Design of lifelong learning program with regional collaboration

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Abstract *— This study is in relation to the designing of a lifelong learning program in a community. The purpose is to improve the community's education capacity based on science and facilitate interaction among the community members. We have been organizing science classes for elementary school students and elderly. For the elementary school students, science classes had been organized to promote the use of community busses from the environmental protection perspective. The lifelong learning programs, in which elderly and elementary school students undertake scientific experiments together, had an effect of improving communications among different generations. In order to further develop our lifelong learning programs, we examined a program to support young people who are about to enter the world of work. In this study, high school students experienced practical work of undertaking a science class, which is one of our research institute's community contribution activities, as an internship. We set the implementation of the science class on the last day of the internship. This way, the students had valuable experiences of facilitating work as a team within a limited timeframe. This paper describes the educational practice based on this experience.*

Index Terms *— lifelong learning, science experiments, internship, LEGO, remote sensing, environmental education.*

INTRODUCTION

This study is in relation to the designing of a lifelong learning program in a community. The purpose is to improve the education capacity based on science in a community and facilitate interaction among the community members. The learning program for the elderly had awoken their half-remembered interests towards science by doing scientific experiments [1]. The learning program for the elderly and elementary school students proved that the participants' interests towards science brought about an effect of facilitating communication between different generations [2]. Furthermore, for the elementary school students, we have been organizing scientific experiments classes handling local community busses. Through these classes, we managed to establish lifelong learning programs for the elderly and children. In order to further develop our lifelong learning programs, we decided to explore developing a learning program to support the youth who are about to enter into real world.

In Japan, corporations usually employ new graduates from high schools and universities all at once. This system allows the new graduates to smoothly enter into a workforce without time to be unemployed. However, if the new graduates cannot find a job at this time, it is difficult for them to "start over" the job hunting, and they sometimes lose an opportunity to find a job. The turnover rate among the young people is also elevating; according to the 2006 statistics of Employment Security Bureau of the Ministry of Health, Labor and Statistics, 34.2% of the young people who started new jobs after college and 44.4% of the young people who started new jobs after high school left their workplaces within three years. This has resulted in an increase in the number of young unemployed (population of non-workers between ages 15 to 34 and not doing domestic help or studying) from approximately 400,000 in the 1990s to over 600,000 after 2002.

Consequently, the needs for career education for the young people to understand their personality and talent while being in a school and appropriately choose their career are growing. For example, the Guidelines for Study (a standard of curriculum determined by Ministry Education, Culture, Sports, Science, and Technology) were reviewed for elementary and junior high schools in 2008 and for high schools in 2009. As a result, a career education is currently being facilitated under the new Guidelines. Under these circumstances, we are exploring the possibility of designing a learning program to develop high school students' sensitivity towards work. We organized an internship program in which high school students experienced practical work for our science class, which is one of our research institute's (Research Laboratory for Affective Design Engineering, Kanazawa Institute of Technology, hereinafter ADE-KIT) community contribution activities. The paper describes the internship program and its practice.

INTERNSHIP FOR HIGH SCHOOL STUDENTS

The internship rate among the high school students has rapidly increased from 1998. According to the survey on the situation of workplace experience/internship by the National Institute for Educational Policy Research, the internship rate in public high schools (full-time, part-time) was 69.1% in 2008. The implementation rate of the classes on work was 82.5% [3]. The internship is promoted as an experimental activity using local education capacity. It is thought that the visits of workplace by elementary school students, experiences of workplace by junior high school students, and internship by the high school students are very effective as systematic experimental activities in accordance with their developmental stage.

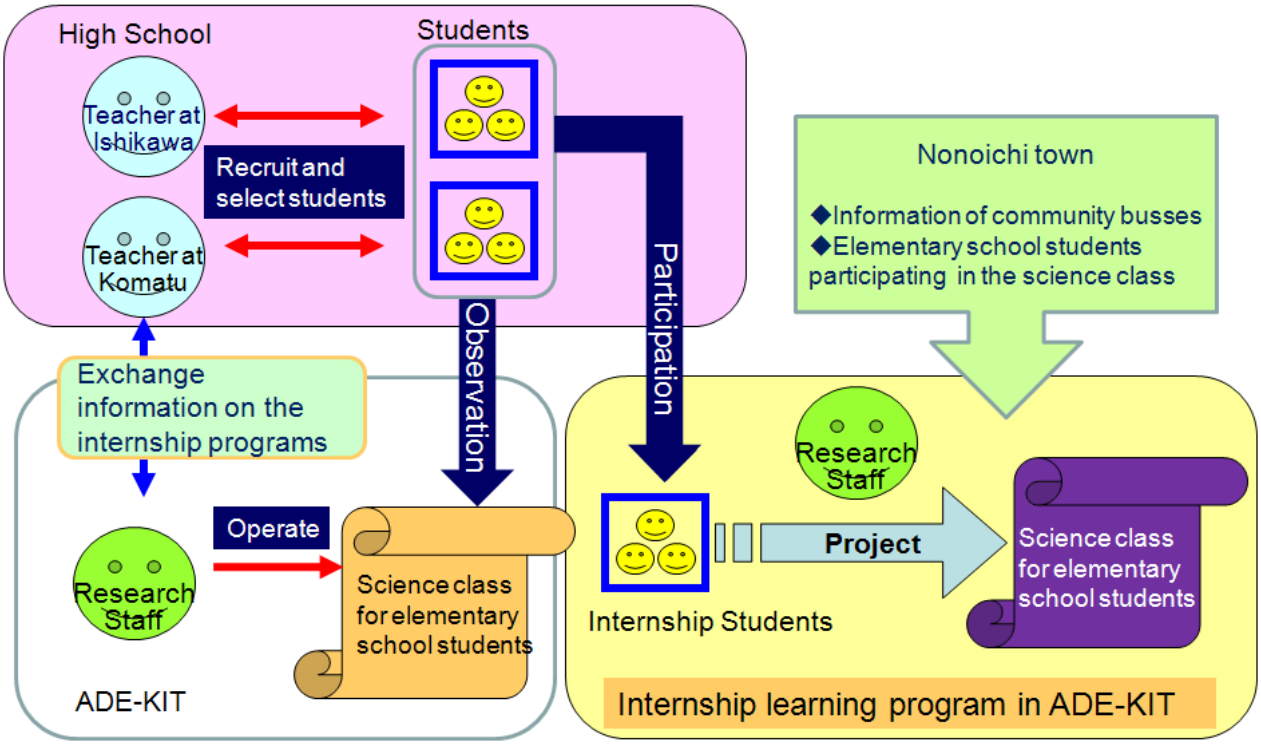

Figure 1: Flow of the internship program for high school students in Research Laboratory for Affective Design Engineering, Kanazawa Institute of Technology

Figure 1 shows the flow of our internship program for high school students. We visited high schools which send out students to corporations as interns and exchanged information on the internship programs. We also provided explanations on the internship learning program offered by our research institute. Then, the high school recruited and selected students who were interested in experiencing internship at our institute. The participating students were asked to observe our "3-hours science class for elementary school students". Figure 2 shows the moment when the class was undertaken. Furthermore, we obtained a bus route map of Nonoichi town, because the science class conducted during the internship period treats community busses operated by the local government (Nonoichi town in Ishikawa prefecture. Hereafter referred to as the Nonoichi town) at the theme. The science class was to be conducted on the last day of the internship; therefore the interns must prepare for the science class within limited timeframe. The interns undertake project activities

Figure 2: Scientific experiment class for elementary school students in Research Laboratory for Affective Design Engineering, Kanazawa Institute of Technology

with this condition. This teamwork allows the interns to build communication capacity which is necessary for the teamwork after they enter the real workplace [4].

INTERNSHIP IN 2009

We divided the 14 participating interns into three teams. Team 1 was responsible for a lecture where elementary school students produce a line tracing car using the LEGO MINDSTORM. Team 2 was responsible for a lecture where elementary school students produce paper models of the body of the line tracing car and assemble the model. Team 3 was responsible for interviewing the interns of Teams 1 and 2 on their project activities and elementary school students participating and writing up and publishing the results as a brochure.

Activities of Team 1

On the first day of the internship, we explained the overview of the LEGO MINDSTORM and assembly procedures of a line tracing car using the LEGO MINDSTORM to the interns in Team 1. On the second and third days, the interns discussed the ways to teach elementary school students programming methods and assembly procedures of line tracing cars and prepared for the class. Figure 3 shows the first day when everyone is learning about the LEGO MINDSTORM. Figure 4 shows the time when they were adjusting the sensitivity of the optical sensor equipped in the line tracing car using a part of the tracing field to be actually used during the class.

Figure 3: Internship students in Team 1 learning about the LEGO MINDSTORM

Figure 4: Internship students in Team 1 adjusting line tracing cars

Activities of Team 2

On the first day of the internship, we explained the software to be used for developing paper models to the interns of Team 2. On the second and third days, we requested the interns to design the body of the line tracing car. On the fourth day, they made paper models based on the design. Figure 5 shows a scene when the interns are designing a paper model of the car body. Figure 6 shows the paper models assembled by elementary school students during the science class. The design of the paper models is based on the community busses operated by the Nonoichi town. The community busses have four routes. Therefore, we instructed the interns to design models that reflect each route's characteristics.

Activities of Team 3

On the first day of the internship, the interns of Team 3 were requested to develop an overall layout of the brochure and produce draft brochures while learning how to use graphic design software. From the second to the fourth days, we advised them to interview interns of Teams 1 and 2 based on the layout of each page on the brochure. On the day of the science class, they also interviewed the elementary school students. Figure 7 shows the interns while they were collecting information using a camera. Figure 8 shows the brochure produced by Team 3. It is 12 pages long in A5 format. 1,000 brochures were printed after the interns' summer break and distributed to the community. Figure 9 shows the interns who were visiting the printing site and checking the finish of the brochures after the internship in our research institute.

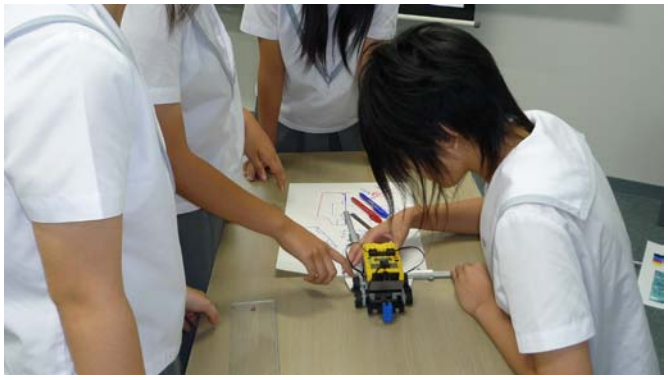

Figure 5: Internship Students in Team 2 producing paper models

Figure 6: The paper models assembled by elementary school students

Figure 7: Internship students in Team 3 interviewing for elementary school students

Figure 8: Brochure produced by the students in Team 3

Figure 9: Students (Teams 2 and 3) observing the printing process of the brochures

Implementation of the science class

This science class adapts remote sensing imaging data observed by high-resolution commercial earth observation satellite, QuickBird by Digital Globe for the course of the line tracing car in order for the participants to "understand the local environment with their own eyes". The mapped course (3m x 4m) for the line tracing cars is made of the imaging data of the entire households of Nonoichi town (50,000 population) which was printed and laminated with special printing method (Figure 10). The elementary school students in the science class can see their houses and the surrounding environment with a resolution of 61 cm nadir.

Figure 10: Mapped routes for line tracing cars (satellite remote sensing imaging of the Nonoichi town)

Figure 11: Science class on the last day of the internship (morning class)

Figure 12: Science class on the last day of the internship (afternoon class)

8 elementary school students participated in the science class. Since there are four community bus routes, we divided the students into 4 teams (2 students in each team). At the class, they learned how to handle the LEGO MINDSTORM and produced line tracing cars in three hours in the morning. In three hours in the afternoon, they assembled the paper models and cover the cars with the models. Then, they attached black tape to the map to outline the course for the line tracing cars, following the community bus routes. At last, they run the line tracing cars and checked the community environment along the community bus routes. Figures 11 and 12 show the science class in the morning and afternoon, respectively.

Comments from the high school students who experienced the internship

In the reports submitted by the high school students, we found several descriptions, indicating that they recognized the importance of communication capacity in team work and difficulties of consensus building. The "survey regarding hiring

newly gradates (graduates of March 2010)" conducted by Nippon Keidanren in April 2010 targeting corporations has revealed that corporations place the most importance on the communication capacity when recruiting newly graduates [5]. From this perspective, we think that the internship was beneficial to the participating high school students. Table 1 shows the excerpts from the internship reports of the high school students.

Table 1: Comments from high school students after the internship

Team 1: LEGO MINDSTORM and Line Tracing Car
I am happy if the participating children in the science class go home with the feeling that "learning science is fun". Science has not been my favorite class. It was rather a challenging class for me. However, during the process of the internship, learning science was becoming fun for me. I was nervous that a person like me could teach programming to the children, but we managed it. I was also afraid if we could complete the preparation on the third day of the internship, but we managed to teach the children on the day of the class. I am glad that I could participate in the internship that is different from the ones offered by the corporations. This internship also allowed me to interact with the local community. I would like to make use of this experience in the future.
Team 2: Paper Model Design for line tracing car
I learned the importance of completing the work that I was in charge of as well as the importance of team work through this internship. I had been aware that it is meaningless if I did not complete the work by the deadline; however, this same awareness was very weak in my high school life. Through the internship, I learned the importance of having a sense of responsibility for my own work. I feel that I could develop as a person. I also learned the greatness of being helpful to the others.
Team3: Report and Produce Brochures
Through this internship, I learned the importance of collaboration. I worked on producing a brochure as a member of the reporting group. I experienced that not all my opinions could be heard for a simple task such as making a page layout and learned that I sometimes need to withdraw my opinions to develop a good final product. I also realized the importance of collaboration to produce digital data of brochure within a limited timeframe. I believe I learned a lot from the internship. I would like to utilize what I learned in my life.

CONCLUSION

The paper described the internship course for high school students, which was implemented in 2009. The students were required to prepare for the science class with a limited schedule, because the science class was set on the last day of the internship. The interns discussed the ways to facilitate children's understanding and explored the materials to be used in the class through trial and error. During the process, they accumulated the experiences of consensus building in team work. This experience will lead to the "development of communication capacity for team work", which is necessary when they go into the real world. We think that this internship program was an effective learning program for the high school students who are about to enter the workplace. We are planning to undertake the same internship program in 2010.

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