought I was indebted to human society in various ways and I want to make contribution to society, and studying computer science might pave the way for it. This desire got me interested in computer, and its potential for contributions to humankind in general and people in the blind community advised me to pursue this career. So I applied for the computer science department in my university, worrying about being rejected for the reason that I am blind. To my surprise, I was accepted without much discussion. The eligibility criteria had apparently been changed. I even got a scholarship, and had the honor of becoming the first blind computer science student in Korea. There were a lot of new things to learn, and I enjoyed them very much. The most difficult part was to obtain books in an accessible format. Most computer science books have important math equations and figures. It was a lot harder to find volunteers who could read math equations. So I often had to meet other students and teach them how to read equations and figures. The figures were mostly described verbally, but complex diagrams like computer architecture diagrams were hard to understand, and I had to spend a long time in understanding them. I had to stay up over many nights. But fortunately, this didn’t discourage me. I got interested in artificial intelligence and machine learning, and I decided to continue to study in graduate school.

Graduate School.

I was accepted to the top graduate school in Korea. There, I learn a lot about machine learning, and wrote a master's thesis on text filtering. I then worked for a welfare center for the blind that had received a government funded project to develop a screen reader running on Korean version of Windows. It was my first experience to develop such a large scale software program. So I learned a lot about designing, testing and debugging such a low level software program. I then came to the States to pursue my PhD. degree. At the University of Washington, I was privileged to have excellent support. We have an excellent Disabled Student Services Office, which recruited paid editors and volunteers and coordinated them to translate text books and papers. But they only covered the material taught in classes. Since I was working as an RA, I also got support from a separate office that provides services for employees with disabilities. They provided me with an additional reader who edited papers related to my research, and proofread what I had to write.

Access Technologies.

Several new technologies helped me throughout my computer science studies here. One of them is a Braille note taker like the one that I am using right now. I can write Braille documents on it. I read computer files downloaded from a PC. I can translate my Braille documents into printed non-Braille text. It also contains such features as web browser, e-mail client, calculator, schedule organizer, audio recorder and player and so on. With this device, I don't have to carry thick Braille books in my bag; instead, I have only to carry this device small device. Latex

helped me with writing papers and answers to homework. Some authors send me the latex source files of their books or papers which contain all the information I need to know. I frequently use a new tool that recognizes math equations and translates them to Latex. The features in screen readers have advanced remarkably. On the internet, I can find a lot of useful information which were not previously accessible to the blind. The advances of these software programs and internet enabled me to be a lot more independent in doing my research.

Research.

I have worked with Professor Ladner on Tactile Graphics Project for the past three years. In other research, I am working on analyzing interactions in recorded meetings automatically using machine learning techniques, which will be my dissertation topic. After finishing my Ph.D., I'd like to have some experience in industry. Then, I will go wherever God will lead me to. It can be academia or a third world country. I don't know for sure.

Summary.

When I reflect on my experience as a computer science student, the important factors that enabled me to pursue this career were (i) recognition of computer technology (motivation), (ii) practical experience in programming and research, (iii) advances access technology, and (iv) good people with unbiased attitudes.

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