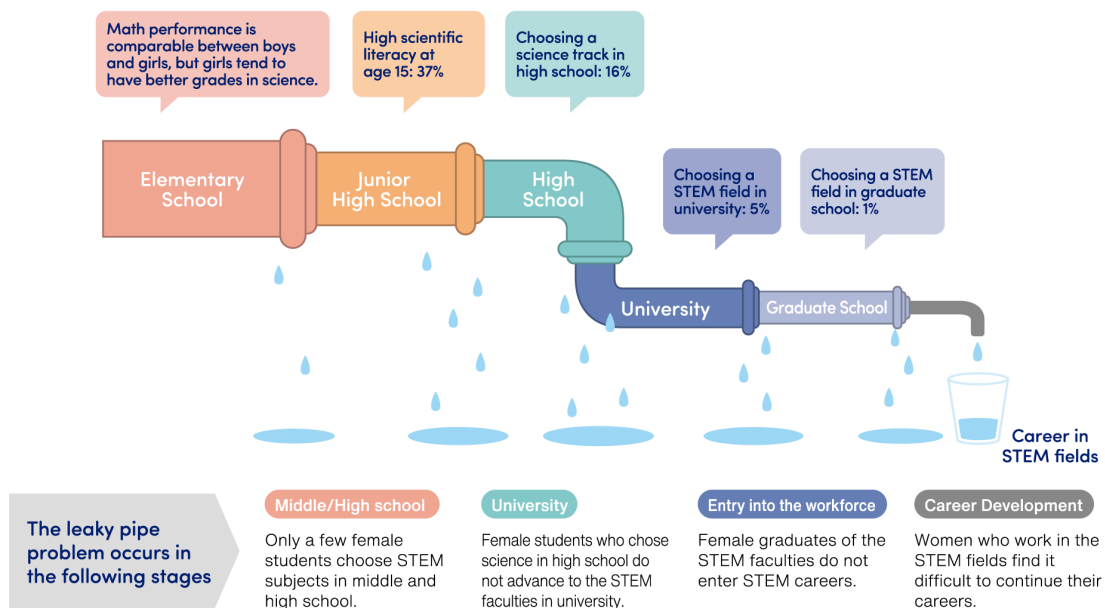# 2023

Waffle College

Impact Report

Introduction

Despite Japanese girls ranking among the top in the world for math and science performance, only 16% choose science courses in high school, and a mere 5% study STEM fields at university. To address this issue, Waffle provides programs such as Waffle Camp and Technovation Girls for middle and high school students, and Waffle College for university students, all aimed at reducing the gender gap in STEM and IT fields.

Math performance is comparable between boys and girls, but girls tend to have better grades in science.

High scientific literacy at age 15: 37%

Choosing a science track in high school: 16%

Choosing a STEM field in university: 5%

Choosing a STEM field in graduate school: 1%

Elementary School

Junior High School

High School

University

Graduate School

Career in STEM fields

The leaky pipe problem occurs in the following stages

Middle/High school
Only a few female students choose STEM subjects in middle and high school.

University
Female students who chose science in high school do not advance to the STEM faculties in university.

Entry into the workforce
Female graduates of the STEM faculties do not enter STEM careers.

Career Development
Women who work in the STEM fields find it difficult to continue their careers.

Reference: Based on PISA (2018), TIMSS (2019), and materials from the Cabinet Office

About Waffle College

Waffle College, launched in 2022, is a program designed for female and non-binary university students, offering a curriculum to help liberal arts students transition into IT engineering careers. The program focuses on three key areas: "Tech Careers," "Empowerment," and "Leadership." Throughout the year, students develop interest in IT and, by experiencing a full-fledged programming boot camp, aim to secure IT internships. The program consists of two parts: the "Entry Course" and the "Tech Career Course."

In the Entry Course, we provide programming beginners with free opportunities to learn programming, develop career-oriented thinking, and meet peers who are also learning programming, as a first step toward becoming an IT engineer.

For participation in the Tech Career Course, a technical screening will be conducted to assess the applicants' skill levels. The students who pass the screening will spend approximately 8 months learning IT skills, aiming to secure an internship as engineers upon completion.

Program Overview

Course	Duration (Period)	Content	Key Outcomes
Entry Course	2 weeks (May-June 2023)	• Basic programming course using block programming tools • Website creation with HTML and CSS	• Increased confidence in programming (the percentage of people who answered they lack confidence

		• Mentor training for programs aimed at middle and high school students (optional) • Career and gender studies course • Company visits and networking events • Guest lectures by role models	decreased from 77.5% to 44.8%) • Higher interest in pursuing a career in the IT industry (the percentage of people who answered they are very interested increased from 43% to 61%)
Tech Career Course	8 months (Aug 2023 - Mar 2024)	• Web apps development using JavaScript • Computer science lectures • Group projects • Company visits and networking events • Career-related seminars • Graduation hackathon	• Internships secured: 36 • Job offers and employment at IT-related companies: 6 • Hackathon participation and awards: 2

IT Education

Waffle College is divided into two terms. During the first term (Entry Course, 2 weeks), students learn fundamental programming concepts such as flowcharts and variables, using the no-code tool "Thunkable" to develop apps. In the second term (Tech Career

Course, 8 months), they progress to studying data structures and algorithms, learning web development using JavaScript.

Company Visits

As part of our efforts to spark interest in the IT field, we organized Office Tours with the support of Google, AWS, and CyberAgent. During the Office Tours, participants deepened their understanding of the IT industry through office tours, panel discussions featuring female employees in IT roles, and networking sessions with female IT professionals.

Role Model Lectures

To inspire greater interest in the IT field, we organized a series of lectures featuring role models, particularly individuals who pursued engineering careers after graduating from non-STEM universities. These role models shared their personal stories from their student days, how they got into IT, and insights into their current work. The lectures proved to be highly valuable for the participants.

New Initiatives for the 2023 Entry Course

To promote more focused learning and deeper understanding, we condensed the program, which lasted three months in 2022, into a two-week intensive course in 2023.

The program was designed to help non-CS background students acquire foundational and practical skills within a short period. Additionally, we incorporated gender studies and career lectures to broaden participants' understanding of the IT field from multiple perspectives.
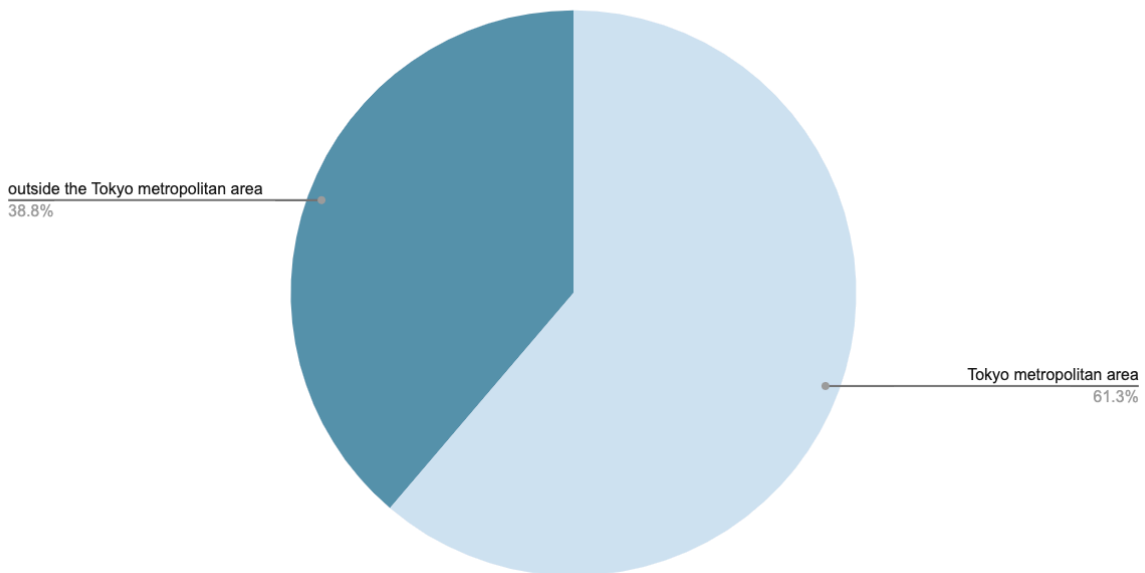
Impact of the 2023 Entry Course

Number of Participants:
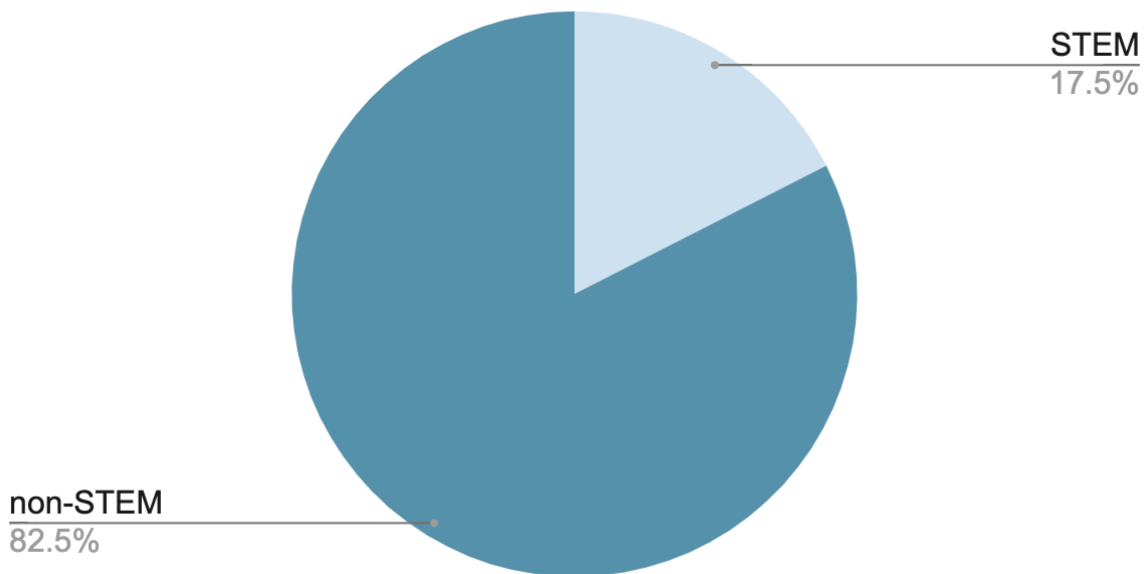
80 students joined the program.

About the Participants:

The locations (prefectures) of the universities attended by Entry Course participants.

outside the Tokyo metropolitan area
38.8%

Tokyo metropolitan area
61.3%

Participants from outside the Tokyo metropolitan area (Tokyo Metropolitan, Kanagawa Prefecture, Chiba Prefecture, and Saitama Prefecture) account for 38.8% (Kyoto Prefecture, Fukuoka Prefecture, overseas, Hyogo Prefecture, Oita Prefecture, Osaka Prefecture, Akita Prefecture, Shiga Prefecture, Miyagi Prefecture, Gifu Prefecture, Aichi Prefecture).

The faculties of the universities attended by Entry Course participants.
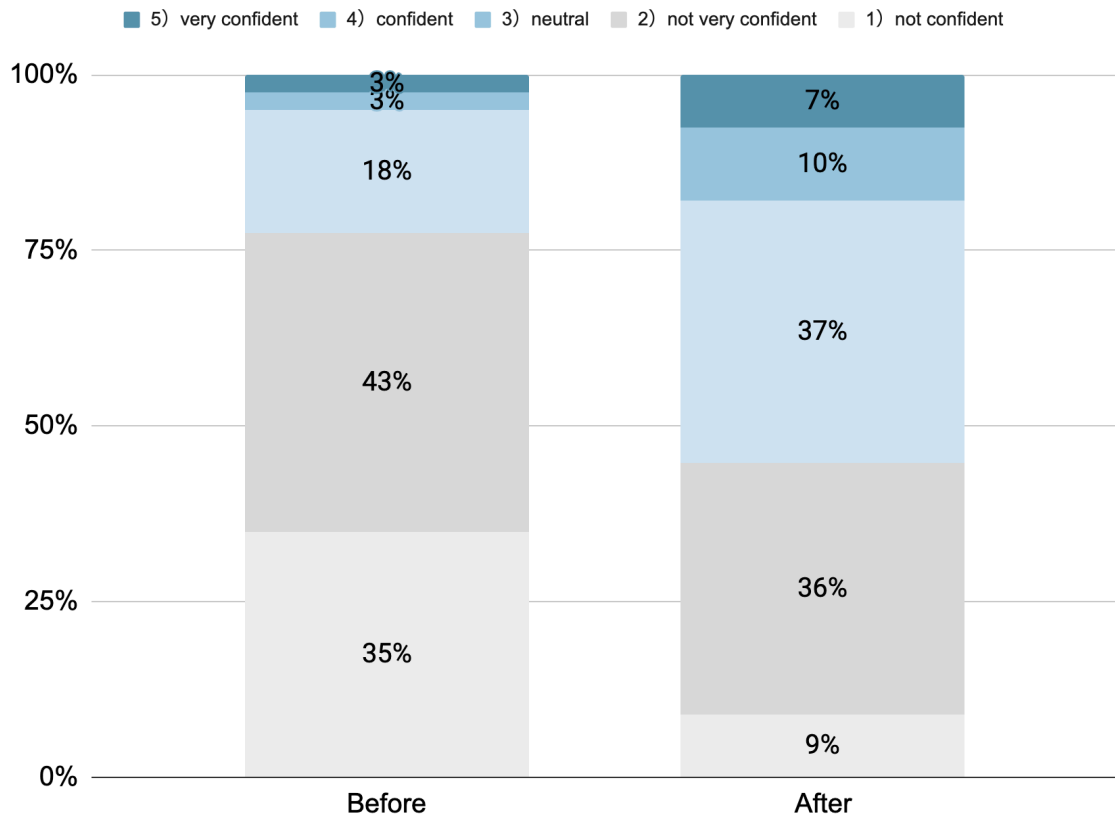
STEM
17.5%

non-STEM
82.5%

A large portion of participants came from non-STEM faculties, with 82.5% of participants coming from fields outside of STEM (including the Faculty of Policy Studies, Faculty of Liberal Arts and Sciences, Faculty of Literature, Faculty of Foreign Languages, Faculty of International Arts and Sciences, Faculty of Law, Faculty of Modern Social Studies, Faculty of Economics, and Faculty of Business Administration, among others).

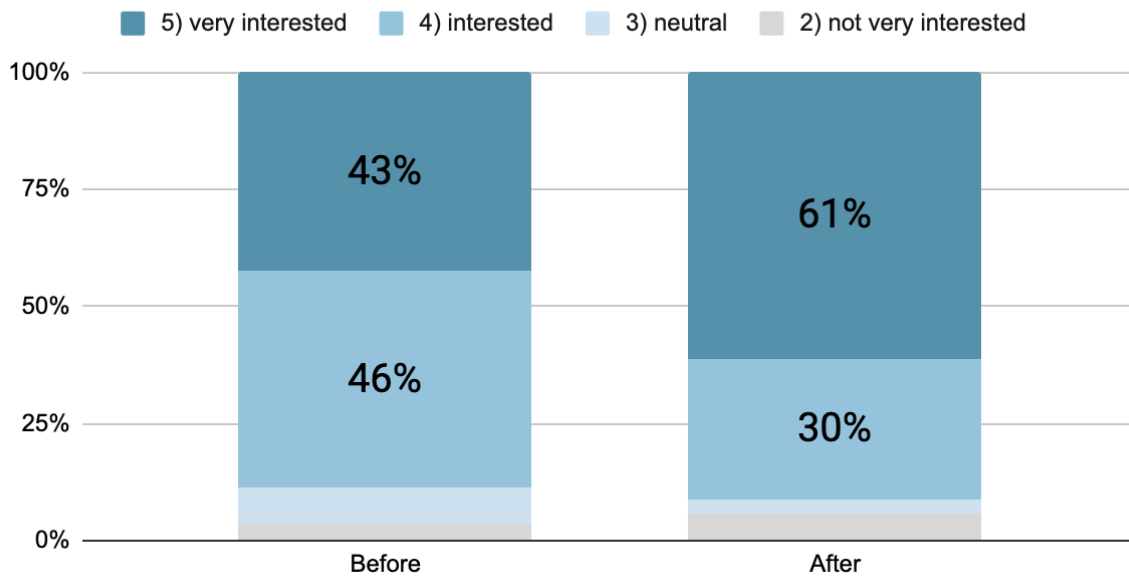**Changes in Participants Before and After the Program**

Before taking the entry course, only 6% of students reported feeling "very confident" or "confident" in programming, while 77.5% reported feeling "not very confident" or "not confident at all." After completing the course, the percentage of students who felt "very confident" or "confident" increased to 17%, while those who felt "not very confident" or "not confident at all" decreased to 44.8%.

Confidence in programming before and after participating in the Entry Course

Legend: 5) very confident 4) confident 3) neutral 2) not very confident 1) not confident

Before:
- 3% (very confident)
- 3% (confident)
- 18% (neutral)
- 43% (not very confident)
- 35% (not confident)

After:
- 7% (very confident)
- 10% (confident)
- 37% (neutral)
- 36% (not very confident)
- 9% (not confident)

In the survey, the percentage of students who expressed "very interested" in the IT industry increased by 18 points before and after taking the entry course. By the end of the entry course, a remarkably high 91.1% of participants expressed a desire to pursue a career in the IT industry.

Degree of Aspiration to Pursue a Career in the IT Industry before and after participating in the Entry Course

Legend: 5) very interested — 4) interested — 3) neutral — 2) not very interested

Before: 43%, 46%
After: 61%, 30%

Usefulness of the Entry Course Program

In the Waffle College Entry Course, we published a paper on women's programming learning and motivation in collaboration with Associate Professor Michiyo Oda from the Faculty of Foreign Studies at Reitaku University (specializing in educational technology).

Overview

A questionnaire survey on programming motivation was conducted with participants of the entry course, applying the "Expectancy-Value Model."

For more details, please refer to the following:

Authors: Michiyo Oda, Asumi Saito, Manami Maitoko, Yoko Noborimoto, Tatsuya Horita

Year of publication: 2023

Title: "Preliminary Study on the Motivation of Female College Students for Programming" in the Research report of JSET Conferences, Volume 2023, Issue 2, Pages 267-273

URL :

Research Results

This study revealed the following changes observed in program participants who joined the Entry Course:

- **Increased self-efficacy through learning programming**, such as developing apps using block programming and creating portfolios using HTML and CSS.
- **Decreased psychological cost of feeling embarrassed by failure.**
- The perceived practical value of programming, such as thinking that learning programming is useful in one's daily life, has increased.
- The recognition that time and effort are required to learn programming has increased (an increase in opportunity cost).

The results of this study confirmed that by participating in the Entry Course, female students experienced an increase in self-efficacy and a decrease in the psychological cost of feeling embarrassed by failure. The Entry Course provides an environment where female and non-binary university students can learn programming together, and it emphasizes offering students the experience of success by leading a team project to completion. These findings suggest that this approach may be effective.

We believe that having a community of peers who continue learning programming together, along with project-based learning and peer learning, is an effective approach to addressing the gender gap in the information technology field.

New Initiatives for the 2023 Tech Career Course

Based on the results of the 2022 program, we recognized the need to further strengthen both technical skills and mindset in order to increase the number of IT internships. Therefore, in addition to the usual initiatives, we implemented the following in 2023:

Computer Science Lectures

Starting from the basics of computer science, we offered lectures designed with actual coding tests in mind. We particularly integrated the flipped classroom method by distributing video materials in advance, requiring students to watch them before class. This allowed us to dedicate class time to hands-on work and Q&A sessions, providing a deeper learning experience. As a result, participants were able to acquire practical knowledge and improve their programming skills.

LeetCode Challenge

To improve coding skills, we implemented a program where students tackled problems on LeetCode. We incorporated the following strategies to enhance their motivation and encourage them to take on more challenges:

- **Step-by-step goal setting**: We set an initial goal of solving three problems, followed by a target of ten problems. This gradual approach helped students build confidence as they progressed.
- **Teamwork**: Participants were divided into teams and worked together on the problems. This collaboration fostered a learning environment where students supported each other.
- **Recognition of Achievements:** We recognized the efforts and accomplishments of teams that solved many problems by awarding them, thereby boosting the motivation of the participants.

Additionally, a group of motivated students established a club called "LeetCode Club" within Waffle College, where they actively engaged with the problems.

Note:
LeetCode is an online platform for preparing for coding tests.

Established a Study Room

To create a conducive learning environment, we established an online study room to support students in engaging in self-directed learning.

Strengthening the Mindset

We conducted leadership training and impostor syndrome workshops to strengthen participants' mindsets. Additionally, we held self-analysis workshops to provide opportunities for deeper self-awareness. Specific activities included:

- Lectures by gender experts
- Team-based app development and app presentations
- Leadership training
- Impostor syndrome workshops
- Career mentoring

Impact of the 2023 Tech Career Course

In 2023, 40 students participated (an increase of 11 from the previous year), collaborating with peers to progress in their learning aimed at securing internships.

During the program, the establishment of a study room and regular team project opportunities strengthened the connections among students. This evolved into a community where students actively supported each other in enhancing their
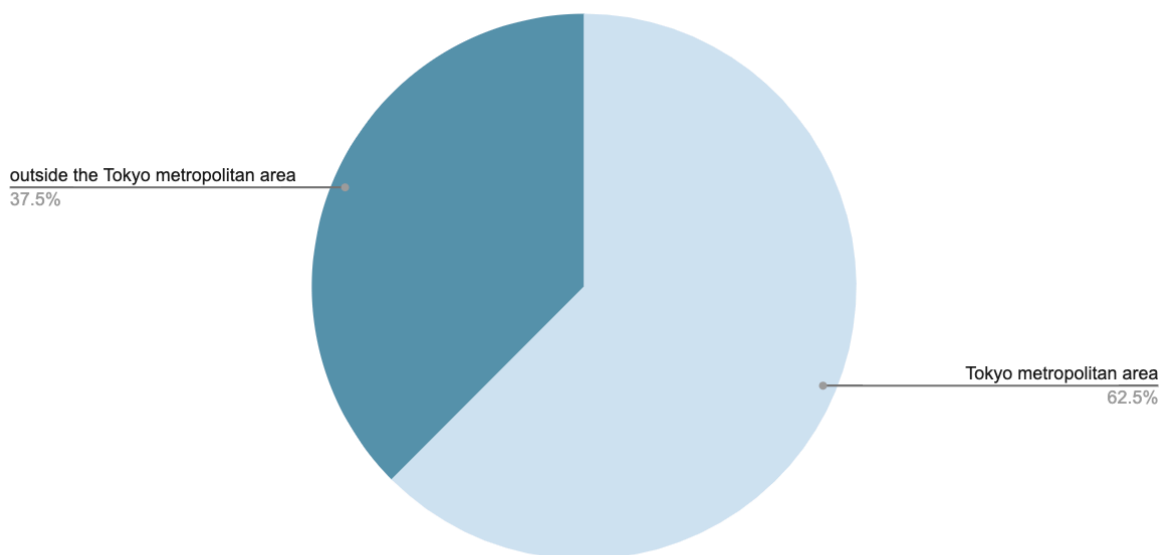
programming skills, leading to the emergence of student-initiated hackathons and a club focused on tackling LeetCode problems.

Additionally, many students applied for and participated in corporate internships from the early stages of the program, demonstrating a strong motivation toward employment as IT engineers.
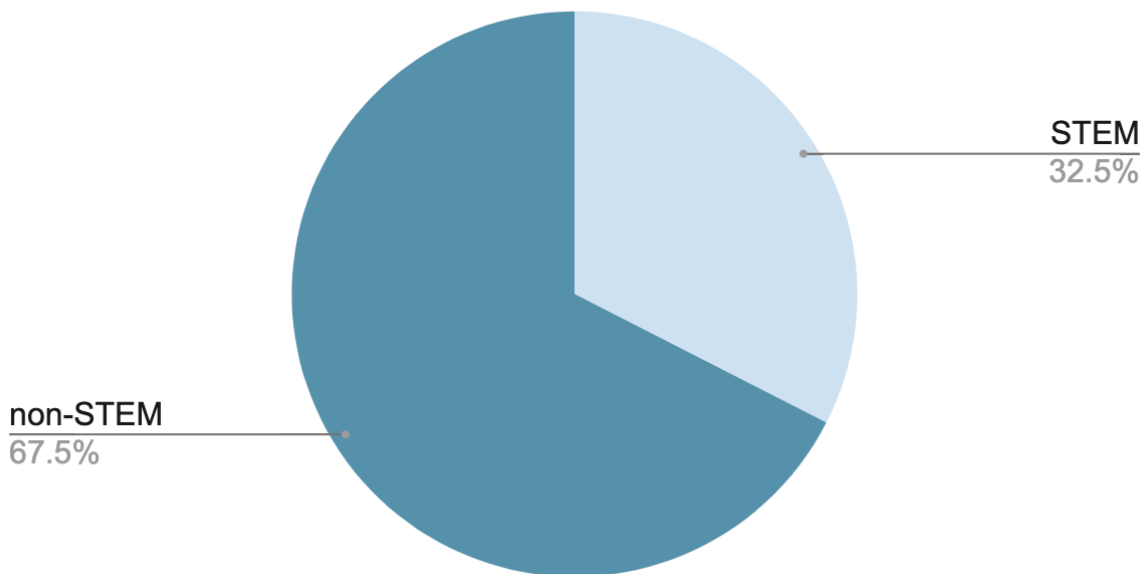
Participants

40 students participated in the program.

The locations (prefectures) of the universities attended by Tech Career Course participants.

outside the Tokyo metropolitan area
37.5%

Tokyo metropolitan area
62.5%

Participants from outside the Tokyo metropolitan area (Tokyo Metropolitan, Kanagawa Prefecture, Chiba Prefecture, and Saitama Prefecture) account for 37.5% (Kyoto Prefecture, Fukuoka Prefecture, Miyagi Prefecture, Akita Prefecture, Osaka Prefecture, Oita Prefecture, Fukui Prefecture, Hyogo Prefecture, and even overseas).

The faculties of the universities attended by Tech Career Course participants.

STEM
32.5%

non-STEM
67.5%

Many participants came from non-STEM fields, with 67.5% of attendees from disciplines outside of STEM (such as the Faculty of Policy Studies, Faculty of Contemporary Social Studies, Faculty of Life Sciences, Faculty of Foreign Languages, and Faculty of Liberal Arts and Sciences, among others).

Learning Outcomes

30 graduates secured a total of 42 internships and job offers from IT-related companies as of July 2024. Additionally, they actively participated in efforts to enhance their technical skills, such as external hackathons and creating landing pages for the Waffle-hosted event "Waffle Festival."

 • **Internships Acquired: 36** (including Amazon Web Services, Inc., Salesforce Japan Co.,Ltd., ITOCHU Techno-Solutions Corporation, The Japan Research Institute, Limited, Mercari, Inc., Fujitsu Limited,
NIPPON TELEGRAPH AND TELEPHONE EAST CORPORATION, NEC Corporation, Sky Co., LTD., QUICK CO.,LTD., etc.)

・**Job Offers in IT-related Companies**: 6 (including Fujitsu Limited, NIPPON TELEGRAPH AND TELEPHONE EAST CORPORATION, Sky Co., LTD., etc.)

・**Hackathon Participation: Waffle College students were selected as finalists for Dots to Code*, and they won the Excellence Award at the Track Job Hackathon - TO THE TOP**.**

- *Dots to Code: One of the largest hackathons for women and non-binary individuals in Japan.
- **Track Job Hackathon - TO THE TOP: A hackathon for university students, graduate students, junior college students, technical college students, and vocational students.

The landing page for Waffle Festival created by the participants.（

https://waffle-festival.com/）

Graduation project (web app) by the participants.

Providing pregnant women with peace of mind and information

"Maternity Heroes"

Learning Spanish verb conjugations through fun quizzes

"enjoy conjugation"

Development into a Sisterhood Community

The entry course demonstrated that a peer-driven community, where students collaborate and learn through trial and error, enhances motivation for programming. Similarly, in the tech career course, participants formed a tight-knit group, working together to solve LeetCode problems and even creating a website to express their gratitude to Waffle College upon graduation.

Many students also volunteered as mentors in Waffle's IT education programs, like Waffle Camp and Technovation Girls, helping to inspire and guide the next generation.

In 2023, 23 out of the 100 Waffle College participants served as mentors, instructors, or TAs for Waffle Camp, and 9 supported Technovation Girls.

An online message board expressing gratitude to **Waffle College** (a project by the student-led graduation album club).

Testimonials

- I was not only able to experience new technologies, but also connect with others who share the same aspirations, gaining a lot of inspiration and experience.
- The program maintains psychological safety while helping me develop real skills. I believe such a wonderful environment is rare to find anywhere else.
- Comparing myself before joining Waffle College to who I am now, I feel I've grown significantly! I spent eight months that were truly valuable and intense. The lectures on programming and computer science were of high quality, sparking my intellectual curiosity and making me find IT interesting. Rather than studying alone, I had numerous opportunities to interact with instructors, mentors, and fellow students, which made collaborating enjoyable; I don't think I could have continued without my peers. Furthermore, I found the career mentoring initiative particularly beneficial. It gave me time to reflect on myself, allowing me to start considering my career path, which changed how I approached my studies.

Planned Initiatives

In 2024, we will continue to provide more university students with opportunities for IT education and support them in stepping into IT careers through the following initiatives:

Advanced Programming Education

We will offer a curriculum designed to help students acquire more advanced programming skills.

Expanding Flipped Learning

By enhancing our online materials, we aim to deepen students' understanding.

Expansion of Leadership Education

We will increase the number of leadership workshops, providing students with more opportunities to demonstrate their leadership abilities.

Media Coverage

Our program has been featured in various media outlets, widely reporting its achievements.

・NHK WORLD (Japan Broadcasting Corporation)

・Saturday Watch 9 (Japan Broadcasting Corporation)

・The Nikkei (Nikkei Inc.)

・The Asahi Shimbun (The Asahi Shimbun Company)

・App Store(Apple Japan, Inc.)