

# Canada Japan Co-op Program Experiential Report

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## Taiheiyo Cement Corporation Central Research Laboratory 太平洋セメント株式会社

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## Acknowledgement

First and foremost I would like to express my deepest gratitude to both the Canada-Japan Co-op program for assisting me in the pursuit of working in Japan and to Taiheiyo Cements for their supervision, generosity, and guidance throughout my internship. I am beyond thankful for not only getting the opportunity to grow in the technical field, but to learn about a different culture and experience a new environment. I will never forget the undivided kindness that was continuously shown to me by those who I have worked with in the company. The memories and friendships that I have made throughout these past 11 months will stay with me for the many years to come.

## 1.0 About the Company

Operating at a global scale, Taiheiyo Cement Corporation is the largest cement manufacturer in Japan, emphasizing its business in cement, construction materials, mineral resources, aggregates, environmental protection, and international business<sup>[1]</sup>. The company's pursuit and commitment towards eco-friendly alternatives of construction materials and advancing socioeconomic order on closed loop materials is what has lead them to their continuous growth and success up to date.

It all began during the Meiji era with the establishment of Onoda Cement Company in 1881. As the demand for the modernization of infrastructure increased, so did the need to produce cement and thus, resulted in an industrial expansion for cement manufacturing. In 1923, Chichibu Cement was founded, and in an attempt to keep up with the cement competition, Onoda Cement Co. merged together with Chichibu Cement Co. to form Chichibu Onoda Cement Co in 1994. To solidify Chichibu Onoda Cement's position as a leader in the industry, a merging with Nihon Cement Co, originally established in 1883, took place in 1998<sup>[3]</sup>. Thus forming what we now know today as Taiheiyo Cement Corporation; otherwise translated as "Pacific Ocean Cement Corporation."

As of today, Taiheiyo Cement owns several production sites within Japan and abroad. With nine plants in Japan, three in the US, three in China, one in Vietnam, and one in the Philippines. Yet amongst these plants, there is only one research laboratory, situated in Sakura City Chiba prefecture. The research laboratory in particular, is the heart and center of my internship experience.

## 1.1 Central Research Laboratory

In the forefront of material production through Taiheiyo Cement's manufacturing plants, the Central Research Laboratory takes the back stage in the analyzation, development, and testing of products. The Research Laboratory was grand in itself, consisting of five floors filled with offices and laboratories. Within this research facility, exists an administrative department grouped together with three research and development (R&D) departments. The following figure illustrates how teams and departments were separated.

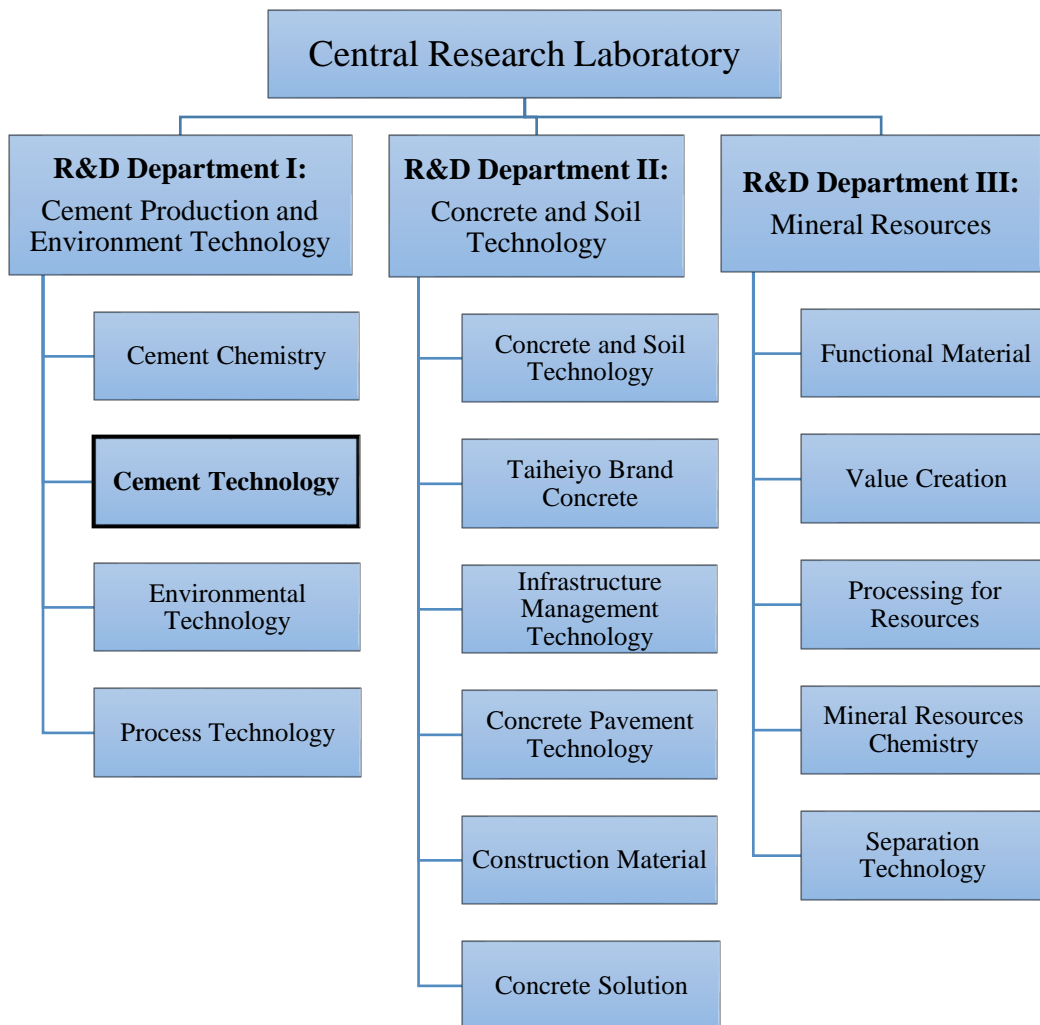


Figure 1.0: Department Sorting of Taiheiyo Cement

## 2.0 Work Life

### 2.1 Position

Amidst all the departments, I was placed in the 1st Research and Development (R&D) department under the cement technology team or “semento gijitsu (セメント技術)”, which is often shortened to “seme gi (セメ技).” The cement technology team was involved with research regarding cement production processes, material properties, maximizing the usage of recycled materials, environmental impact reduction and energy-saving alternatives<sup>[2]</sup>. My team worked in close relation to the cement chemistry team or “semento-kagaku (セメント化学)” as both our teams were in the same office and had similar objectives when it came to cement chemistry research. As part of the R&D department, I was assigned a research project that involved analyzing the physical and chemical properties of cement affected by minor additives.

### 2.2 Research and Responsibilities

Prior to coming to Taiheiyo Cements, I did learn about cements back in my home university, because of my degree, allowing me to have some relevant background information of my work. Despite this, the work relied heavily on the chemistry of cement, whereas the field of engineering I was familiar with was concrete structural design. Thankfully I was given much time to read several articles, books, and references that would later prepare me to conduct my research. To ensure that I truly understood the nature of my research, I was assigned to reproduce an experiment done in the past. A few months into my internship involved heavy studying, reading, and understanding of the bases of my potential research. On top of the studying, I was also trained on how to use various laboratory equipments, calculating and measuring chemical compositions of cement clinkers, and understand how to interpret experiment results.

The research project that was given to me was to analyze the formation of equilibrium phases that appeared during high temperature cement clinkering processes and the effects of added minor elements. When raw materials are mixed together in certain proportions and then burned at temperatures of about 1450°C, the raw material solidifies into pebble like nodules called “clinkers”. Upon cooling, phases are formed in these clinkers which give cement its distinct properties. Cement is then produced by grinding these clinkers along with gypsum to control the setting of cement.

Ordinary Portland Cement (OPC) clinkers contains phases such as tricalcium silicate (aka.  $C_3S$ ) which contribute to early strength, while tricalcium aluminate (aka.  $C_3A$ ) influences early setting time of the cement. The four main phases of OPC, which are  $C_3S$ ,  $C_2S$ ,  $C_3A$ , and  $C_4AF$ , can be affected when certain amounts of  $SO_3$  is added into the raw material. On top of seeing the effects of  $SO_3$  on Ordinary Portland cement, other additional parameters were tested to observe how the effects of  $SO_3$  can be offset. With this research, I was able to assist my team in their pursuit to uncover new cement advancements.

Being the only fluent English speaker in my department put me in a position where members of the team would rely on my ability to complete English related tasks. This meant that I would often read, revise, and/or interpret English documents. These English papers relied on the involvement of international business as well as understanding international information. These tasks were something I knew I could excel at and was always eager to complete whenever it was assigned to me. Through these tasks, I felt that I was able to contribute and help my team members outside of my research.

## **2.3 Work Environment**

As the company bus drops employees off at the laboratory door front around 8:50am, everyone quickly changes into their work uniform and the day officially starts with the ring of the bell at 8:55am. A few minutes after 9:00am when most members have arrived at the office, our leader would conduct a short meeting called “KY”, which an abbreviation for “Kiken Yochi (危険予知)”. This essentially meant “danger prediction”, where members of the team would discuss a precaution to keep in mind for the day. It could be “Take care of burns from using the electric furnace” to something as simple as “Take care of back aches from desk work.” I made it a goal to respond in Japanese during these daily meetings, as one way to improve my verbal skills.

The work was done both in the office desks and in the laboratories. The atmosphere of the office can go from ambient keyboard typing and mouse clinking in one moment to conversations that lit up the room in the next. Laboratory work is usually done by myself after being taught the necessary procedures to conduct experiments. The environment in the workplace was friendly and pleasant.

## **2.4 Work Etiquette**

Upon arriving at the office, greeting everyone good morning by saying “ohayougozaimasu (おはようございます)” was customary. Throughout the day, at any moment when I came into contact with another coworker, it was very typical to greet them with “otsukaresama desu (お疲れ様です).” The greeting is derived from the word “to be tired – 疲れる”, but the general feeling behind this widely used phrase is the acknowledgment of someone’s effort that caused them to be tired. This phrase is used depending on the setting and situation. It was also common courtesy, when leaving earlier than my coworkers, to say “osakini shitsureishimasu (お先に失礼します)”. This tells your coworkers that you are excusing yourself for leaving earlier than they are.

## 2.5 Relationships

Upon starting my internship, I found out that there were also a few members who just started working for the company around the same time I did. Those who first started working in the company were known as the first year group. Since we all technically fell around that same hierarchical tier in the company I was able to get along with my coworkers who started the same year as I did.



Figure 2.0: party with the first year group.

In the beginning I was very hesitant to approach my coworkers and socialize during working hours. As time progressed, I became slightly more comfortable being able to socialize with them when they approached me. Though I still had lingering worries about disrupting their work, they were always willing to lend me their time to address my questions and concerns whether it was related to work or not. I appreciated their patience to educate me and even spark up non work related conversations.

Ultimately the best times to socialize was outside working hours. I enjoyed how some of my coworkers would even try to talk to me in English, as they too wanted to improve on their speaking skills. It was great to have the sort of mutual language and culture exchange between myself and my coworkers. Every day I felt that I was learning something new from the teachings and conversations I had.



Figure 3.0: Party with cement technology team.

## 2.6 Company Related Activities

### 2.6.1 The Parties and Extra Activities

My team occasionally held parties and even organized a business trip during my stay. The first party that was held for me was the “kangeikai (歓迎会)” which was the “welcoming party”. There were numerous parties, or “nomikai (飲み会)”, held throughout the year and for special events such as the New Year’s party “shinenkai (新年会)”. At the end of my work term, they held the “soubetsukai (送別会)” which was my farewell party. All with the intention of talking about work related subject, getting to know one other, improving conversational skills, celebrating, and just to have a good time over delicious food and drinks.

A once in a year event, held sometime in August, was the Sakura party, aka “sakurakai (さくら会)”, where members from all departments could participate in what was essentially a game night with food and drinks. Held in the laboratory’s cafeteria, all the participants were grouped together in teams that competed for prizes. It came as an unexpected surprise when my team had actually won first place. There were a ton of prizes displayed on a counter where the winning teams can pick which ever prize they wanted. I was pretty happy with the prize that I was able to take home.

For the awareness of environmental protection, many members would volunteer to go outside the laboratory and clean up the grounds. Not so much picking up garbage, but removing weeds, leaves, and scattered twigs. It was a great way to get fresh air from being inside all day, as well as exploring the laboratory’s surroundings.



Figure 4.0: Outdoor cleaning.



Figure 5.0: Hakodate business trip



### 2.6.2 Business Trips

The most memorable experience that Taiheiyo cement has provided me with was a site tour to the Kamiiso cement plant and Garo mine located in Hakodate, Hokkaido. This plant is known to be Taiheiyo Cement's biggest cement plant with 3 rotary kilns dating back to 120 years old.

Everything about the plant was truly impressive, from its grandiose structure, to its extremely intricate parts webbed together in a complex system. During the tour, I learned about how the company produces cement in an eco-friendly way. Items that would normally be dumped in landfills, such as wood waste, car tires, and plastics, were utilized as fuel to power the kiln. Ash left behind from the waste could be used as raw material for the cement itself.



The size of the plant and limestone mine was like a town in itself, as it was both managed by over 200 employees. After our tour guide showed us the general operation of the plant, we were then escorted to the Garo mine, which was connected to the plant by an extended conveyer belt just 6km away. We were given a view that overlooked the mine from the top of the hill and witnessed dump trucks deposit the excavated limestone into the underground crusher. The mine allegedly contained limestone that could last for 300 years.

Afterwards, the company tour guide took us through a tunnel that would eventually lead to a crusher right below the mine. The crusher was constantly at work, reducing incoming boulder sized limestone that was being deposited. Overall the tour was an eye opening experience that gave me a sense of the amount of work that goes towards manufacturing cement.

After the site visit was finished, we had about a few hours to tour Hakodate. I got a chance to visit the 5 pointed star fort, also known as the “goryoukaku (五稜郭),” and eat an exclusive Hakodate burger joint called “Lucky Perriot.” Other kinds of food I got to eat during my visit was squid sushi and Okhotsk Atka mackerel. Hakodate is well known for its night view of on top of mount Hakodate. Although I didn't get a chance to see it at the time, I'm hoping to return and have it checked off of my ‘to visit’ list. |

## **3.0 Personal Life**

### **3.1 Living Arrangement**

I was very fortunate on the day of my arrival to Japan as two of my supervisors and another coworker greeted me upon my arrival at Narita airport. From the airport, my supervisor drove us to Narita Shrine where I immediately got to experience a taste of Japanese culture. After exploring the shrine and the little shops that lead to it, I was driven to the apartment where I would be living in for the duration of my stay. One of my coworkers who was present at the time of my arrival, was someone who was also living in the same apartment as I was. She taught me what I needed to know about my living arrangement and became someone that I could rely on when I had any issues. When it came to government documents and opening a bank account, my supervisor and lab mentor went with me to sort them out. I felt that though their help I had an easier time adjusting to my temporary home.

The apartment I stayed at was restricted to women only. I was happy with my living arrangement as it was relatively large for a one person room. It included a private washroom, a mini kitchen, and a main bedroom. There was also a laundry room on the first floor of the apartments. When it came to food, ready prepped meals at the supermarkets was my choice during the days I was exhausted from work. However, through my desperate attempt to save money, I learned how to cook proper meals that wasn't just fried eggs and instant ramen. Some of the dishes I learned how to cook were Japanese curry, miso soup, chicken katsu, and various other donburi meals. Through this I discovered how much I enjoyed cooking and even took a baking class.

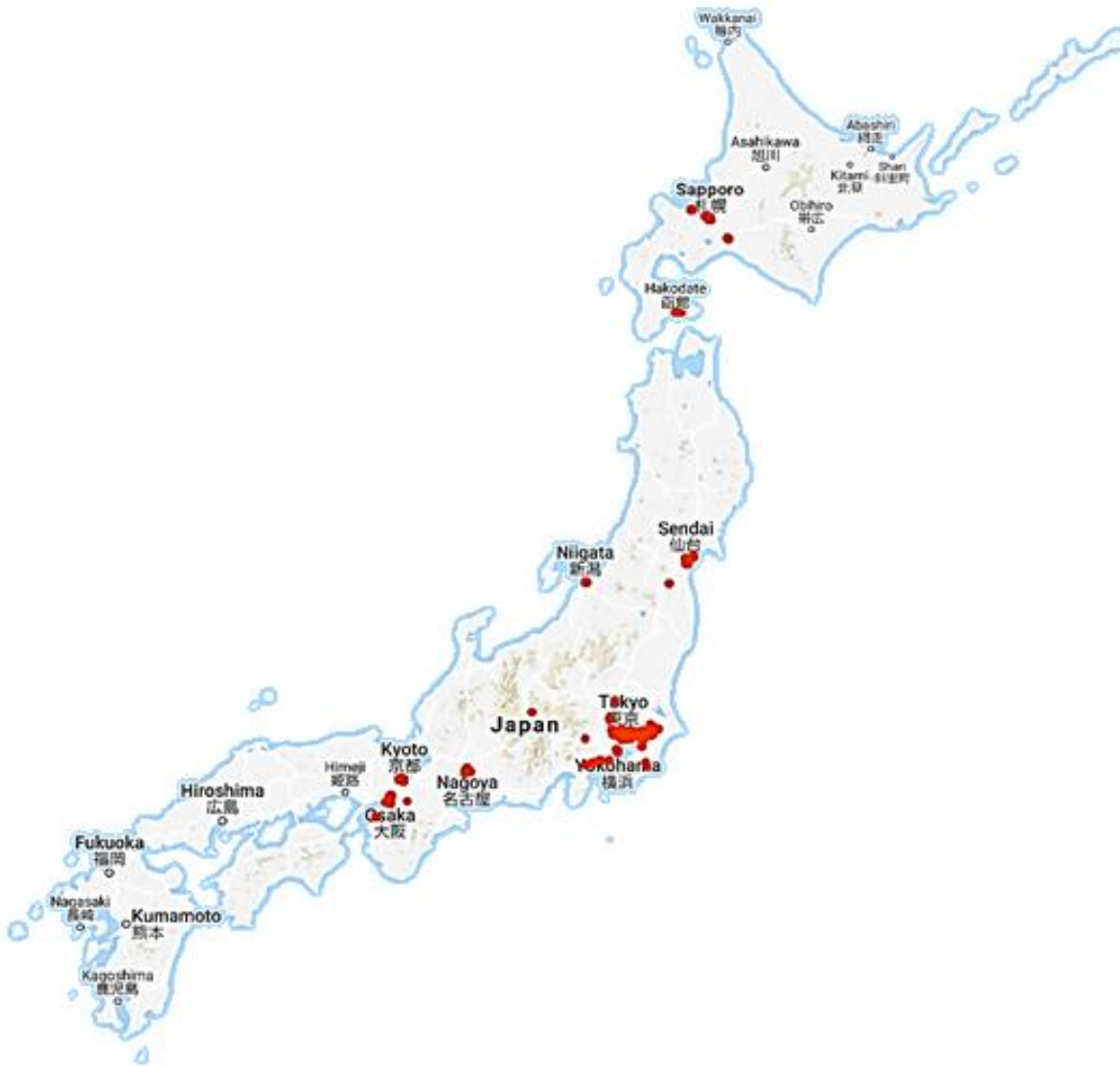
### **3.2 Experiences**

#### **3.2.1 Living in Chiba Prefecture**

Chiba prefecture reminded me of Alberta in a way. With wide open spaces, rice fields, quant sightseeing areas and major landmarks. Although I visited Tokyo often, I liked the fact that I lived an area that wasn't as busy and crowded. Major venues such as Lala port, Disney resort, and events held in Makuhari messe made for a couple enjoyable weekends. Not to mention how convenient it was to get to the airport whenever I traveled. I don't often bike back home in Calgary due to the perennial winters, but in Sakura city I was also able to bike around my neighborhood countless times during the summer. Chiba has a lot of hidden gems and treasures that are great if you take time to explore.

### 3.2.2 Japan Travels

I had many Japanese friends who I met through my university's homestay student program, so it was great being able to visit them during the weekends and long holidays. I also had friends back in Calgary who were also living in Japan during the same time I was. Some lived in Sendai and others lived in Tokyo. Since I had connections through them I was able to visit these areas often. Otherwise I spent the long holidays visiting areas that were much farther away.



### 3.2.3 Other Travels

Living in Japan also gave me a great opportunity to travel to other parts of Asia. I was able to visit South Korea and Thailand during the long holidays.

### 3.2.4 Food

Being able to experience the rich and unique varieties of food was one of the best and also weirdest experiences of living in Japan. Despite having no problem with eating chicken innards, I still couldn't get used to eating as natto, let alone torisashi. Though when it came to my preferences, I tend to have a sweet tooth. I more so leaned towards the many types of desserts that was available in Japan such as the wagashi, mitarashi dango, matcha, mochi, ice creams, puddings, parfaits, cakes, and bakeries.



Figure 6.0: Eel and a plate of washoku.

### 3.2.5 Kabuki

A former Japanese homestay student invited me to see a Kabuki play held in Kabukiza Theatre in Ginza with her family. Kabuki is essentially a stylized dance and drama dating back to being 400 years old. Additionally, all the actors were male performers, despite the female roles. The length of the show lasted 5 hours long, though it is said that some plays could last full day. What was amazing about the show was sheer amount of detail put into the costumes, make-up, and stage set ups. One of the main performers even changed their outfit 7 times within one scene. Not to mention, the stage set up would completely change for every major scene, all coordinated on a revolving platform. Although it is a very traditional play, the program was able to accommodate foreign visitors with English subtitles provided on a tablet.

### 3.2.6 Media

If you enjoy Japanese media such as anime and manga, you'll be able to experience a lot of the events and conventions catered to the industry. I attended JUMP fest held Makuhari messe, World Cosplay Summit held once a year in Nagoya, Anime Japan in March, and Universal Studios Japan with their many anime attractions. There were also many pop up anime themed museums, themed restaurants, cafes, and numerous anime live shows and stage plays that I was able to go to.

### 3.2.7 Various Other Experiences



Figure 7.0: Keisei Sakura Matsuri, Dolphin show at Nagoya Port, Imoni-kai by the river in Sendai

*Not pictured:* onsen, karaoke, and izakayas.

## Reflection

Being at Taiheiyo Cement taught me the practical implications behind research and why certain procedures were done the way they were. I was taught how to operate practical laboratory equipment which made me confident in performing experiments on my own and learned how to interpret data. Additionally, I became familiar with proper laboratory etiquette. From cleaning the equipment, measuring samples accurately, avoiding contamination during handling, and even proper sample storage. Through this, I became further aware of the type of work that was involved with performing laboratory experiments.

Despite only taking a Japanese language introductory course many years back in university, I found that my Japanese has improved a great deal during my stay. Because there were very few English speakers where I lived, I was forced to use whatever Japanese I knew to survive. I know there is still much more to learn, but I hope that one day I can become fluent.

Doing an internship abroad was special in a way, as I have also gained knowledge outside the technical aspect of just the work. I've learned to adapt to the norms of a new environment, enhanced my abilities to speak another language, and even obtained some cooking skills. To be placed in a completely foreign environment with all familiarities and comfort zones stripped away can be challenging. But through these challenges, I've grown to be independent and discovered more about myself and where my interests lie.



## Recommendations

You may think that before you start your internship, it's important to study and do prior readings of technical texts related to your project as much as possible. At least that's what I first thought. In actuality, you don't need to know everything there is to know about cement and chemistry prior to the internship. Although some background knowledge will be helpful, you will be spending a lot of time, even throughout the year, studying the field. While my undergrad degree gave me the general insights as to what cement was, nothing would have prepared for me amount of detail and vast information that was really required. Everything is learnt at the time and they won't be expecting you to know everything. Not to mention that for the most part, they will teach you what is relevant.

It is also good practice to accept any work given to you without question and attempt them to the best of your abilities. Communicate with your supervisors about your work and keep them updated. If there is something that you don't understand, don't be afraid to ask. Be patient with language barriers, admit to your mistakes, and be honest with your work.

It's obvious enough to say that you should learn as much Japanese as you can before coming to Japan. Even if your level of speaking and comprehending is non-existent, a strong interest in learning and actually using it will have your colleagues appreciate your efforts. Spend some time understanding Japanese business culture and etiquette, as certain gestures and phrases can make your image appear more respectful and even natural.

It can be difficult to open up and show yourself when you struggle with communicating your thoughts, but I highly encourage trying to be more social even if you can only speak in English. Being somewhat farther away from Tokyo is great in a way, as not many people speak English, so if you are keen on learning you will surely improve.

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