A 20-year collaborative educational program among students, inhabitants and local professionals in Tochio, Japan

Satoshi BODA
Dept. of Architecture
Niigata University
Niigata City, JAPAN
s.boda@eng.niigata-u.ac.jp

Shin-ya NISHIMURA
Dept. of Architecture
Niigata University
Niigata City, JAPAN
shin-ya@eng.niigata-u.ac.jp

Noriko SAKURAI
Institute of Education
Niigata University
Niigata City, JAPAN
sakurai@ge.niigata-u.ac.jp

Abstract — an educational program developed by Niigata University ran in collaboration with inhabitants of Tochio, Japan from 1997 to 2016. Gangi, traditional arcades are owned by residents living in snowy districts, require careful maintenance and generational renovations. Our aim was to rebuild one arcade each year while integrating learning and actual engineering within an educational program. Over the twenty years of the program, eighteen Gangi were successfully designed and constructed.

The present study describes various aspects of the program covering twenty years, including analysis of the process, problems that occurred, questionnaires completed by students and program outcomes. Moreover, we aim to clarify the level of influence the collaboration in actual town planning had on students. The study verifies the problems and effects of annual construction of Gangi as well as social recognition through on-site surveys of inhabitants.

During the program, we were fortuitous to come across various situations and processes we had not foreseen or experienced. This is because the participants faced the challenges and duties that professional engineers meet in their daily work. Consequently, collaboration between the students, inhabitants, local officials and professionals was vital to overcome these difficulties. Clearly, one of the most rewarding results from our program was coming up with viable solutions for these unexpected problems as a collective.

Keywords—Collaboration; Sustainability; Design and construction; Traditional wooden arcade

I. INTRODUCTION

Most architectural designs are carried out by a team, as architects collaborate with other professionals to make a design into a reality. At design studios in Japanese universities, it is common for students to design architecture individually, in part, because they are not good at collaborating during the design process. Also, there are few opportunities for students to produce architectural design with real clients. Demands by clients can be diverse and contradictory, so it is necessary for architects to maintain clear channels of communication with clients to best understand and accept customer preferences and to ensure the design is built as planned. Nowadays, corporations are expecting graduates to have educational training in team design and high-level communication skills with clients and professionals.

Located 350km north of Tokyo, Tochio is a small town in a snowy district on the island of Honshu. Gangi are traditional arcades found in such snowy districts, covering pedestrian spaces and protecting them against the falling snow and rain. Gangi is located in front of a house and considered private land. By connecting Gangi, a long major passage is formed along a street. A cycle of rebuilding Gangi is established, which occurs approximately every thirty to forty years. It is customary for the land owner to collaborate with local carpenters and fellow inhabitants. Gangi are open to use by all residents and help to create a beautiful landscape within Tochio. These small arcades were created to be a part of the traditional landscape, however, as most of the inhabitants are elderly, they cannot afford to maintain or rebuild their Gangi by themselves.

Looking from an architecture education and town planning perspective, Professor Shin-ya Nishimura of Niigata University developed this collaborative educational program to design and

Fig.1 Location of Tochio and constructed Gangi
II. A COLLABORATIVE EDUCATIONAL PROGRAM

An educational program named “Architectural Planning and Design” was in place at the Department of Architecture in Niigata University, Japan. It was run for fifty-five third grade undergraduate students during the first semester from April to September. Each year students challenged to design and then construct Gangi through face-to-face collaboration with local inhabitants. In collaborating directly with the inhabitants, in essence, students replaced the local carpenters who had been central to collaborative Gangi renovation projects in the past.

Professor Shin-ya Nishimura and assistant professor Satoshi Boda oversaw the program for twenty years with the assistance of Niigata University, as well as the local and central governments of Japan. It was designated as a representative educational program in Niigata University, one which made a highly beneficial social contribution.

2.1 Purpose of This Educational Program

In Tochio, numerous Gangi are left unattended and in need of repairs. Due to the low birthrate, aging population and the increased concentration of the young population in nearby large cities, over 35% of all inhabitants in Tochio are aged 65 or older. With most of these elderly being single-person householders or couples living without their children, many cannot afford to rebuild their Gangi without assistance. The cost of rebuilding one Gangi is approximately $40,000, making it extremely difficult for pensioners. Additionally, with an increased demand for parking, some Gangi and traditional townhouses are knocked down and replaced with parking lots. For these reasons, the number of missing Gangi is increasing in Tochio. The problem of maintaining the beauty of a town is common in Japan, especially in small cities. These issues are influenced by a wide variety of factors, including neighborhood relations, manpower shortages and budget restraints.

From 1997 to 2016, this educational program was conducted through collaboration with the local inhabitants. In 1997, the program began with the presentation of a master plan, followed by the design and construction of house signboards in 1998 and 1999. The next year, the focus changed to the major theme, that of designing and building Gangi. Since 2000, one Gangi was rebuilt every year, and the Gangi arcades were reconnected for the local inhabitants. Our aim was to reclaim the beauty of Tochio by solving its problems through an academic approach.

The purpose of this program was to allow students typical and real-world experiences in actual town planning. It provided benefits to both the inhabitants of Tochio and also the students. Residents were able to maintain vital winter pedestrian areas and their town’s beautiful landscape without having to spend large sums of personal money. Students, in contrast, gained invaluable experience on several fronts within an actual town planning project. They participated in real design and construction, project management, environmental research, public speaking and open dialogue with residents and local government. Niigata University also benefited from the program, as it made a key contribution to society while fostering a distinctive educational practice. We celebrated the twentieth year of the program in 2016, by which time we had successfully built eighteen Gangi in Tochio. In Japan, students often collaborate with citizens in small cities through educational programs, however, most involve city planning presentations or construction of temporary installations. This program, in contrast, consisted of various ongoing activities to design and rebuild permanent structures.
relationship with nearby or neighboring Gangi. In mid-July, each team was asked to present their design to local inhabitants as a mid-term presentation. Design features and expected problems were discussed in detail by inhabitants, professionals and public officers alike.

Students visited Tochio several times to discuss the design of the Gangi in August and September. Being summer vacation, they were free to travel to Tochio by themselves. In some cases, teams visited Tochio more than ten times to discuss the design with residents. In the final presentation, students presented improved or alternative design using tenth part of scale models, slides and panels. After presentation of their designs to the local inhabitants, models were put on display in Tochio Community Center, a once vacant traditional town house converted to a community center. The community center was provided by Nagaoka City as the activity base for this program.

April to September: Design phase

Local inhabitants voted to select the best design for construction two weeks after the final presentation. In October to November, local professionals such as carpenters, builders and architects hosted a meeting with local inhabitants and students to discuss the process of construction and design details of the Gangi. The reliability and safety of the designs were discussed in detail and checked carefully.

October to March: Construction phase

After the design and expected construction costs were confirmed, work on the Gangi site commenced in December. It sometimes carried into March because of heavy snowfall, a common occurrence in this part of Japan during these months.

While collaboration between students, local inhabitants and professionals was the main feature of this educational program, another was the experience of real town planning in the actual construction of the Gangi. This two-stage collaboration made the program a unique and successful town planning activity, with eighteen Gangi and twenty-four signboards designed and constructed during the twenty year period.

2.3 Actual Outcomes

This program, and in particular, its collaboration with local inhabitants and professionals provided a variety of opportunities to train students in skills they would require later in life. Our students acquired communication and oral presentation skills, an understanding of process management, team building, research and design skills, as well as concept making.

It is worth mentioning that participants in this program were not only 3rd grade undergraduate students. Graduate students of Niigata University were able to assist in this program as teaching assistants. Though not credited, it was a valuable experience for them, as they train new skills in the management of town planning. These included scheduling, conducting surveys, collecting site data, and most importantly, communicating with local government officers and professionals.

Each year, all participants completed surveys that evaluated their own activities. Students were asked to rate the effectiveness of their communication with the local inhabitants and the educational benefits of design in managing the different requests of the residents. On the other hand, local inhabitants evaluated the program on the following points: how well they collaborated with the students, the level of revitalization in the town, and how effectively the students were able to preserve the traditional landscape through the construction of the Gangi.

III. PROBLEMS TO BE ADDRESSSED

After the workshops of the program were held, we surveyed the students’ opinions using a questionnaire designed to improve our program. Questionnaires included questions on the design concept they had discussed, requirements of the inhabitants they faced, the most valuable experiences they had, and the general pros and cons of the program. From these answers and our observations of the activities students collaborated on, we noted several problems in our program, such as its educational contribution and environment, evaluation and budget. Balancing the quality of education and that of design was also problematic.

3.1 Evaluation

Only the local residents could vote to select the Gangi design in the two weeks following the final presentations, so students were evaluated mainly through the voting of the local inhabitants after the public meeting. In architectural competitions, architects compete with each other through their original design and presentations. In general, the best design is chosen. However,
designs which are unsuitable for the construction site or not properly thought out are at times selected. Choosing the best design is a very difficult task, even for professionals. Lacking knowledge on architectural principles and perspectives, the local inhabitants in Tochio tended to select the best design from a personal point of view. Consequently, the winning design was not necessarily a design of the highest-quality. For this reason, it was important for educators, professionals, local officers and owners to perform additional evaluations of the students on their work and design processes.

The students realized they had a higher possibility of being selected by answering the local inhabitants’ requirement in full. However, sometimes such requirements caused a deterioration of neighborhood relationships or damaged the area’s landscape. In these cases, students carried out further discussions with the inhabitants to understand why they had made such improper requests and then changed their designs to more appropriate ones. Not all inhabitants could clearly understand the proper requirements needed because this program involved practical town planning. This included the matter of maintaining professional ethics, an element that is always required as an architect. We, therefore, were required to evaluate how far the students had progressed on this point.

Within our design program, all members of one team were given the same evaluation through the voting system, however, there were noticeable differences in the quality and quantity of learning achieved by each member of one team. It was necessary to evaluate each member by distinguishing the amount and quality of their work individually, so we obtained evidence of each student’s contribution from their actual work or designs.

### 3.2 Educational Environment

We tried to prepare an environment where the students could hold discussions with local inhabitants and professionals freely, therefore, cell phone numbers were exchanged within the group. A former city official was named as a consultant to the students. He visited Niigata University to discuss the Gangi design with the students two or three times in the first semester. Also, the graduate students acted as mentors, offering advice to students about the program and their designs. Due to the various support features that were made available, the students visited Tochio many times to discuss the Gangi design with the inhabitants.

As this was an educational program, it was vital to ensure the safe learning conditions for the students and the residents. We collaborated closely with the local government officers to maintain a safe environment for the students during the practical exercises in Tochio. Students were not permitted to use their own cars or motorcycles to travel the 60km to Tochio from Niigata University. To guarantee their safety and avoid potential traffic accidents, especially in the winter, we asked City Hall for a bus to transport the students from the university to Tochio for

<table>
<thead>
<tr>
<th>Table 1 Chronological table of the educational program until 2016</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Object of activity</strong></td>
</tr>
<tr>
<td>------------------------</td>
</tr>
<tr>
<td>Master plan</td>
</tr>
<tr>
<td>1997</td>
</tr>
<tr>
<td>1998</td>
</tr>
<tr>
<td>1999</td>
</tr>
<tr>
<td>2000</td>
</tr>
<tr>
<td>2001</td>
</tr>
<tr>
<td>2002</td>
</tr>
<tr>
<td>2003</td>
</tr>
<tr>
<td>2004</td>
</tr>
<tr>
<td>2005</td>
</tr>
<tr>
<td>2006</td>
</tr>
<tr>
<td>2007</td>
</tr>
<tr>
<td>2008</td>
</tr>
<tr>
<td>2009</td>
</tr>
<tr>
<td>2010</td>
</tr>
<tr>
<td>2011</td>
</tr>
<tr>
<td>2012</td>
</tr>
<tr>
<td>2013</td>
</tr>
<tr>
<td>2014</td>
</tr>
<tr>
<td>2015</td>
</tr>
<tr>
<td>2016</td>
</tr>
</tbody>
</table>

* Niigata University/Other University including other county/Technical Highschool/Double Home which compose of students in other department in one of particular educational program in Niigata University.
** Gang has two types according to relation between gang and townhouse: Tsukin-kom type is that gang and townhouse was connected which is traditional type. Stand-alone type is that gang disconnected to townhouse.
each practical exercise. Also, during construction of the Gangi, students were limited in their activities. They were not permitted to work as carpenters freely, and in addition, they could not climb up on the roofs of the Gangi, nor use professional tools without assistance.

### 3.3 To Ensure the Quality of Education and Design

In order to preserve the characteristic landscape of Tochio, we tried to create a unique design to maintain the diversity of the Gangi. By purposely using fewer design regulations, we hoped to maintain a level of diversity in design to make sure the local landscape was beautiful and in harmony with the environment. We limited the number of regulations to allow the students full creativity in their designs. These included: (1) Gangi had to be constructed using natural and local materials such as Tochio cedar, (2) ceramics had to be used on the roof, (3) products and services of local traditional industries were to be used. Thus, students were forced to utilize alternative thinking to complete their designs. To be historically correct, the shape of traditional Gangi differs from each other according to the budget of each family and the adaptation necessary for the business it represents. Naturally, creativity is one of the important elements in design education, but students had to understand the reasons and conditions which controlled the range of possible designs.

As this educational program lead to real-life town planning, it was necessary to create a design that would contribute to the city landscape and improve neighborhood relations. Students sometimes simply followed the desires of the local residents, however in reality, architects are required to propose new design possibilities by correcting client requests. In essence, architects are responsible for creating good designs and doing good work.

A compulsory competition was organized for the students to participate in at the end of the first semester. We believed that this would help to keep the students motivated throughout the semester. The competition was also open to students of other universities and high schools. The institutions to participate included: Nagaoka Institute of Design and Polytechnic University of Japan, Niigata High School of Technology, Nitsu High School of Technology and Dalian Institute of Technology, China. Moreover, another Niigata University educational project, Double Home, provided students from other faculties the chance to participate in the Gangi program, thus, having collaborative learning opportunities in civic engagement and experimental learning.

To ensure the quality of this program, we sometimes were forced to change its regulations, processes or activities. In 2004, for example, a large earthquake hit the area, damaging many old farmhouses. In 2005 and 2006, a decision was made to re-use the timber of the farmhouses damaged in the earthquake as a memorial. Moreover, in 2014, we re-used the original timber of a standing Gangi after a request from the owner. In 2010 and 2016, students from Dalian Institute of Technology were invited to collaborate with us. By changing the conditions of the program, students learned that it is important to be flexible and to create a solid design that can adapt to the current environment (Table 1).

### 3.4 Educational Contribution

Results of the questionnaire about the pros and cons of the educational program were analyzed each year. In 2015, there were 50 positive and 40 negative comments, while in 2016, 40 positive comments partnered 42 negative ones. Areas of positive emphasis for students were group work, collaboration with other participants, design study, concept making, visiting the site and scheduling. Students were asked to evaluate group work and collaboration with participants throughout the program. The likely reason for these comments was that students had yet to design something with others, even with friends (Fig.5).

![Fig.5 Positive points of the program](image)

On the other hand, students evaluated design study, concept making, group work and scheduling negatively. In the program, students dealt with various factors for actual design, so they couldn’t easily decide on the concept and design. In design study and concept making, they had to discuss Gangi design many times while taking into consideration actual site conditions, user demands, safety and suitability for landscape. It was difficult for undergraduate students to unify all of these aspects into one design idea. As for group work and scheduling, some groups experienced minor conflicts, especially between students and inhabitants. These issues arose naturally because team members’ viewpoints on design and concept were vastly different, perhaps due to generational changes. Interestingly, group work was viewed by students as both positive and negative (Fig.6).

![Fig.6 Negative point of the program](image)

Additionally, user oriented design was the most-commented element in 2015 and 2016. This was followed by group work and actual construction. Students felt they could take advantage of this experience in user oriented design and group work in their
future, although design study and group work were classified as negatives of the program. Interestingly, few comments centered on actual construction. Students had educational opportunities to obtain collaborative skill in design, but developing professional and actual design skills in such a short time was hard. The program, therefore, needed to develop an educational system that provided students with more efficient practice (Fig.7).

3.5 The evaluation by the participants

The interviews of sixteen inhabitants and three local government staffs were conducted from January to March in 2010. Their comments are summarized in the categories presented in figure 8. Most inhabitants and local government staffs appreciated the activities. They mentioned how the program empowered the local community and enhanced interaction among residents. Also, the enthusiasm of key persons and collaboration among all residents was highlighted. Both groups also enjoyed interacting with students, and they looked forward to them progressing in their studies. Additionally, the praise and evaluation of this activity from central and local governments and other organizations made them proud of the activity, and in particular, their Gangi. Inhabitants pointed out the revitalization by students and communication with them as positive point of the activity. The relationship with students was one of their motivation for participation. In contrast, inhabitants listed finding the right construction site as the most evident problem. Every year inhabitants located potential construction sites through negotiation with owners. Moreover, the aging of Tochio’s population and a lack of successors made the continuation of this program challenging.

IV. CONCLUSION

As this program was a practical one, we were unable to make all aspects of it conform to usual educational conditions. In other words, we had to face and overcome all possible situations that occurred when collaborating with local inhabitants, officials and professionals. For the students, the activities in our educational program became valuable practical experiences through which they learned how to negotiate with team members and local inhabitants about design, to express their designs and concepts and to find solutions for design problems. Whenever we encountered problems, we shared them and solved them with the assistance of the local inhabitants and officials. In a sense, students did in fact gain educational knowledge, only that it was obtained through various common experiences and reliable partnerships. Each year there were numerous difficulties to contend with, but the longer the program continued, the more we gained valuable experiences as professional architects.

This unique educational program was awarded ten prizes by various public and private institutions. These included, the Ministry of Land Infrastructure and Transport, the Japanese government, the Ministry of Public Management, Home Affairs, Posts and Telecommunications, as well as the Ministry of Education, Culture, Sports, Science and Technology.

REFERENCES

[1] Shin-ya Nishimura & Akihiko Iwasa, A designing and building educational program in collaboration among students, inhabitants and local professionals, 10th WCCEE