

Study on the Effectiveness of Educational Activities Using Public Transit to Ease Urban Traffic Problems

Nobu TSUCHIZAKI*, Nobuhiko MATSUMURA**, Atsuko KAGA***

Abstract:

Megacities in Japan still face traffic-related problems, such as congestion and pollution caused by the excessive use of cars, and are urged to build urban communities, in which residents can move around using public transit without relying on private cars. However, given the difficulties in soliciting investment for or forming a consensus on large-scale public works projects, creative approaches are sought to cultivate people's understanding of the social significance of public transportation while promoting mobility management education that has recently been introduced to schools. Accordingly, we have developed an educational program and conducted trials to evaluate its effectiveness. The results revealed that traffic-related educational activities help children and their families better understand public policies and act more cooperatively, and that such activities could be used as a practically effective means of mitigating traffic-related problems in urban areas. We also sorted out points to note, including the fact that the effectiveness characteristics of the program vary depending on the familiarity and service levels of the subject, arranging the program content to suit the needs of the school, and other factors.

Keywords:

mobility management education, facilitation of use, forming of consensus

* Oriental Consultants, Co., Ltd., ** Ehime University, ***Osaka University
E-Mail: tschizaki@oriconsul.com

1. Introduction

Japan is still plagued with excessive use of cars, triggered by rapid urbanization during the high economic growth period. Even in most central urban districts, people continue to rely on cars as the main means of transportation, resulting in the continued decline of bus, train, and other public transit services and bequeathing problems such as chronic traffic congestion and environmental pollution. In a society with a rapidly-aging and declining population, there is an increasingly urgent need to build communities, in which urban functions are concentrated so that residents can move around using public transit without relying on private cars. However, expanding public transit services is rather challenging these days, given the increasing difficulty in soliciting investment for or forming a consensus on large-scale public programs due to fiscal constraints of national and local governments, as well as deregulation and privatization of public works projects, as exemplified by the Linear Chuo Shinkansen (magnetic levitation bullet train) Project that is to be implemented by a private sector entity. Under these circumstances, it is important to encourage the use of public transportation through education and enlightenment while cultivating each citizen's understanding of the importance of public transport policies and motivation to get involved by publicizing widely and continuously the significance of public transit in protecting the environment, building safe and accessible communities, and bringing other benefits to society.

Accordingly, it is important for children to familiarize themselves with, and better understand public transportation through early education, although this is not being offered by schools in most of Japan. Traffic-related education is mostly limited to, for instance, a few road safety classes on how to use roads safely on foot and bicycle over a 6-year period in elementary school. While elementary schools in some regions have recently begun providing mobility management (MM) education for pupils to learn about public transit systems, many such programs merely provide opportunities for pupils to use public transportation, arouse their interest and/or develop action plans incorporating the use of public transit services. Other programs are being considered to teach traffic-related topics as part of school curriculums to make them more useful for schools and ensure their continuity. Again, such programs are designed for pupils to study certain contents of the curriculum (e.g. interest in and understanding of their local communities, understanding of information society, understanding of political system, etc.), the purpose of which differs somewhat from understanding the social roles and significance of public transportation. In addition, it will be difficult to disseminate these programs in wider areas, as they are heavily dependent on the availability of local resources and the interest/cooperation levels of stakeholders in each community.

With the above in mind, more creative approaches need to be incorporated in MM education to further cultivate the understanding of pupils and their families of the social significance of public transportation and to disseminate such educational programs more broadly. Accordingly, we developed an educational program and conducted trials to analyze the effectiveness of educational activities and are considering how best to enhance them with the aim of boosting awareness and promoting active involvement in public transit systems.

2. Development and Trials of an Educational Program

(1) Development of a Program

We chose to center this program on buses, since they can be found in any community in Japan. The social significance of the bus to be understood by pupils and their families as part of

solving the above-mentioned problems not only encompasses its “ecological features” and “ability to rapidly transport people to remote areas, etc.” but also its “roles in supporting the lives of diverse people, besides their own families, in their respective communities.” To effectively encourage pupils to get involved and take various actions, it is important to motivate them, not just through information and knowledge, but by cultivating their interest, deep understanding, and reasoning.

Taking into account the above points, as well as the ease of implementation in diverse communities, we developed a simple 90-minute program, which will involve pupils getting on an actual bus to observe its various features and subsequently reflecting on the roles of the bus and what they can do in support. To inform the pupils’ families of the program, a leaflet, containing the Program Outline and pupil’s feedback, will be produced and distributed to each family (Figure 1).

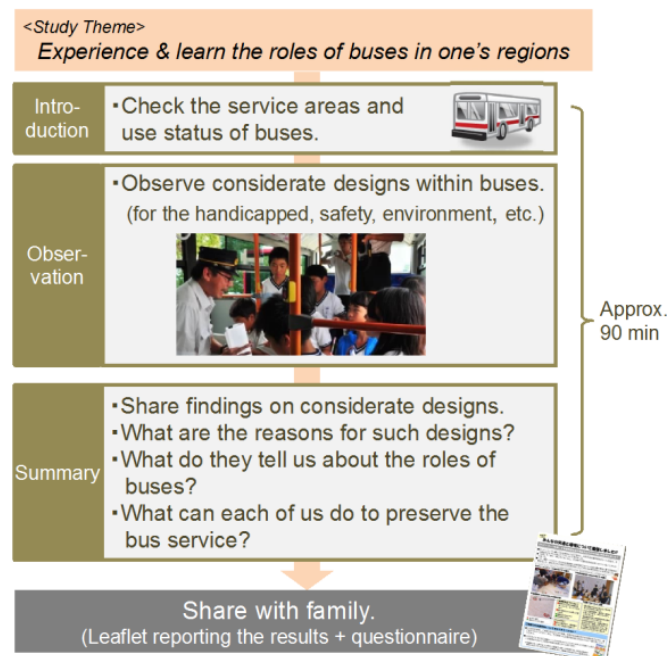


Figure 1. Program Outline

(2) Trials of the Program

The effects of the program are likely to vary depending on how each child and his/her family members relate to buses on a daily basis. Accordingly, we selected four target schools (Table 1) with varying bus service levels (families’ familiarity with buses) and bus use levels (children’s familiarity with buses as indicated by their bus use frequencies). We provided the program for the administrative organ and bus service provider in each target area and had them implement it in each target school.

The focal points and other program contents were adjusted according to the needs of each school and the circumstances of each community. School A focused mainly on observing the ecological advantages of and change in demand for bus services in relation to the aging of population. Schools B and C emphasized good manners when using a bus, as well as its roles in social welfare. Since School D has no buses in its own community with easily observable universal design features, the pupils instead studied a bus running in the city’s central district to

understand the roles of their local buses.

Table 1: Targets of Trials

Target School	Bus Use Level			Target Grade	Trial Year	Remarks
	Bus services to main train station	Use status	Other			
School A (Kameoka city)	Peak: 7/hour Off-peak: 3/hour	Used daily by the whole family	Aging residential area	5 th grade (approx. 70 pupils)	2013	Kameoka is a bed town of Kyoto located 15km east of Kyoto.
School B (Kameoka city)	Approx. 0.5/hour	Hardly used by family members/Used by children for commuting to school	Sparsely populated suburban area	5 th grade (approx. 30 pupils)	2011 - 2013	
School C (Fukuchiyama city)	Approx. 1/hour	Hardly used by family members	Newly developed residential area	5 th grade (approx. 60 pupils)	2012/2013	Fukuchiyama is a local city located 60km northeast of Kyoto.
School D (Fukuchiyama city)	No direct service (Branch line: 7/day)	Hardly used by family members	Semi-mountainous area	1 st – 6 th grades (approx. 30 pupils)	2013	

(3) Evaluation of Trial Results

To evaluate the interest levels of pupils and their families in buses, as well as their understanding of their social significance and change in their behavioral intentions regarding bus usage or other matters related to bus service; we analyzed the written feedback of pupils at the end of the program, as well as their parents' responses via the questionnaire distributed along with a leaflet of the program. To also evaluate the feasibility and possible benefits of applying the program more widely, we conducted interview surveys at each target school with representatives of the administrative organ and bus service provider.

Each school was evaluated based on previously compiled results of similar studies and interview surveys conducted during FY2013.

3. Evaluation of Trial Results

(1) Change in Children's Awareness

Comments such as, "I was surprised to know that the bus contained far more creative ideas than I had imagined" show how the pupils became more interested in buses after seeing actual designs incorporated in the vehicles (Table 2). Many parents wrote in the questionnaire how their children became more interested in buses e.g. "(our child) described to us with much interest that the bus was filled with considerate designs," also confirming the effectiveness of using actual buses in stimulating interest (Table 3).

As for the effectiveness of the program on encouraging pupils' understanding of the social significance of buses as well as their behavioral intentions, pupils of all target schools indicated that observing the actual vehicles helped them understand better about the roles of buses and reflect on own their behaviors by saying, "Without the buses, people in our town would have to

walk to get anywhere,” “Buses are for everyone and designed to be easily accessible to all,” and “I’d like to be able to offer my seat to the elderly and handicapped.” (Table 2) Conversely, parents’ responses via the questionnaire varied from school to school. Some parents of Schools B and C acknowledged that the program facilitated their children’s understanding of the social significance of buses by writing, “(the program) provided a good opportunity for the children to learn about its necessity, etc.” while the parents of Schools A and D had no such comments (Table 3). With regard to children’s behavioral changes, the ratios of parents who felt their children had become more considerate when using public transportation were higher in Schools A and B compared to the relatively low percentages among parents of Schools C and D (Figure 2).

One of the reasons for this is likely because Schools B and C emphasized the perspectives of good manners and social welfare, unlike Schools A and D (although these perspectives were generally covered in the class). Accordingly, pupils of Schools A and D focused more on “environmental friendliness,” “convenience,” “more frequent use” and other aspects of the bus that are not directly related to its social significance, which, consequently, might have influenced their parents’ impressions. Another reason may be that as the bus observed by the pupils of School D differed from those servicing their community, the pupils might not have felt any direct connection, which was also conveyed to their parents. In contrast, pupils of Schools A and B, for whom buses are more or less part of their daily lives, made such comments as, “I had no idea about some of the considerate designs, even though I have been using the bus since first grade” and “I plan to use buses when I grow up and observe good manners,” indicating that they were able to observe the bus with a more sense of curiosity and intent because of their direct connection with buses (Table 2), which made it easier for them to be more considerate and make other behavioral changes, which were consequently more conspicuous to their parents.

(2) Educational Effects on Families

In the questionnaire, 60 to 80% of parents responded that their image of the bus service provider had improved. 50 to 60% of the parents, regardless of usage, said that they would consider using buses in future, suggesting that the program also made parents more aware of the importance of buses and stimulated their behavioral intentions (Figure 2).

Although the questions asked were essentially the same for all target schools, parents’ feedback varied. In School A, multiple parents indicated that the program provided an opportunity for them to reflect on their family’s behavior for the benefit of the whole community by writing comments such as, “Because the bus is an integral part of our community, we should use it more often to support it.” School C also received comments confirming the parents’ increased intent to use buses, e.g. “I drive my car daily but am now considering a bus for shopping.” In contrast, no such comments were found in the feedback of Schools B and D (Table 3). This is likely to reflect the difference in parents’ awareness in relation to their actual intention to use bus services, which are readily available in the community of School A and, to a lesser extent, School C, but less so in the areas of Schools B and D to the point of persuading them to reconsider their behavior on a daily and practical level. In addition, it is possible that parents of School A, who are aware of the aging population and other local issues, took the opportunity to contemplate what they could do for their entire community.

(3) Acceptance Levels of Schools and Feasibility of the Program

The results of the interview survey with the target schools revealed that Schools A, B, and C used the program, respectively, as part of their social study course, environmental study course, and as part of daily-life-related materials to cultivate understanding in its annual social welfare class. Moreover, all schools expressed their wish to continue the program. School A, in particular, acclaimed the program by saying, “Conducting a bus-related educational program in our city without our school being involved is unthinkable.” School B voluntarily conducted a follow-up class to further the study (Table 4). These suggest that educational activities using familiar objects are useful and easy to implement for schools. Where bus usage is relatively low, the program can still be utilized as part of a school’s annual curriculum to facilitate pupils’ understanding.

Interview surveys with bus service providers and administrative organs also confirmed their willingness to continue the program, despite some restrictions on the number of classes per year, etc. They felt various positive effects were reflected in comments as, “interactions with children raised our motivation” and “it was a good opportunity to rethink the relationship between the bus and the local community.” (Table 5) These also seem to validate the feasibility and practicality of the program from the perspective of bus service providers and administrative organs.

Table 2. Typical Feedback from Pupils

	Interest in bus	Understanding of significance	Actions and behavior
School A	<ul style="list-style-type: none"> • Now I know how the bus works, I can ride it with peace of mind. • I learned that I can ask the driver the destination of the bus via the intercom. I learned many other things I had not known until today. • I'd like to continue studying on my own to learn many other things. 	<ul style="list-style-type: none"> • The bus is scheduled to arrive at the station at 6:00 in time for the train that will arrive at 6:07. Many things were coordinated to meet everyone's needs. • The bus was filled with compassion and caring for people. It was very nice. • I learned that people on wheelchairs could also use buses. They are designed with kindness and care. 	<ul style="list-style-type: none"> • From now on, I'll try to use the bus, even when travelling to somewhere far away. • Next time I take a bus, I'd like to practice what I learned today. I'd like to help the elderly and wheelchair users in any small way I can. • I plan to use buses when I grow up. I'd like to observe good manners when riding a bus.
School B	<ul style="list-style-type: none"> • Though I take a bus every day to go to school, I was surprised to see how it had been made easily accessible for wheelchair users and the elderly. • As there must be many things I have yet to know, I want to continue learning. • I'd like to explain what I learned to my mother and grandmother. 	<ul style="list-style-type: none"> • Having a bus is a blessing because without it, people in our communities would have to walk to get anywhere. • I never knew that the bus I use every day was so full of considerate designs. It was designed with wheelchair users and old people in mind. • I got interested in working for a bus company. 	<ul style="list-style-type: none"> • I had no idea about some of the considerate designs even though I have been using the bus since 1st grade. There are many things we can do to help, so I'd like to do my share. • I'd like to use the bus with care and respect. • I'd like to get on the bus quietly and respectfully. I'd like to offer my seat to someone who needs it when I'm commuting to and from school.
School C	<ul style="list-style-type: none"> • I was surprised to see that the bus had far more creative designs than I had imagined. I was amazed at how the bus floor lowered when the door opened. • Though I had hardly used a bus, I was shown everything about the bus and learned so much today. 	<ul style="list-style-type: none"> • Without buses, old folks and people without cars could not even go shopping. I will use the bus as much as possible so that the service will continue. • I thought riding a bus was very convenient because it is designed to be used easily by everybody. 	<ul style="list-style-type: none"> • I knew nothing about buses and hardly ever rode them. But I will definitely ride a bus next time I have a chance. • I will try to sit on a seat as far back in the bus as possible. If there are too many people, I will give up my seat for others.
School D	<ul style="list-style-type: none"> • I was surprised to see many universal designs in the bus and many other things of which I was previously unaware. • I got interested a bit in buses. 	<ul style="list-style-type: none"> • I was impressed by the way the driver was helping physically and visually handicapped persons get on the bus. I got interested in becoming a bus driver. 	<ul style="list-style-type: none"> • I'll avoid using cars and instead travel on foot or by bicycle as much as I can. • I'd like to be able to offer my seat to the elderly and handicapped. I'd like to help so that anyone can take a bus easily.

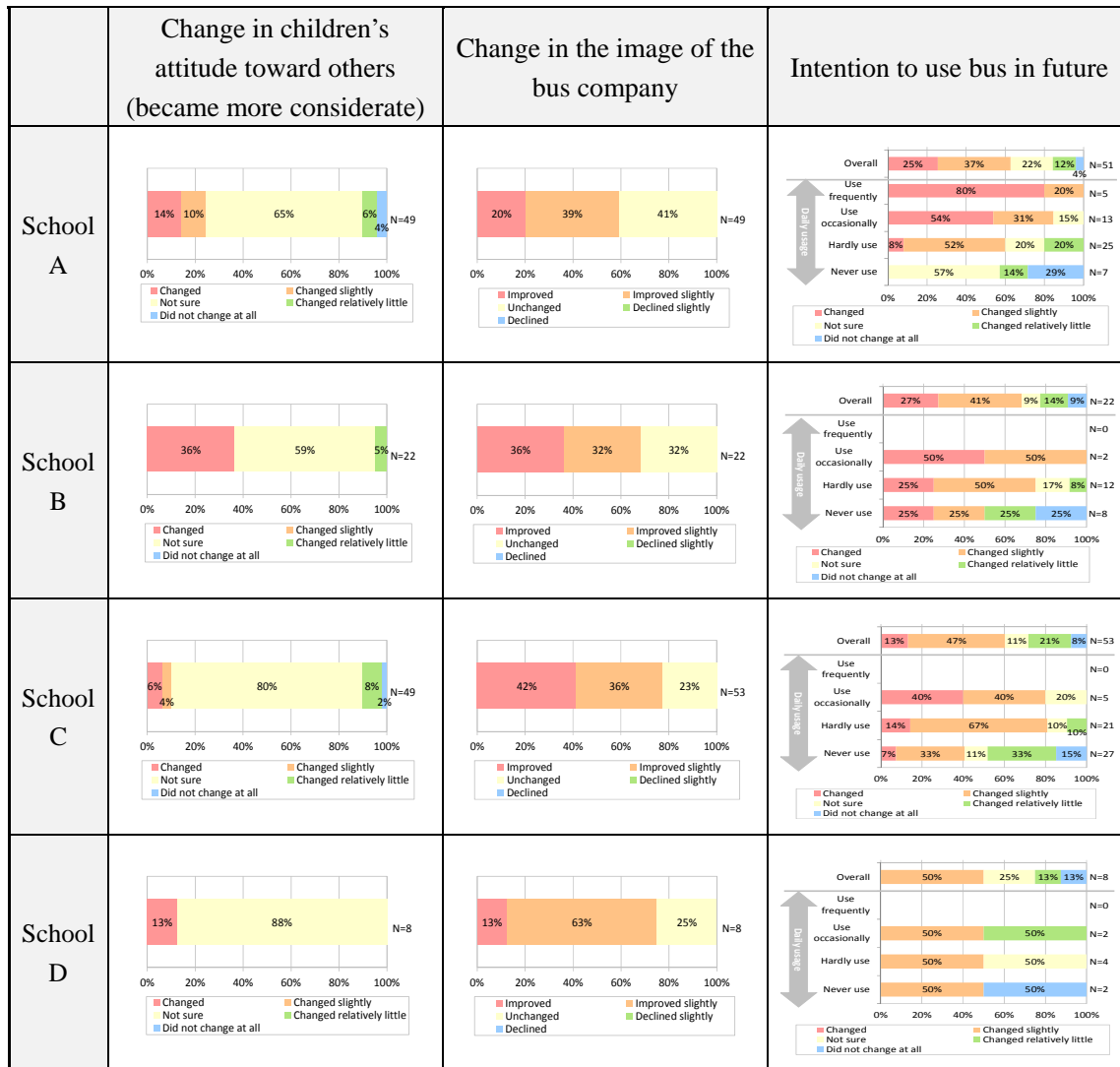


Figure 2. Results of Questionnaire for Parents

Table 3. Feedback from Parents (Questionnaire)

	Children's response		Parents' understanding, families' behavioral intent
	Interest in bus	Understanding of significance	
School A	<ul style="list-style-type: none"> • It was good to be able to learn many things about buses, as we do not use them very often. • It was good to learn about the creative designs, to which we had not paid attention while riding a bus. • Though (my child) rides a bus very often, the program made him/her like it even better. 	-	<ul style="list-style-type: none"> • I understood well that the bus service is convenient and readily available. • It was very educational for both children and parents. I hope more people will start using buses. • The bus is an integral part of our community. We should use it much more often to help it thrive. We hope the program will be continued, as it was very good.
School B	<ul style="list-style-type: none"> • Because children use buses almost daily to go to school, they know much more about them than parents. • Seeing the actual bus had a positive impact on children's behavior while riding a bus to and from school. This kind of hands-on experience will arouse children's interest in many other things as well. • (My child) was discussing the many creative designs with considerable interest. 	<ul style="list-style-type: none"> • It was a good activity, through which children could see kindness and compassion expressed in actual objects. • It was good in that children could learn that the bus they use daily is considerably designed to be accessible to all kinds of people. • A class like this to teach children the importance of environmental protection, mutual aid and concessions while they are still open and unbiased will positively boost their development. 	-
School C	<ul style="list-style-type: none"> • It was good to be able to ride an actual bus and have hands-on experience. It would be great if a bus company could come to school and teach more things. (The children) felt closer to buses. • Kids these days lack opportunities to ride a bus, as their families own cars. The class was great in that it showed children the considerate designs incorporated in the bus. 	<ul style="list-style-type: none"> • It was good that they were able to see first-hand many considerate designs incorporated in society. • The class provided a great opportunity for children to learn about public transportation and its importance for the local community, as well as for parents to consider using bus and other public transit. • It is wonderful that children can learn about human rights. 	<ul style="list-style-type: none"> • I always drive my car, but am now considering using a bus to go shopping. • I am planning to take a bus to make a short trip with my child. • I understand now that many considerate designs are incorporated in buses for people without cars and the physically challenged. Next time we take a bus or train, I would like to think and discuss with my child about what we can do to help people.
School D	<ul style="list-style-type: none"> • The program provided a rare and great opportunity for children to gain first-hand experience from the perspective of disabled people. 	-	-

Table 4. Results of Interview Surveys with Schools

School A	<ul style="list-style-type: none"> • Choosing a bus as the subject of study was very effective, as those in our community are intimately familiar with this mode of transportation . • Including many environment-related topics in the program was very effective, particularly for 5th graders, according to their teachers, as they study a lot about environmental protection in social study and other classes. • Conducting a bus-related program in Kameoka city without our school is unthinkable.
School B	<ul style="list-style-type: none"> • We have been continuing the program for 3 years. It is becoming part of our educational activities. • We chose the “environment” as the theme for this year’s integrated study and are teaching classes on transportation and environment as part of the study. Pupils are now summarizing what they have learned, and ten of them chose “transportation and the environment” as their study theme and are now investigating how many bus users it will take for buses to have a positive environmental effect and other specific conditions.
School C	<ul style="list-style-type: none"> • The program was conducted as part of this year’s integrated study on welfare, directly related to wheelchair users, with whom pupils also interact. • Two hours is insufficient to cover this highly-educational topic. It will be good to link this program to classes before and after.
School D	<ul style="list-style-type: none"> • As the program was conducted for all graders, we do not plan to repeat it the following year.

Table 5. Results of Interview Surveys with Bus Companies & Administrative Organs

	Bus Service Provider	Administrative Organ
Schools A & B	<ul style="list-style-type: none"> • We feel we can participate in the program unhindered, as drivers are delighted when children listen to them with interest. • There is no problem continuing the program at the rate of two or so schools per year. • It may be good to conduct the program with fewer children and/or in areas where they can actually travel some distance using a bus. 	<ul style="list-style-type: none"> • It is important to continue conducting the program to refine and familiarize ourselves with it through trial and error. • The program provided us with an opportunity to cast new light on the relationship between transit services and local communities. • It is important to cultivate people’s understanding of buses, even though they do not use them. Educating children is more effective than directly explaining things to adults.
Schools C & D	<ul style="list-style-type: none"> • It was very good to see the driver(s) sincerely responding to the pupils, with whom they normally have no interactions. The experience elevated their motivation. • We would like to continue participating in the program as much as possible. • From the perspectives of both schools and bus companies, it would be good to conduct the program in areas with high bus service/usages. 	<ul style="list-style-type: none"> • A program like this is necessary from a long-term perspective, as children in Fukuchiyama city usually have no opportunity to take a bus. • We would like to continue the program as part of efforts to promote and revitalize public transportation in the Fukuchiyama area.

4. In Conclusion

The results described in the preceding sections indicate that educational activities using public transportation are effective in deepening the understanding of children and their families of its social significance and public policies, as well as cultivating more cooperative behavior. It is particularly effective to stimulate their interest by showing actual objects and having them observe their characteristics to deduce their roles. The effectiveness is even more pronounced in areas where children and their families are familiar with the transit service because of high service/usages, etc.

In areas where public transit is not used on a daily basis, the program can still be useful to an extent, depending on how it is arranged, to facilitate children's understanding of public policies, encourage compassionate behavior, and cultivate other social conduct. The program is also somewhat effective in raising the awareness of parents toward behavioral changes, including intentional use of the bus. Even in areas where residents are unfamiliar with buses, this program will benefit schools, if it can be conducted as part of their study courses on social welfare and the environment, etc., as well as for bus service providers to motivate their drivers and enjoy other benefits.

Based on the above, this kind of educational activities using public transportation are effective and feasible for areas of high public transit service and usage, as well as, to a lesser extent, for areas in which public transit is not used on a daily basis. In other words, a program like this will be useful for overcoming the challenges of local communities with low service levels, where understanding of public policies and cooperation among various stakeholders are especially needed. Given its ability to stimulate various forms of local cooperation, it can also be utilized as an important and practical strategy for solving traffic-related problems in many regions.

When actually implementing the program, it is important to select appropriate target areas that are optimally suited for addressing the issues of and devising strategies for each region because the effect of the program varies depending on the familiarity of the study subject to the residents. In addition, the specific program contents need to be adjusted according to the needs of each school while also taking into account the fact that such adjustments could affect the extent to which children and their families understand the social significance, as well as change in behavior.

Helping the program penetrate more widely will require the inclusion of other forms of public transit besides the bus, as well as other adjustments. With the aim of mitigating traffic-related problems in urban areas, the program should be further refined by evaluating how the end products of these activities help formulate and promote actual transport policies.

Acknowledgements:

This paper was made possible with the support of the Foundation for Promoting Personal Mobility and Ecological Transportation, as well as the cooperation of Kyoto Prefecture's Traffic Policies Division, Kameoka city Policy Promotion Division, Fukuchiyama city Regional Traffic Division, and the elementary schools and enterprises that participated in this program, to which we would like to express our deepest gratitude.

References:

- 1) Fujii, S., Karaki, K., Matsumura, N., Taniguchi, A., Hara, F., Takahashi, K., Mobility Management Education, Journal of Japan Society of Civil Engineers, Ser. H, 2009, Vol. 1, pp. 25-32, Japanese
- 2) Kitagawa, M., Nakada, S., Takayama, J., The Application of a Mobility Management Program in an Elementary School in Kanazawa city, Proceedings of Infrastructure Planning, 2009, Vol. 39, Japanese
- 3) Makino, N., Practical Trials of MM Education in Preparation for Introduction to All Elementary Schools in Sapporo city, Proceedings of 8th JCOMM, 2013, Japanese
- 4) Tofuku, M., Mobility Management Education Promotion Project in Toyama city, Proceedings of 8th JCOMM, 2013, Japanese