

Developing Social Capital Among Learners in Collaborative Learning Through Introducing Yet Another Exchange System Based on the Concept of “Bi-directional Debt”

Hideyuki Suzuki
Faculty of Humanities and Social Sciences
Ibaraki University, Japan
hideyuki@suzuki-lab.net

Hideo Funaoi
Faculty of Education
Soka University, Japan
funaoi@umegumi.net

Yoshihiko Kubota
Graduate School of Education
Tamagawa University Japan
kubota@kubota-lab.net

Hiroshi Kato
Faculty of Liberal Arts
The Open University of Japan, Japan
hiroshi@kato.com

Abstract: The present study aims to develop social capital among learners engaged in collaborative problem solving. For this purpose, the authors propose a norm of “bi-directional debts”, and rules for mutual assistance based on this norm. These rules of mutual assistance place a person who has been helped under an “obligation to help someone,” while at the same time placing a person who has helped someone under an “obligation to be helped by someone else.” Credit is given only when these obligations are fulfilled. The authors introduced these rules into a project-based cooperative learning setting to verify their effectiveness. This preliminary study has suggested that these rules are effective in facilitating formation of social capital in a group of learners.

Introduction

Considering the importance for learners who are engaged in collaborative learning of spotting human resources in their learning group and then exploiting them properly to carry out their collective tasks, this paper focuses on fostering social capital in a group of learners who are engaged in collaborative learning activities. According to R. D. Putnam, social capital comprises “features of social organization, such as networks, norms, and social trust, that facilitate coordination and cooperation for mutual benefit” (Putnam 1995) or “features of social organization, such as trust, norms, and networks that can improve the efficiency of society by facilitating coordinated actions” (Putnam 1993). Using Putnam’s definitions as a basis, the OECD defines social capital as “networks, together with shared norms, values and understandings, that facilitate cooperation within or among groups.” Lin (2001) defines social capital as “resources embedded in a social structure that are accessed and/or mobilized in purposive actions.” Adler and Kwon (2002) define social capital as “resources embedded in personal ties.” Although there is no single, agreed definition of social capital, the authors of the present study have adopted an understanding that is based on the studies mentioned above. Social capital is not something that accumulates in individuals or constitutes the whole network of human relationships. It is a social mechanism through which members of a group can use various resources (abilities, goods, etc.) belonging to people within the group, through a network of human relationships. If this social mechanism is formed correctly, members can obtain needed support from the group when they engage in various activities. Creating such a mechanism within a group of learners will foster a culture of mutual assistance. In this sense, social capital can provide a foundation for sustained collaborative learning, enabling group members to solve problems by collaborating with others.

Although social capital research originally targeted local communities, research on the development and impact of social capital in organizations, such as businesses, also has a relatively long history (see Tsai and Ghoshal 1998, Gabbay

and Zuckerman 1998, Hargadon and Sutton 1997, and Nahapiet, and Ghoshal 1988). Many previous studies of education and social capital have investigated the way in which differences in social capital among students or parents affect school life, academic accomplishments, and students' ways of dealing with problems at school (e.g., Van Rossem et al. 2015, Horvat et al. 2003, and Stanton-Salazar 1997). However, these studies did not any provide solutions to the problem of developing social capital in learning settings.

Within this context, the present paper tries to propose a methods of fostering social capital among learners and verifies its effectiveness by practicing the method in a university setting.

Fostering social capital in school-setting and its difficulties

This study defines social capital as a social mechanism through which members of a group can use the resources (abilities, goods) of others in the group by accessing a network of human relationships. The central question here is how such a mechanism can be created. Putnam argues that networks, norm of reciprocity, and trust are the three most important elements of social capital; they are closely linked and reinforce each other (Putnam 1993). Networks are personal connections. According to Putnam, horizontal networks that bring together people of the same status and levels of power can foster spontaneous cooperation. Reciprocity is a pattern of mutually contingent exchange of gratifications (Gouldner 1960); and the norm of reciprocity is the norm of social commitment, which stipulates that "people should not injure those who have helped them" (Gouldner 1960). There are two types of reciprocity: balanced reciprocity and generalized reciprocity. The former refers to a simultaneous exchange of benefits, as when two people exchange gifts; the latter refers to an exchange that may cause a temporary imbalance but increases the probability of being rewarded for an altruistic act in the future. Putnam sees generalized reciprocity as an important factor in establishing cooperative relationships and as a result social capital. Trust is an expectation that one will not be betrayed or used by others, as well as a sense of assurance that one can rely on a particular group.

The above discussion leads us to guidelines to form social capital in classroom. The first thing we must do is facilitate the broader exchange of knowledge and skills among learners. Sharing resources expands the network of human relationships; various types of assistance circle around, letting group members know what the network's resources are (i.e., who has what). The second thing we need to do is find a way for everyone to receive assistance. It is not enough to urge learners to help others, because generalized reciprocity is fostered when people accumulate experiences of being helped (Misumi 2013). Those who provide the help must acquire a positive attitude toward those who are helped. To establish the sense of reciprocity among learners, both those who provide assistance and those who receive assistance must have positive attitude. If those who are helped feel guilty or inferior, or if those who provide assistance look down on those needing help, generalized reciprocity will not develop. And as a result, no sense of trust would be fostered. To sum up, broad exchange of skills and accumulation of "helped" experience are the keys to foster social capital in learning group.

When we try to install the above guidelines into collaborative learning settings, we may experience difficulties that come from the very nature of school or classroom. First, diverse abilities or levels of sociability of learners confines a particular learner into fixed position, that is, either "who always help others" or "who always be helped by others". Fixed roles of this sort can prevent some members from accumulating experiences of being helped, thus interfering with the development of a generalized sense of reciprocity. Second, the fixed roles may tarnish the dignity of learners who are defined as people needing help. If helping someone is a gift (Nihei 2011), then those who receive such a gift are obligated to give something back in return (i.e., returning the favor and offering help) (Mauss 2011). If the obligation to give something back is not fulfilled for a long period of time (for example, if the same person continues to receive help), then that person will lose face; his or her status will drop within the community. This declination of social status is going to be more serious as their teacher gives "regular helpers" higher scores in praising them as great contributors to class activities. Through this translation, learners who often receive help receive relatively low ratings in school. As a result, learners start to feel negative about receiving assistance.

How can we facilitate learners to engage in broad exchanges of knowledge and skills with many people, in order to actively accumulate experiences of being helped, while avoiding the discrimination mentioned above? In this paper, as one possible way, the authors try to introduce yet another type of norm of exchange to create social environment in which skill exchange is enhanced while both "giving" and "being given" as equally valued. The norm proposed here is based on the concept of "bi-directional debts".

The norm of bi-directional debts and rules of mutual assistance that are based on it

The norm of exchange proposed here comprise of the body of the traditional norm, i. e., "if you are helped by someone, you should help someone in return" and an additional part, i. e., " if you help someone, you should be helped from someone". Traditionally, those who receive help are obligated to provide help in return. Here, those who provide help are obliged to receive help from someone. As those who provide and those who receive assistance are both obligated to reciprocate, we call this the "norm of bi-directional debts." If people act in accordance with this norm, those who provided

help are naturally led to seek help from someone actively. This makes it less likely that help providers and receivers will end up in fixed roles. In addition, as many people will receive assistance, they will accumulate experiences of being helped. Based on this norm, accepting help will settle a debt for people who previously offered help. The negative connotations of receiving help are expected to vanish, for recipients and donors alike. Furthermore, both donors and recipients will look to the group for help in settling their own debts, deepening their understanding of the resources available within the network. Thus, this expanded norm is expected to help forming social capital among learners even if they are embedded in school settings.

Rules of skill exchange, based on the norm of bi-directional debts are summarized below:

- A. Those who have received help are “obligated to help someone.”
- B. Those who have offered help are “obligated to be helped by someone.”
- C. Those who have fulfilled their obligations will receive credit (those who have received help will receive credit when they help someone; those who have offered help will earn credit when they receive help from someone).
- D. The level of difficulty of the assistance and the time required to offer or receive it are irrelevant; these factors will be ignored when fulfilling obligations.

In the list above, Rule A is based on the traditional norms. To this has been added the new Rule B, stipulating that those who offer help are “obligated to be helped by someone”. Those who have helped someone must seek help in return. Only when this obligation is fulfilled a credit is earned (C). Similarly, those who have received help from someone can only earn credit by helping someone in return (C). The level of difficulty and time involved in helping are irrelevant and ignored in this set of rules (D). The credit may take various forms, such as points, tokens, or grades.

To earn credit in accordance with these rules of skill exchange, learners must not only offer significant assistance but must also find opportunities to rely on others, by paying attention to their surroundings. Naturally, those who have received a favor must think about what they can do for someone else. The more learners try to generate this credit, the more mutual contributions develop within the group. There is no bias attached to providing or receiving assistance. All learners—not just those with higher-level abilities—must offer help because no one can earn credit simply by receiving or providing assistance. Even if pairs of learners who provide and receive assistance are rewarded with good grades, individuals striving to gain higher grades will expand the network of reciprocal assistance. By engaging in activities based on these rules, learners adopt the norm of bi-directional debts; as a result, they accumulate experiences of being helped on a broad scale. Social capital is thus expected to be created on a large scale within the group of learners.

The rules of mutual assistance proposed here can provide an infrastructure for designing learning activities. Various types of cooperative learning can be designed, based on these underlying rules.

Pilot study

In a university course, the authors compared difference between two types of rule of mutual assistance. One was based on the norm of bi-directional debts, the other was rules based on the traditional norm of reciprocity. The experiment was carried out using the last 4 sessions of a 15-session undergraduate course entitled, “The fusion of play and learning.” In the course, 38 learners participated in several group discussions and lecture-style lessons on gamification and learning-environment design. In the experimental session, students created simple card/board games to teach high-school students the fun of college life. The experimental session was organized as follows; (1) Pre-survey and grouping (2) Game making, (3) Game making, (4) Wrapping up and post-survey.

Pre-survey and grouping

The pre-survey consisted of: (1) a social-network survey and (2) a questionnaire survey. The social-network survey asked participants to indicate (by marking the class list) the names of people they knew and had spoken to. Their responses revealed the breadth of the social network at the start of the experiment. The questionnaire survey explored participant attitudes toward requesting and providing support, as well as their sense of what it meant to make a contribution to the class. The survey used 10 items proposed by Nozaki (2011) to assess learner attitudes toward requesting and providing assistance. Participants were asked to provide answers using a 7-point scale; responses ranged from “Very true” to “Not true at all.” After this session, the students were divided into Group E (19 students) and Group C (19 students), ensuring that both groups had a similar number of network connections (people known and spoken-to, based on the results of the social-network survey.) We assumed that the frequency and quality of acts of mutual assistance would depend on the overall number of acquaintances.

Activity: Making Games

During the game making phase, materials and tools required for production (drawing paper, pen, scissors, glue, etc.) were placed in the center of each room. The students were allowed to use whatever they wanted. Each student was expected to create one game; they were also told to help each other whenever necessary during the production process. Figure 1 shows an example of games created in the class. It is a “University Life Sugoroku,” Sugoroku means Japanese board game. In this game, as players proceed from enrollment to graduation, they experience fun and encounter various events or traps (easy-to-make mistakes) characteristic of undergraduate student life. The creator of this board game carried out various tasks to complete the game: (1) firming up an idea; (2) collecting episodes to include; (3) designing the game; and (4) producing it (creating frames by cutting colored drawing paper into various shapes, writing events and instructions on them, and placing them on the board temporarily); (5) testing and adjusting the game by playing it; (6) and pasting frames onto the board. During these activities, the student asked other students for the following kinds of assistance: (1) feedback to improve the Sugoroku idea; (2) examples of fun or difficult university experiences; (3) help with cutting and pasting paper; and (4) asking help in playing and testing the first version of the Sugoroku.



Figure 1. An example of games created during this activity (University Life Sugoroku)

Introducing the rule of mutual assistance via paper cards

To introduce the rules of mutual assistance, we used paper cards in this experiment. In Group C, we distributed 20 cards with “Thank you” written on them to each person (left in Figure 2). The students’ names were pre-printed in the name section of the cards, so that each student had 20 cards with his or her name printed on them. We told the students that they could request additional cards from the lecturer when they ran out. In this group, we told the participants to hand out “Thank You” cards when they received help from someone during the activities. They used their own subjective judgment to decide which actions constituted “help.” The students filled in black slots on the cards with the date, time, and type of help. In Group C, the students were allowed to exchange each “Thank You” card received from another person for a coin card. The exchange could be made at any time during the session by asking the lecturer; alternatively, all exchanges could be made at the end of the session. To prevent the students from losing or forgetting to bring in their cards, the lecturer collected all cards at the end of each session. Before beginning the experiment, students were urged to collect as many coin cards as they could.

In Group E, the students received 20 “Thank You” cards and 20 “You’re Welcome” cards (left and right of Figure 2). As in Group C, the students’ names were printed on the cards. During activities, they were expected to give out “Thank You” cards when they receive help from someone. However, they also needed to receive a “You’re Welcome” card from

that person. Both donors and recipients were told to note the date, time, and type of help on the cards. In Group E, a paired set of cards (one “Thank You” and one “You’re Welcome” card) could be exchanged for a coin card. Before the experiment, we urged the students to collect as many coin cards as possible. The timing of the exchanges, card collection after the session, and issuing of additional cards followed the same rules as in Group C.



Figure 2. “Thank You” card (left) / “Welcome” card (right)

Post-survey

Post-survey was carried out after wrapping up of the activity. The post-survey included (1) the social-network survey; (2) the survey on understanding the characteristics of others; (3) freely described opinions; and (4) the questionnaire survey. For the social-network survey, we used the same format as the pre-survey. From the social-network surveys, we anticipated changes in the numbers of people known and spoken to before and after the experiment. This number indicated any increase or decrease in the number of people the students could access. If the number went up, it would indicate a quantitative expansion of the network. For the survey on understanding the characteristics of others, we listed the names of all the students in the group and asked them to freely write down everything they could think of about each of the other students—in other words, what they had discovered and noticed about the other students. They had the option of giving several answers per person or leaving the section blank if they had nothing to say. This method incorporated the name generator and resource generator as methods of measuring social capital (Alvarez et al. 2016). The survey on understanding the characteristics of others enabled us to verify the expansion of network resources. Any increase would indicate a larger number of possible forms of assistance available through the network, indicating a qualitative expansion of the network. For freely described opinions, the students were asked to give their opinions freely on the group production activities and mutual-assistance activities in this experiment; again, they were urged write frankly what they thought and felt during the experiment. For the questionnaire survey, we used the same items as in the pre-survey.

Results

Social capital

Change in social network

Table 1 shows the results of the pre and post social network surveys. The results of the analysis of variance indicated that only the main effect (before and after the experiment) was significant, when it came to the number of people whose names the students knew within the group ($F(1,36)=27.08, p<.01$). In relation to the number of people the students had spoken to within the group, only the main effect was significant before and after the experiment ($F(1,36)=29.94, p<.01$). Both rules of mutual assistance helped to increase the number of people whose names the students knew and the number of people they had spoken to.

		Number of people whose names the students knew within the group		Number of people whom the students had spoken to within the group	
		M	SD	M	SD
Group E	Before	9.78	2.55	7.16	2.08
	After	13.94	3.56	11.00	4.81
Group C	Before	9.68	2.69	7.11	2.61
	After	12.26	3.74	9.79	3.29

Table 1. Comparison of the social network before and after the activity

Understanding of the characteristics of others

Table 2 shows the categorized characteristics of others, derived from the survey on understanding the characteristics of others within the group. The unit is the number of times a characteristic was observed. The characteristics were divided into four categories; representative examples of each category are shown in the table. The results of the chi-square test showed that the dispersion of frequencies was significant ($\chi^2=19.791$, $df=3$, $p<.01$). The results of the residual analysis showed that there were significantly more new findings about abilities and knowledge and far fewer findings about personalities and character in Group E. The opposite trends were observed in Group C. In the table, \blacktriangle means significantly high at the 0.05 level and \blacktriangledown means significantly low at the 0.05 level.

	Example	Group E	Group C
Abilities and knowledge	Good at drawing/ Leadership	25 \blacktriangle	16 \blacktriangledown
Personalities and characters	Friendly/ Cheerful	4 \blacktriangledown	27 \blacktriangle
Department	Education/ Letter	2	7
Hobbies and leisure	Comedy fan/ Plays soccer	15	13

Table 2. Understanding qualities and resources

Attitudes toward requesting and providing assistance

Table 3 shows items in the questionnaire surveys on attitudes toward requesting and providing assistance. Table 4 shows the results of the pre and post-surveys of each group. Items were rated using a seven-point scale, ranging from 7 (“Very true”) to 1 (“Not true at all”). Table 4 shows the mean values and standard deviations of the preliminary and post-questionnaire surveys in each group. The content is omitted here; only the codes are used. Because the questionnaire forms were submitted at a later date, not all were collected. The forms for both the preliminary and post-questionnaire surveys were collected from 16 students in Group E and 15 students in Group C. The students’ answers were used in the analysis. The results of the analysis of variance showed that the interaction was significant in Item C. “ashamed (not ashamed) of asking the people in the class about things I don’t know” ($F(1,29)=4.79$, $p<.05$). The test of simple main effects showed that Group E scored higher than Group C in the post-survey ($F(1,29)=6.30$, $p<.05$); Group C scored lower in the post-survey than in the pre-survey ($F(1,29)=4.65$, $p<.05$). In the post-survey, members of Group E became less ashamed of asking about things they didn’t know than those in Group C. Members of Group C were more ashamed of asking about things they didn’t know after the activities than they had been before; no changes were observed in Group E.

- a. I can learn from having others in the class teach me what I don’t know.
- b. I like learning about things I don’t know from people in the class.
- c. I am not ashamed of asking people in the class what I don’t know.
- d. I don’t think people in the class would look down on me if I asked them about something I didn’t know.
- e. It is not frustrating to ask people in the class about things I don’t know.
- f. It feels good to teach people in the class about things they don’t know.
- g. I like teaching people in the class about things they don’t know.
- h. I don’t feel ripped off when I teach people in the class about things they don’t know.
- i. It is not tiring to teach people in the class about things they don’t know.
- j. It is not a nuisance to teach people in the class about things they don’t know.

Table 3. Items for attitudes about requesting and providing assistance

Item	Group E				Group C			
	Before		After		Before		After	
	M	SD	M	SD	M	SD	M	SD
a.	5.56	1.32	5.75	1.64	5.73	1.00	5.67	1.53
b.	3.88	1.62	4.56	1.87	4.00	1.03	4.40	1.40
c.	6.00	1.32	6.31	0.92	5.80	1.42	5.00	1.79
d.	5.81	1.29	6.13	1.11	5.80	1.33	6.27	0.77
e.	5.44	1.66	6.31	0.92	5.07	1.57	6.07	1.00
f.	5.00	1.73	5.25	1.79	4.60	1.08	4.87	1.36
g.	4.88	1.27	5.13	1.49	4.87	1.41	5.13	0.81
h.	6.56	0.70	6.44	0.86	5.93	1.29	6.07	0.93
i.	5.38	1.69	5.88	1.27	5.47	1.20	5.53	1.02
j.	5.56	1.37	6.13	1.17	5.20	1.22	5.60	0.88

Table 4. Attitudes toward requesting and providing assistance

Mutual-assistance activities

Frequencies of helping behaviors

We counted the number of helping behaviors the students demonstrated in class, based on the number of cards exchanged. 80 helping behaviors were observed during the two sessions (4.68 activities per person) in Group E and 108 (5.68 activities per person) in Group C. However, among the categories of helping behavior (described later), when those categorized as “socialization and play” were excluded, the number of activities was 86 (4.52 per person) in Group E and 83 (4.37 per person) in Group C, indicating no difference between the two groups.

Categories of helping behaviors

Table 5 shows the categorized helping behaviors written on cards and frequency of activities. In the table, ▲ means significantly high at the 0.05 level and ▼ means significantly low at the 0.05 level. Representative examples of each category are included in the table. Among the categories, “socialization and play” activities were not relevant to the tasks, as the examples make clear. The results of the chi-square indicated that the dispersion of frequencies was significant ($\chi^2=21.42$, $df=4$, $p<.01$). The results of the residual analysis indicated that “providing tools” was significantly high in Group C and “socialization and play” was significantly high in Group C. The number of learners who engaged in “socialization and play” activities was 13 in Group C and 3 in Group E.

Name of category	Example	Group E	Group C
Consultation and ideas	Received ideas about the game	43	52
Supporting tasks	Drew pictures for me	21	20
Providing tools	Lent me scissors	12▲	3▼
Small supporting tasks	Brought me a piece of paper	8	9
Socialization and play	Said I was handsome / Gave me candy	3▼	25▲

Table 5. Categories of helping behaviors and their frequencies

Immediate mutual help exchange

The author define immediate mutual help exchange as an exclusive “go and return” exchange by a pair (i.e., returning the offer of help immediately after receiving help—for example, A helps B and B immediately helps A). Because there may have been margins of error in the times written on the paper cards, cases of help being returned within 3 minutes of the time written on the cards were considered examples of “immediate mutual help exchange;” the frequencies were counted. There were 5 cases of immediate help exchange in Group E, with 7 learners engaging in these exchanges. There were 28 cases in Group C, with 17 learners engaging in these exchanges. When the helping behaviors categorized as “socialization and play” are excluded, there were 21 cases by 15 learners in Group C. The numbers did not change in Group E.

Opinions about the activities (subjective evaluation)

EdMedia + Innovate Learning 2019 - Amsterdam, Netherlands, June 24-28, 2019

We asked students who couldn't finish writing their opinions about the activities by the end of class to submit them at a later date. We were able to collect forms from 16 students in Group E and 18 students in Group C. Students in both groups felt that the expansion of communication among the participants was a good feature of the experiment. Members of both groups felt that ideas improved through mutual help.

- (1) I think it was good that this gave me an opportunity to speak with people I wouldn't have spoken to otherwise. (Group E, Student 6)*
- (2) I spoke to people I wouldn't think of speaking to under ordinary circumstances and was able to communicate with them well by helping each other. (Group C, Student 4)*
- (3) [By communicating with others and engaging in the tasks], I felt that the possibility of coming up with an idea I didn't think of myself and creating better things would increase. (Group E, Student 14)*
- (4) I frequently saw positive effects; for example, I was given an idea I couldn't come up with on my own. (Group C, Student 7)*

In both groups, members were happy to find that they could ask others for help easily.

- (5) An atmosphere where we can easily rely on others was created. (Group E, Student 2)*
- (6) I no longer felt hesitant about asking for help. (Group C, Student 14)*

In Group E only, members felt that they became more conscious, in a positive way, of others in the surroundings.

- (7) I was able to pay attention to the surroundings to see whether anyone was in need of help. (Group E, Student 2)*
- (8) I began to observe the surroundings naturally because I needed to know who was good at what. (Group E, Student 6)*
- (9) I frequently paid attention to the surroundings to see what kind of help I could get and what I could do to help. (Group E, Student 12)*

In Group E only, members expressed the positive view that the experiment provided an opportunity to create an atmosphere in which members could offer each other small favors, have casual conversations, and communicate more easily.

- (10) The production speed was accelerated by offering small each other small favors, like lending scissors or cutting pieces of paper for others, to create an atmosphere where we could casually have conversations (Group E, Student 4)*
- (11) It was good that I was able to communicate with others through small things, like borrowing scissors or having others get something for me (Group E, Student 9)*

Many students in both groups had negative feelings about being forced to offer help via the point system (receiving credit in return for help).

- (12) This created "fake mutual assistance" just because the students wanted to earn points...this could lead to a situation far from true "mutual assistance" (Group E, Student 1)*
- (13) Even purely good behaviors can be taken as actions to earn points... I didn't want others to think that my good deeds were only to earn points (Group C, Student 2)*

In relation to this, many students in Group C criticized or felt badly about exchanging cards simply to earn points.

- (14) Some gave the cards for things that were obviously not meaningful (Group C, Student 5)*
- (15) Some gave away Thank You cards to everyone without anyone doing anything and received Thank You cards in return, just to earn points (Group C, Student 9)*

What was uniquely observed in Group C, in relation to the point system, was an exchange structure in which helping benefitted the donor; the recipient was therefore in an inferior position, in terms of points.

- (16) The one offering help is positioned as the superior. If the positions were equal, it would be much better (Group C, Student 5)*
- (17) I kind of felt that the benefit for the person giving away Thank You cards was lower than the evaluation the other party received (i.e., the benefit for the party who gives the card < evaluation of the other party) (Group C, Student 13)*
- (18) It was difficult to ask for help twice from the same person, which I think was a weak point. I couldn't tell whether it was okay to receive Thank You Cards twice from the same person, so I couldn't ask for help the second time (Group C, Student 15)*

Discussion

Formation of social capital

As seen in the result of social network analysis the number of people that students knew the names of and had spoken to increased in both groups through this experiment. As freely expressed opinions ((1) and (2)) indicate, this experiment facilitated communications among the learners, and the learners acknowledged that this had a positive effect on their production activities (see (3) and (4)). In terms of the quantitative expansion of the social network, the method proposed in this paper was not superior to mutual-assistance activities based on the general norm of reciprocity.

There was a difference between the two groups when it came to understanding the characteristics of others. Group E students had a better understanding of the abilities and knowledge of others, while Group C students had a better understanding of the personalities and qualities of others. According to the definition of social capital (i.e., a social mechanism through which the members of a group can use the resources of others, though the network of human relationships), we can conclude that the network—as an element of social capital—changed as desired in Group E, where the students had a better understanding of the resources of others within the network after the experiment. In Group C, the network was maintained because intimacy increased, but the students had a relatively weak understanding of resources within the network; this was insufficient, from the viewpoint using network resources.

Simply understanding the available resources was not enough if the students could not access them as social capital. However, as the free opinions (5) indicate, the learners felt that the atmosphere enabled them to rely easily on others. This suggests that, for Group E, expanding their understanding of the abilities and knowledge of others was a qualitative expansion of the social-capital network.

The results of the surveys of attitudes toward requesting and providing support revealed that the students in both groups no longer considered it a nuisance to teach people things they didn't know, after this experiment. This suggests that a positive view of helping others was fostered by mutual-assistance activities in both groups. However, the students in Group C ultimately felt more ashamed of needing to be taught things they didn't know after the experiment; being helped acquired negative associations. One reason for this may have been that the credit earned for helping others was more highly regarded; as a result, students may have felt that being helped was a negative thing. This negative consciousness wasn't observed in Group E, where seeking help was an obligation in accordance with the norm of bi-directional debts. However, corroborating the causes of these results will require further investigation.

In association with social capital, positive attitudes toward helping others and being helped were fostered in Group E, which had an advantage over Group C when it came to consciousness of reciprocity, which fostered the use of network resources. Not feeling ashamed of asking others to explain things can also be seen as a sign of trust; the students felt safe enough to rely on the network.

The above results show that the students in Group E developed an understanding of the resources of others in the network through this experiment; they learned to obtain support from the network and to trust the network. These elements may be necessary, if members of a group are to use the resources (abilities and goods) of others via a network of human relationships. It is therefore possible to say that social capital was formed in Group E.

Realities of the activities of mutual assistance

It is clear that Group E and Group C had different types of helping behaviors. There was no difference in the number of helping behaviors associated with “consultation and ideas” or “supporting tasks,” but behaviors associated with “socialization and play” were significantly higher in Group C. “Socialization and play” describes behaviors that are not directly related to the tasks. They are behaviors that express friendship, such as chitchat, as shown in the examples. Many members of Group C chose “personalities and qualities” as the characteristics of others they discovered during the experiment. If the learners found it valuable to establish intimacy during the collaborative tasks, then issuing “Thank You” cards for “socialization and play” behaviors would not have seemed a waste of time. However, free opinion (14) and (15) suggest that the learners knew that the purpose of these behaviors was just to earn points.

On the other hand, the number of helping behaviors in the category “providing tools” was significantly high. Providing tools is a simple helping behavior—lending scissors and staplers; it is just like “small supporting tasks.” This suggests that there was an atmosphere in which members regarded even very simple favors as meaningful support. As shown in opinions (10) and (11), the students viewed these simple helping behaviors positively, as a way of creating a friendly atmosphere and good communications. The fact that peripheral, simple support was accepted by the group seems to have encouraged many students to engage in mutual assistance.

How did differences in the helping behaviors of Groups E and C lead to differences in their understanding of resources and the characteristics of others? Because the number of helping behaviors categorized as “consultation and ideas” and “supporting tasks” was the same in Groups E and C, it is not surprising that the students in Group C gained a better understanding of the abilities and knowledge of others, just like the students in Group E. One explanation for the difference is the fact that the learners in Group E were trying to understand what they could receive from others and what the others needed, while focusing on small acts. This conclusion is suggested by the fact that Group E members had a very high number of small helping behaviors, like providing tools; in addition, the opinions in (7)(8)(9) were only reported by students in Group E; (7)(8)(9) indicates that the learners engaged in activities while paying attention to the abilities and the needs of others. In other words, they set out to understand the abilities and resources of others and gradually increased their

understanding of the abilities and knowledge of others, through the experience of providing advice, receiving advice, helping others, and receiving help with their own tasks.

In relation to this result, there was also a difference in rate of “immediate mutual help exchange.” The number was overwhelmingly high in Group C. It is worth noting that only 7 of the 28 mutual-help-exchange pairs provided helping behaviors categorized as “socialization and play,” which were probably done to earn points. In 21 mutual-help-exchange pairs, the helping behaviors were directly linked with work-production activities, such as “consultation and ideas” and “supporting tasks.” In other words, the learners in Group C received “Thank You” cards for helping other people and immediately gave “Thank You” cards back to those people by having them to do something in return. When they helped others for the first time, they probably asked for help based on their needs. However, when they asked for help from people they had just helped, some probably suggested tasks that weren’t really necessary. The phases and content of tasks will vary when people engage in production activities at their own pace. Therefore, it is unlikely that the students immediately needed help. In other words, in Group C, where many mutual help exchanges were observed, students exchanged less needed helping activities with people’s whose support they were not certain of. This made them less interested in and impressed by the abilities of those who helped them. As a result, they did not develop a clear understanding of the abilities and knowledge of others, in comparison to Group E.

On the other hand, there were only 5 mutual-help-exchange pairs in Group E. This suggests that the learners in Group E helped others but didn’t receive immediate help from those people in return. However, they asked for help at another time or from another person. Here, it is very likely that the students shared a mutual understanding of the kind of support needed (whether larger or small) and exchanged helping behaviors based on this knowledge. They likely gained an understanding of the abilities and knowledge of others. This is consistent with the fact that Group E alone had higher scores for “I am being helpful to everyone,” after the experiment, in the survey that measured the sense of contribution.

The students in both Groups E and C were encouraged to earn points and told that they were supposed to earn as much credit as possible (as shown in free opinion (12) and (13)). Nonetheless, only the students in Group C embraced the mutual help exchange, probably because of the different rules of mutual help given to Groups E and C. Group C was given the regular rule of exchange: they could earn credit by engaging in helping behaviors. In the classroom, this rule was expressed as: “they do something and receive a “Thank You” card, which can be exchanged for coins.” For the students in Group C, doing something for others was linked immediately with earning credit. Here, seeking help from others helped those offering help to accumulate credit, placing the recipients of help in an inferior, when it came to earning credit. The best way to increase self-benefits in this game was to help others continuously without seeking help from others. As shown in free opinion (16)(17)(18), the students in Group C were aware of this. Mutually exchanging “Thank You” cards when helping behaviors were carried out was a way to resolve this imbalance. It kept the credit of both parties balanced. It is presumed that many students in Group C exchanged helping behaviors that consisted of “socialization and play,” which are mainly meaningless. In this way, they tried to correct quickly the temporary imbalance of credit caused by offering and seeking help.

By contrast, the rule given to Group E was based on the norm of bidirectional debts. Therefore, they were able to earn credit only when both “helping” and “receiving help.” The rule was implemented in the classroom in this format: “when you help someone you receive a “Thank You Card,” but you only receive coins if you accept help from that person—giving him/her a “Thank You” card and receiving a “You’re Welcome” card in return.” Under this rule, no one receives credit simply by helping or receiving help once. In other words, receiving help doesn’t necessarily benefit the other party, and helping doesn’t necessarily benefit the student him or herself. There is therefore no need to keep the credit of both parties balanced. A person who has helped someone must also seek help to gain credit. The person who has received help must also help someone to receive credit. To increase self-benefit under this rule, one must repeat the process of helping and seeking help. Even students who were highly motivated to gain credit would have to create a circle of help. Bearing the above in mind, we believe that there were no blatant mutual help exchanges in this group. A high number of helping behaviors at various levels were related to actual needs. This facilitated the exchange of knowledge and skills on a wide scale and led to the formation of social capital.

The students in Group C repeated mutual help exchanges to keep their benefits balanced. This helped maintain the balance between helping and seeking help, but increased non-essential helping behaviors. The students were less aware of the skills and knowledge available within the group. This result shows that, in order to form social capital in a group of learners, it is important to be aware of the abilities of others and the need for help by becoming a donor and recipient of help, rather than just keeping the balance between helping and seeking help.

Conclusion

The present study proposed a rule of mutual assistance and carried out a collaborative-learning project to verify its effectiveness. The results indicated that the rules were effective in forming social capital in a group of learners. Future issues to be examined include the reduction of the workload when engaging in mutual-assistance activities based on the rules of bidirectional debts. Carrying out a project using paper cards gives both lecturer and learners a heavy workload. Considering the use of the rules in a project-type class, there will be a lot of off-campus activities, and therefore we need to

address mutual assistance at places outside the control of the lecturer. To resolve these issues in the future, we are planning to explore ways of conducting classes and introducing tools via ICT.

In future, we will also examine the relationship between the formation of social capital and learning achievements.

References

- Adler, S., Kwon, S. (2002). Social Capital: Prospects for a new concept. *Academy of Management Review*, **27** (1): 17-40
- Álvarez, C., Romani, R. (2017). Measuring social capital: further insights. *Gaceta Sanitaria*, **31**(1): 57-61
- Cote, S., Healy, T. (2000). The Well-being of Nations -The role of human and social capital. OECD
- Gabbay, M., Zuckerman, W. (1998). Social capital and opportunity in corporate R&D: The contingent effect of contact density on mobility expectations, *Social Science Research*, **27**(2): 189-217
- Gouldner, W. (1960). The Norm of Reciprocity: A Preliminary Statement. *American Sociological Review*, **25**(2): 161-178
- Hargadon, A., Sutton, I. (1997). Technology brokering and innovation in a product development firm. *Administrative Science Quarterly*, **42**(4): 716-749
- Horvat, M., Weininger, B., Lareau, A. (2003). From Social Ties to Social Capital: Class Differences in the Relations Between Schools and Parent Networks. *American Educational Research Journal*, **40**(2): 319-351
- Lin, N. (2001). *Social Capital: A Theory of Social Structure and Action*. Cambridge University Press
- Mauss, M. (2011). *The Gift: Forms and Functions of Exchange in Archaic Societies*. Cunnison, I. (trans.), Martino Fine Books
- Misumi, K. (2013). *Shakai kankei sikon: riron togo no chosen [Social Capital: A Challenge to the Integration of Theories]*, Minerva Shobo
- Nahapiet, J., Ghoshal, S. (1998). Social Capital, Intellectual Capital, and the Organizational Advantage. *The Academy of Management Review*, **23**(2): 242-266
- Nihei, N. (2011). "Borantia" no tanjo to shuen <zoyo no paradokkusu> no chishiki shakai-gaku [The Birth and End of Volunteering: Sociology of knowledge of "paradox of gift"], Nagoya Daigaku Shuppan Kai
- Nozaki, H. (2001). *Jidou-seito no kyoudougakusuhuu ni okeru ennojousei no hattauteki kenkyuu [Developmental Change of Helping and Help Seeking Behavior in Cooperative Learning]*, Miyazak gakuen Junior College Research Report (4), 91-101
- Putnam, R. D. (1993). *Making Democracy Work: Civil Traditions in Modern Italy*, Princeton University Press
- Putnam, R. D. (1995). Bowling alone: America's declining social capital. *Journal of Democracy*, **6**(1): 65-78
- Stanton-Salazar, R. (1997). A Social Capital Framework for Understanding the Socialization of Racial Minority Children and Youths, *Harvard Educational Review*, **67**(1): 1-41
- Tsai, W, Ghoshal, S. (1998). Social capital and value creation: The role of intrafirm networks. *The Academy of Management Journal*, **41**(4): 464-476
- Van, Rossen, R., Vermande, M, Völker, B., Baerveldt, C. (2015). Social Capital in the Classroom: A Study of In-Class Social Capital and School Adjustment. *British Journal of Sociology of Education*, **36**(5): 669-688

Acknowledgements

This work was partially supported by JSPS Kakenhi Grant Numbers 26282045, 17H01991.