A SOCIO-TECHNICAL NETWORK APPROACH TO SUSTAINABLE UNIVERSITY–COMMUNITY COLLABORATION FOR RESEARCH AND EDUCATION

Masako Nakamura
Tokyo City University (JAPAN)

Abstract

Many community-based or collaborative studies of the universities are being conducted, though not all cases have worked satisfactorily. It is difficult in such attempts to share knowledge on how to manage a project because researchers tend to consider such information as peripheral and hesitate to describe the process in detail in the article. However, it is very important and valuable to examine various cases and extract general knowledge from a theoretical viewpoint. The aim of this study was to point out how to find the essential actors (human/ non-human) to maintain the collaboration. Socio-technical network analysis which was based on the Actor Network Theory [1], [2], [3], was employed to determine the essential points for constructing and maintaining a project under a university–community collaboration. In this study, the author especially paid attention to the cases in which the university researchers added academic research interest to a project. Such a trial seemed to impede successful collaboration at first sight; though it invigorated and stabilized the collaboration dynamically, when it was planned deliberately.

Keywords: socio-technical network, university, community, collaboration, Fifth Dimension Project.

1 INTRODUCTION

University-community collaboration is already popular in Japan, as well as in Western countries; it is a model that integrates both community contribution and learning opportunities for students. In the United States, it is called service learning and financially supported by the government since 1993, when the “National and Community Service Trust Act” was extended to facilitate the participation of not only primary and secondary schools but also higher education organizations in community service.

In Japan, university-community collaboration was activated in the middle of 2000s, when Japan’s Ministry of Education, Culture, Sports, Science and Technology (MEXT) began to support university-community collaboration with large competitive funds.

Local governments, non-profit organizations, and residents’ groups became more and more interested in collaboration with universities.

There is much research on how to improve the effect of service learning on undergraduate students. Suarez-Balcazar et al. [4], after summarizing the results of their Oxford House service, which lasted over 10 years, pointed out that the development and maintenance of cooperation is difficult. They outlined three implications for better collaboration. First, we need to understand the non-linear nature of community projects. The authors advised involved researchers that collaborative research partnerships require a high tolerance for complexity and ambiguity. Second, researchers and community partners need to be sensitive to the issue of boundaries between roles. They need to play different roles such as facilitator, researcher, and advocate. Third, we need to apply expanded and proper methods other than ones characterized by traditional positivism. These implications are consistent in other studies and in the following cases. However, they didn’t suggest practical means to realize this advice.

Although service learning programs are usually placed among liberal arts subjects in which students of all majors can participate, there is another type of university-community collaboration related to the students’ major. Participation in community planning by students of urban planning or civil engineering majors is an example. Support for nursing homes and kindergartens by students from social welfare or child study departments is another. Researchers tend to consider this type of activity not as service learning but as a kind of apprenticeship experience. They sometimes overlook the evaluation of its educational quality and terminated it within a short period.
2 PURPOSE

The aim of this study was to indicate how to find the essential actors (human/non-human) to maintain and improve university-community collaboration. A socio-technical network analysis based on the Actor Network Theory (ANT) was employed to determine the essential points for constructing and maintaining a project under university-community collaboration [1], [2], [3].

In this study, the author focused on the collaboration in which students of related majors participated. Conway pointed out four dimensions of the service learning effect: personal, social, citizenship-related, and academic. In the case studies of this article, an effect on the academic aspect was highly expected besides the other three [5].

The author introduced three research projects related to learning and child development. Undergraduate and graduate students from related laboratories participated in them. They came into the projects as novice staff, and if they wish to, they could participate the following year (or semester) as experienced staff. As a result, experienced students help newcomers learn how they should behave on site. Students usually experience equal conditions in ordinary service learning programs. However, the complexity of these projects made them more effective. Peer-to-peer learning was facilitated. In addition, experienced students were enabled to suggest new ideas to improve the program from a research perspective. Thus, the characteristics of research sites were expected to activate project practices.

3 SOCIO-TECHNICAL NETWORK PERSPECTIVE AS AN ANALYTICAL STANDPOINT

The socio-technical network perspective is derived from Actor Network Theory (ANT). According to ANT, everything exists as a result of networking with other actors [1], [2], [3], without distinction between human and non-human beings, at first. This distinction appears after the network is stabilized successfully. ANT is sometimes called the sociology of translation. To bring something into existence, we must gather various human and non-human elements in the network. Callon illustrated four tactics of central actors (spokespersons) to get other actors involved [3].

1. Problematization (being made indispensable): the definition of the nature of the problem in a specific situation by an actor and the consequential establishment of dependency
2. “Interessement”: “locking” other actors into roles proposed for them in the actor’s plan for resolving that problem
3. Enrolment: providing the definition and interrelation of the roles to the actors
4. Mobilization of allies: ensuring that the supposed spokesperson for relevant collective entities is properly representative of all actor members of the network that are acting as a single agent

Once the network is stable, it becomes a black box that people take as a matter of course without questioning what it is made of. As the stability depends on the robustness of the network of various actors, if one of the actors “betrays” the network, the black box may collapse, and its existence becomes unstable.

The author proposed to consider the university-community collaboration project as an object configured by a socio-technical network of other actors. With this perspective, we can identify the fluid nature [6] of the project and the key actors that are indispensable to maintain the project. Betrayal by both human and non-human elements sometimes endangers the continuation of the project. From this standpoint, we can identify the actors that are important for maintaining cooperation and may be able to find ways to compensate actors.

4 METHODOLOGY AND DESCRIPTION OF THE CASES

Three different types of university-community collaboration were surveyed to illustrate socio-technical networks and their changes over time.

The first case was an attempt to introduce an authorized curriculum in a public junior high school. The second was a local journalism activity in which children aged 10 to 15 from various schools and age groups voluntarily participated. The last project was the Fifth Dimension, which began in the early
1980s as an after-school learning activity in local communities with universities. This project once existed in more than seven universities [7].

4.1 Case 1: Designing a custom-made program for a public junior high school

The first case was a project for a junior high school program in Japan, which was placed in the formal education curriculum for disaster prevention that lasted 11 years (2007–2017). The author was involved in the entire project process.

In Japan, the risk of an earthquake is everywhere, yet programs to learn disaster prevention in school were inadequate. In cooperation with a principal focused on the problem, the author designed a curriculum to learn about disaster prevention, using the time for comprehensive learning. The author, along with undergraduate students in the research laboratory, cooperated with the teachers’ project team and carried it out.

First grade students of the junior high school (12 to 13 years old, around 150 members per year) participated in the project as part of the formal education. Each student belonged to a team of five to six members, attended a specialist’s lecture outside the school, investigated the area, interviewed key persons among residents, prepared a report, and presented research findings to the inhabitants including students’ parents. Students were highly committed to the project. The author found that the educational effect very high among the junior high students but also that the project was a valuable opportunity for the undergraduate students to learn a great deal about children’s learning and research methods.

Though some teachers were sceptical about the project at the beginning because it was totally new to them, they came to change their opinions by watching the students’ activities and receiving high evaluations from parents and residents. The program was basically consistent over the years, although it partially changed from year to year as a result of negotiations between teachers and lab members. New ideas of the undergraduate students were accepted in some cases. A pre-post questionnaire survey was conducted every year to monitor the effect of the project. The data functioned not only as evidence of the educational effort but as research data for the university team. In addition, lab students kept records of the activities called “field notes” as a part of their research training. The details of the project were introduced in Nakamura [8].

4.2 Case 2: Children’s local journalism activity

The second project was a media literacy project for local children that has been conducted for 10 months every year since 2009 and continues to operate today. The details of the project were introduced in Nakamura [9].

The project is called the “Tsuzuki Junior Press Project” (“Tsuzuki” is the name of a place located in Yokohama City, Japan). Thirty to 70 children aged between 10 and 15 years, who voluntarily applied to the recruitment, engaged in local media activities as “Junior Journalists.” The author’s lab and a non-profit organization (NPO) of the area cooperated to manage the project.

Children participated in the project from different schools. They were offered opportunities to interview people from local organizations, companies, and municipal offices and famous figures who lived in the area (i.e., athletes, actors, singers, and old people who knew the local history of the town) according to a list they themselves proposed.

After the interviews, the children wrote signed articles for their web pages. They also issued a newspaper with the support of the staff as a summary of their yearly activities, in which the articles they wrote and some special research reports were published. Throughout the whole activity, the children took on the role of journalists.

While they enjoyed activities as “Junior Journalists,” they also learned about the area, interacted with a wide range of people, made a speech in a gathering, and wrote news articles. They learned to cooperate with children from different age groups and from other schools, something they rarely had the chance to do in school.

NPO members expected that participants would become more interested in the area and that the activity would cultivate local patriotism, leading children to become participating citizens when they grew up. They also expected adult community members including the children’s parents to show interest in the community through this project. This project was also a field experiment for laboratory members to study children’s varied experiences through these activities.
In both of the two abovementioned projects, data were obtained from participatory observations of the author and undergraduates in the form of field notes, quantitative survey data, and interviews with the participants (children). In the first case, teachers were also interviewed.

### 4.3 Case 3: Participatory research on the Fifth Dimension project

The third project was an after-school project in the United States called the Fifth Dimension Project of the University of California, San Diego. The project began in the 1980s and has been conducted in many places worldwide. Some lasted for decades [7], and some are continuing.

The author collected data by participatory observation at three sites of the project in San Diego over the span of five months. Interviews were conducted with the leading professor, teaching assistants, and undergraduate students during 2010.

### 5 RESULTS: ATTEMPT TO MAINTAIN THE SOCIO-TECHNICAL NETWORKS OF THE PROJECTS

The socio-technical networks of cases 1 and 2 are described in Figures 1 and 2. In both cases, some elements changed as time elapsed.

**Figure 1-1** presents the constellation of actors before the project that existed without a network in the first case. There were different unfulfilled needs for each actor (lab researcher, school principal, and local volunteering group): The researcher required a research field to examine a new type of learning program. The principal of the junior high school wanted to introduce a disaster prevention program for students. As for the volunteer group for regional disaster prevention, residents' lack of interest in disasters was a major problem. It was important for them to gain attention through publicity. The program was intended to obtain the “interessement” of all these actors. While networking, many actors became “interested” and participated in the socio-technical network of the project. Among those were teachers, students, undergraduates, and a web system to present research findings of the students. Because internet publishing was a brand-new experience for most junior high students at that time, it fascinated them. To introduce the internet system, the author even had to negotiate with the educational committee of the city, because it had ruled out internet connection from servers without permission. Non-human elements such as the computer system and regulations of the city education committee were also required to be integrated into the network. Figure 1-3 represents dropout of the web system in 2010. As it took a certain time for first-grade students to learn how to use a computer, teachers proposed to take it away and to use handwritten panels for the presentation. On the other hand, interviews with local key persons were introduced to the program using the excess of time after the negotiations. Web publishing was the core factor of this research in the first stage for the laboratory side. The project could have been terminated if other actors stayed the same. However, the research focus of this project for the lab team could be shifted from the web system effect to a sustainable disaster prevention program at that point. Collaboration was maintained consequently.

In the second case, there was a major change in that the municipal office withdrew its subsidy from the project in 2010, as the support budget was originally planned for only one year. It was expected to be extended because the activity was highly appreciated by the municipal office and residents. Nevertheless, the municipal office decided not to continue the support. The project could have collapsed at that time. However, it was preserved by adding a new alliance that reinforced the network. The student members of the author’s lab helped to maintain the activity. On the lab side, it became the opportunity to collect data (See Figure 2-1 to 2-3).

As for the third case, the author didn’t commit to the whole process of network construction. Instead of describing the overview constellation of the project network, she tried to point out some indispensable actors the professor had succeeded in mobilizing in the network. One of the main actors of the network were the voluntary child participants. Pedagogy based on the socio-historical activity theory played an important role in facilitating the participation of the children. Tools such as personal computer, maze, and “wizard” prepared playful learning for children. As for the university side, an information system to share the field notes of the university students played a role as a boundary object [10]. A boundary object is an object that plays multiple roles.

As for the field notes,

1. Taking field notes helped undergraduate students to understand the theory;
2. The professor read written notes every day to monitor what happened in the day at the sites. He was very too busy to attend all sites every day, so it worked very well;

3. Notes provided evidence for the unit evaluation and became a part of the qualitative data for the research purpose.

“Characteristics” as an official subject was also effective. Undergraduate students who took the course could return to the site as a graduate student or as a researcher, which enabled them to lead the student team and help them to behave properly at the site. This system assisted in stabilizing the undergraduates’ activity and continuity of the university commitment.

Figure 1-1. Socio-technical network of case 1 (before the project).

Figure 1-2. Socio-technical network of case 1 (in 2007).
Figure 1-3. Socio-technical network of case 1 (in 2010 and after).

*Figure 1 to 3: Source of reference: Arranged and translated from [8]

Figure 2-1. Socio-technical network of case 2 (in 2009).
6 DISCUSSION

6.1 Network of “interessement”

In the first case, this project fulfilled the “interessement” of the principal, laboratory, and volunteer group for regional disaster prevention. However, the “interessement” of the three actors was not enough to build a robust socio-technical network. The author and principal cooperated in adding various actors to the network to make it stronger and more heterogeneous [3]. The school schedule
timetable was difficult to integrate in the network because timetable changes affected most teachers, including those who were not project members. To solve the problem, the principal assigned a teacher in charge to rearrange the schedule to make room for the program. However, once it was fixed, it became difficult to return it to how it had been. In other words, the timetable "acted" to support/oppose the project. Students are naturally important actors in the project. If they had not been interested in the program, it would have ended at the end of the first year. The questionnaire also played an important role. It allowed for the visualization of student opinion and persuaded teachers to continue the project even if imposed an extra load on them. The project continued for 11 years, although the principal changed three times during the period.

Considering university-community collaboration, introducing a research interest seems, at first, to make a project more complicated and difficult to manage. However, as we examined above, the project will be more stable and fruitful if we have the perspective of building a socio-technical network.

6.2 Change of actor and maintenance of the project

Changes or dropouts of one element did not necessarily terminate the project. We could continue a project if we could re-arrange the network by changing or adding another actor. The way to remove the obstacle was not limited to adding the same type of actor. Removal of the web system was supplemented by a shift in the research plan, in the first case, and the lack of subsidy by the voluntary participation of undergraduate students, in the second case.


If a hotel manager hopes guests will not to take the room key out of the hotel, he/she can talk to the guest personally (human). However, there are other means. He/she can resort to some methods such as oral notices, written notices, and heavy metal weights attached to the key (non-human). All these methods are equivalent for preventing lost keys. In a similar manner, we can resort to various ways of producing and maintaining a robust socio-technical network.

7 CONCLUSIONS

The author demonstrated the availability of the concept of socio-technical networks. ANT would be just a description of the situation if it were used statically. However, it would be of great help if we used it to understand the unstable nature of a project as a heterogeneous network of actors. It also helps in finding alternative solutions to maintain and develop the university-community collaboration.

ACKNOWLEDGEMENTS

I would like to thank all participants of collaborative projects of my lab. I am grateful to Professor Michael Cole and lab members of the Laboratory of Comparative Human Cognition in University of California, San Diego, for the warmest acceptance of my stay as a visiting researcher.

REFERENCES


