RESEARCH ON TRAFFIC SAFETY EDUCATION AND EVALUATION OF ITS EFFECTS IN CHIBA PREFECTURE, JAPAN

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Abstract: This paper reviewed current situation of traffic safety education for elementary schoolchildren, especially traffic safety training in the case of Chiba Prefecture, Japan. According to interview survey with 11 elementary schools, we classified traffic safety training into 4 types having different procedures of training implementation, which mainly come from varieties of trainers, trainees, and surrounding traffic situation. Since there are no school evaluated their trainings quantitatively and qualitatively, it is necessary to evaluate training effects and feedback it to training-process more effectively. Thus we proposed to use the mirroring method, which can improve one's self-evaluation ability, on traffic safety training as one of the effective measures and evaluated its applicability though the trial at the Ootaki Municipal Oikawa Elementary School. As the result, we found that traffic safety training using mirroring method could change the most of targeted trainee's traffic safety behavior and their self-evaluation abilities to be better off.

Key Words: Traffic Safety Education, Mirroring Method, Traffic Safety Training, Self-evaluation Ability, Behavioral Change

1. INTRODUCTION

Traffic safety education for elementary school which was established more than 40 years ago has played an important role in the promotion of traffic safety in Japan. Since the traffic situation has changed during last four decades, the existing education system must be improved. However, the situation of traffic safety education has not always been grasped systematically. Thus this paper reviewed the situation of traffic safety training conducted as a part of traffic safety education for elementary schoolchildren in the case of Chiba Prefecture, where the number of traffic accidents is one of the highest in Japan, and discussed problems and appropriate future traffic safety education.

To develop effective training contents, an impact of education or training should be analyzed and it should be feedback to trainee and also training contents itself. If this can include as improvement loop on the educational system, traffic safety education will be more effective. Corresponding like this situation, psychological method should be applied. Mirroring method can be considered as one of such methods, which can improve one's self evaluation skill. Thus this study proposes the traffic safety education using mirroring method as an appropriate traffic safety education and evaluates its effectiveness of the traffic safety education.

2. RESEARCH REVIEW AND POSITION OF OUR STUDY

Goldenbeld et al. (1999) mentions that it is easier to stimulate desirable new behavior than to change existing behavior, especially if that behavior has been a habit. And important

precondition is that people have sufficient skills and knowledge in order to be able to exercise the desirable behavior. The necessity of traffic safety education in the earlier stage of human development is indicated.

So, the situation of traffic safety education for elementary schoolchildren in Japan is reviewed. The traffic safety education policy, which has been enhanced based on the article 108-28-1 of the traffic safety law in Japan, indicates that the activity of traffic safety education must be conducted gradually and systematically (Aoyama 2001, Kanamaru 1996). Moreover, the manual of safety guidance for elementary school provided by the Ministry of Education, Culture, Sports, Science and Technology (MEXT) indicates the purpose of traffic safety education and guidance contents for each school year. However, there are great disparities in activities of traffic safety education depending on local governments (Yano, et al. 1998). And several points at issues in terms of traffic safety education have been pointed out, for example, detailed guidance methods of traffic safety education are set up by each trainer at current circumstance, purposes of traffic safety education are vague, and so on (Yano, et al. 1998, Hamaoka 2001). In this point of view, Hamaoka (2001) indicates the 3 kinds of necessities for traffic safety education; way of thinking about purpose setting for traffic safety measurement, traffic accident-prone sections analysis and its indications, and way of information sharing. Arai (2001) suggests the purpose and the contents of traffic safety education corresponding to targeted persons, and he categorizes the purpose of traffic safety as acquisition, improvement and experience.

In case of the implementation contents of traffic safety education, Kanai et al. (2003) report that a person who remembers the contents of traffic safety education conducted when he/she was schoolchild, his/her awareness of danger while riding on bicycle is higher and it tends to decrease his/her experiences of near-miss or traffic accidents. Thus he recommends practical methods for contents of traffic safety training. Regarding to the implementation contents of traffic safety training for schoolchildren, Arai (2001) reports that depending on the traffic safety education, implementation effects can be changed, for example, traffic safety lecture by schoolmaster/schoolmistress can be accepted and effective as intelligible topic for lower grades schoolchildren. Thus it is necessary to consider the appropriate traffic safety training implementation depending on school years.

Regarding to evaluation of traffic safety education, Arai (2004) indicates that only simple evaluation had been conducted, for example, descriptions of trainee's impression and so on. Thus, only how trainees took the training could be clarified, but effects of traffic safety education to trainees haven't been evaluated quantitatively. In addition, Yoshida (2004) reports that the manual of safety guidance issued by MEXT describes the necessities of evaluation of educational effects, guidance planning and method of guidance. So he mentions that it is necessary to grasp how children can get desirable traffic safety behavior and ability. Recently, traffic safety educations for elementary schoolchildren have been conducted by not only school but also other organization, for example, Arakawa Ward in Tokyo issues driver's license for bicycle. However, no organizations have evaluated their educational effects quantitatively. Rundmo and Iversen (2004) evaluate how driver change their behavior with and without having traffic safety behavior comparing with without having any campaign. Ota (1999) described that traffic safety problem can be caused by optimum bias affected by improper self-evaluation skill. Koivisto and Mikkonen (1997) mention that mirroring method

is one of the training methods to improve one's self-evaluation skill, which they have developed. It has been effected to younger driver's behavior.

As the result of the literature review, actual situation of traffic safety education has not been always grasped systematically. Thus, for considering proper future traffic safety education, it is necessary to reveal the actual situation of traffic safety education firstly, then implementation purpose, differentiations of guidance method and so on must be clarified. Furthermore, it is necessary to propose appropriate educational system and to evaluate its effect.

3. ACTUAL SITUATION OF TRAFFIC SAFETY EDUCATION

For grasping the actual situation of traffic safety training, questionnaire survey is conducted at all of elementary schools located in Chiba Prefecture whether they provide traffic safety training as a part of traffic safety education. And 11 schools with different numbers of all the pupils are selected, in which traffic safety class has been conducted while April to June in year 2004. The locations and the averaged numbers of enrolled schoolchildren are shown in Figure 1. The averaged numbers of schoolchildren at each school have large disparities from minimally 50 schoolchildren to maximally 1,200 schoolchildren.



Figure1. Location and Averaged Numbers of Enrolled Schoolchildren at Targeted School

Observation of the traffic safety training and interview survey to related person had been conducted at each training place. And questionnaire surveys were conducted to responsible person of each elementary school and instructors from outside of schools after few days of trainings. The result of the questionnaire surveys is shown in Table 1. In terms of traffic safety training, the contents and implement method of each school are different depending on the process traffic safety training. In this research, the implementation procedure of traffic safety training could be categorized as following 4 types according to the surveys:

- (A) Board of education of each municipality asks each elementary school located in their jurisdiction whether school wants instructors for traffic safety training. If an elementary school wants the instructor, the board of education send instructors such as staff from city hall or provincial office, police or traffic safety association.
- (B) City hall, town hall or village office send document to each school located in their jurisdiction whether school wants them to conduct traffic safety education. And then if a

school wants them to conduct traffic safety training, these staffs conduct the training. (C) Teachers plan the implementation of traffic safety training, and ask traffic safety

- association to send instructors to the school for conducting traffic safety training.
- (D) No organizations ask to school whether they want someone to be sent as instructors for traffic safety training. Thus school conducts traffic safety training by themselves.

| School | Main Instruc tor | Assista nt | | | Targetee | ř | | | |
|--------|------------------------|--|---------------------------------|-----------------------------|---------------------------------|-----------------------------|-----------------------------|-----------------------------|--|
| | | | 1 | 2 | 3 | 4 | 5 | 6 | Characteristics |
| А | teacher | PTA ^{*1} | walking (PR ^{*2}) | video | bicycle (SR1 ^{*3}) | video | bicycle (PR) | video | Training is conducted by teachers |
| В | police | teacher, TSA ^{*4} | walking (SR1) & video | walking (SR1) & video | bicycle (SR1) & video | bicycle (SR1) & video | bicycle (SR1) & video | bicycle (SR1) & video | Training is conducted at driving school established by the town. Thus situation of training is very similar to real world. Whole of the town try to assist the traffic safety education. |
| С | police | TSA, teacher, PTA | walking (PR) | walking (PR) | bicycle (SR1) & video | bicycle (SR1) & video | bicycle (SR1) & video | bicycle (SR1) & video | Danger intersection in school district is adopted as training place for way of walking. |
| D | police | SCH ^{*5} , TSA, teacher | walking (PR) | non ^{*6} | bicycle (SR1) | non | non | non | Walking was for schoolchildren and their parents. Bicycle was mostly concentrated "Stop at stop mark". |
| Е | SCH | police, teacher | non | non | non | bicycle (SR1) | non | non | Giving demonstration of the impact hit by car using dummy. |
| F | SCH | police, teacher, MBE ^{*7} , | walking (PR) & video | non | non | non | non | non | Parents also watched video together with schoolchildren. After watching video, schoolchildren had training, parents had a lecture by MBE. |
| G | SCH | teacher, RSS ^{*8} | walking (SR2 ^{*9}) | non | non | bicycle (SR2) | non | non | Training was conducted in gymnasium with simulated road. |
| Н | SCH | teacher, RSS | walking (SR2) | non | non | bicycle (SR2) | non | non | Training was conducted in gymnasium with simulated environment. |
| Ι | SCH | teacher | walking (SR2) & video | non | non | non | non | non | Training was conducted in gymnasium with simulated environment. Walking under umbrella was focused. |
| J | SPO ^{*10} | SCH, teacher, PTA | walking (SR1) | non | bicycle (SR1) | non | bicycle (SR1) | non | Training was conducted at schoolyard with simulated environment. |
| K | TSA | teacher | video | video | video | video | video | video | Teacher made training video by themselves focused on danger points in the school district. And explain to schoolchildren with watching video. |

Table1. The Contents of Traffic Safety Training Conducted at Elementary School

*1) PTA: Parent-Teacher Association, *2) PR: Public Road, *3) SR1: Simulated Road outside of building, *4) TSA: Traffic Safety Association, *5) SCH: Staff from City Hall, *6) non: No training, *7) MBE: Member of a Board of Education, *8) RSS: Representative of Schoolchild of each School, *9) SR2: Simulated Road inside of building, *10) SPO: Staff from Prefectural Office

Implementation methods are used to follow established procedures of each organization. In the most of cases, there are no cleared reasons to follow it. However, the differentiation of implementation procedure makes large disparities in contents of each traffic safety training, which can be categorized mainly following points;

(1) Instructor

Teacher, police, staff from traffic safety measure section in municipality office, and/or staff in traffic safety association are generally in charge of instructor of traffic safety training. To be a main instructor can be corresponded to process of traffic safety training. If organizer is elementary school, instructor is mostly teacher. On the other hand, if the organizer is from outside of school, instructor can be depending on above implementation process (A), (B) or (C). Furthermore, if the number of targeted schoolchildren is large, parents assist cooperated by Parent-Teacher Association (PTA) often helps traffic safety training. And, representatives

of schoolchildren also instruct to their friends at each danger points. It is considered that assigning assistant also provides one of the good effects to schoolchildren and their parents to aware important points of traffic safety.

(2) Target

Targeted school years are quite different depending on schools. School A and C conduct traffic safety training to all of school years, on the other hand, the other elementary schools set up the target as only specific school year. One of the reasons of differentiation is caused by the number of enrolled schoolchildren, because if the number of enrolled schoolchildren is small, training can be conducted rather easier. Moreover, the school conducts training to all of schoolchildren, in which the teachers in charged of traffic safety seem to be more active for traffic safety education. In case of School E, they permit schoolchildren to ride bicycle without their protectors from grade 4 after they have taken traffic safety training, that's why the targeted school year is set up as grade 4. There are sometimes such particular reasons behind to set up the targeted school year. Conversely, some schools are not active enough for setting up the targets, for example, School I sets up the targeted school year as only grade 1.

(3) Implementation Method

There are 2 purposes for implementation method for traffic safety education. Depending on the purpose, implementation methods can be changed; to have practical experience and to gain traffic safety knowledge. There are 2 types of implementation method for practical training; to set up simulated transportation environment and to use public road. For gaining traffic safety knowledge, watching traffic safety video is mostly used. Combinations of these implementation methods are adapted according to circumstances. To set up simulated traffic environment at schoolyard and/or gymnasium is the most adapted implementation method among elementary schools. The advantages of simulated traffic environment are to arrange road or intersection freely and to set up traffic device such as traffic signal, traffic sign and so on properly depending on training contents or purpose. The level of reality for simulated transportation environment can be different depending on the training purpose. For example, the purpose of the training for bicycle in School D is "stop properly at the place where you must stop", thus they don't use any simulated devices excepting lines on the ground expressing as road. In contrast, School G, H and J use many of simulated devices such as traffic signals, traffic signs, crosswalks, illegal parking car, moreover, they conduct prepare blind intersection or corner. School E includes reproduction of the danger of sudden rushing out in front of cars using dummy. As the unique example, School B conducts traffic safety training at town driving school. In this case, town hall, police, board of education, traffic safety association and driving school cooperate, prepare and conduct traffic safety training. The training can be conducted in more realistic and safer environment.

Some cases, trainings are conducted at public road. The most of school in such a cases, there are obvious traffic danger points in school district. For example, in case of School C, by-pass was built in the school district, where most of schoolchildren go through while attending and leaving school. Thus School C adapts the pedestrian push button signal on the by-pass as training place for grade 1 and 2. In the case of School F, there is blind crosswalk in front of the gate of the school. Thus they use the blind crosswalk and teach how to across the crosswalk properly for grade 1. Regarding to the training using bicycle, the most of school try not to use public road because of difficulty to keep safer training environment. Only one case, School A conduct training for grade 5 at public road to realize the danger points in school

district. On the other hand, watching traffic safety video often uses with practical training. There are 2 purposes for adopting to watch traffic safety video; if practical training cannot be conducted by any reasons, it is used as complementary role of principal training. Other is to learn fundamental knowledge of traffic safety. Contents of video are quite different depending on targeted school year. Generally, the contents of video for the higher classes of elementary school are to realize fear of traffic accident and to understand why traffic accident had been happened. The main point of video for lower classes of elementary school is often make schoolchildren to be interested in traffic safety, so most of videos adapt famous cartoon character to make schoolchildren pay attention. As the unique case of audiovisual media training, in the case of School K, schoolchildren watch traffic safety video on the market firstly, and then they watch the video which is made by teachers. For making video by teachers, the teachers discussed the detailed contents of the video with instructors from traffic safety association, and trainees took video especially at the dangerous points in their school district. In this case, the content of video has concreteness, and they are using the video obviously to gain the same effects as the training conducted at public road.

(4) Contents of Training Course

Implementation contents of traffic safety education are adapted walking for grade 1 and 2, and bicycle for more than grade 3 in the most of elementary schools. Fundamental training contents are followed by "the manual of safety guidance for elementary school" produced by MEXT, however, detailed training contents are mostly decided by instructors. If instructors are sent from outside of school, the instructors often decide the detailed traffic safety training contents with or without having any discussion with schools. In some cases, opinion from school can be reflected to the training, for example, instructors from city hall explained some patterns of training contents to School F, and teacher in charge of traffic safety choose the appropriate training course. As the results, training contents has disparities among schools.

(5) Evaluation

After conducting traffic safety training, most of schools don't have any evaluations. School C discussed among only teachers. School K exchanged opinions among teachers about improvement of training. Thus only discussions have been done at few schools. According to hearing survey, no school conducted quantitative evaluation to reveal how traffic safety effects to schoolchildren.

5. TRAFFIC SAFETY EDUCATION BY MIRRORING METHOD

Although the actual situation of traffic safety education is revealed, it is necessary to evaluate the effects of traffic safety education and to feedback for improving current traffic safety education to be more effectiveness. It is important to introduce this improvement loop as not only educational system but also personal educational process. Corresponding like this situation, psychological method should be applied. In this case, Mirroring method can be considered as one of such methods, which can improve one's self-evaluation skill. Thus this study proposes the traffic safety education using mirroring method as an appropriate traffic safety education and evaluate its effectiveness of traffic safety education.

Mirroring method is one of the effective educational method to improve self evaluation skill developed by Koivisto and Mikkonen in Finland. Koivisto and Mikkonen (1997) explained the detailed of mirroring method that the purpose of mirroring method is to make the

opportunity to evaluate trainee's consciousness and behavior by themselves by knowing other's opinion and behavior. They mention that mirroring method can improve trainees' self-evaluation skill to be better off. Ogawa (2003) indicates the important points in educational training by mirroring method; (1) to show trainee's behavior as objective fact, (2) trainer must show only the fact, it needs to be careful in trainer's speech and action to force trainer's opinion on trainee, (3) try to make trainee to understand the fact and to make them realize important point of traffic safety subjectively.

In this study, the traffic safety training using mirroring method has been conducted to all of the schoolchildren at the Ootaki Municipal Oikawa Elementary School, Isumi, Chiba Prefecture located in Figure 1 as School B. The total number of school children of the targeted elementary school, 50 schoolchildren, is rather few comparing with national level 306 school children (the number is counted in 2004, only in public elementary school). Ota (2000) mentions that training for driver using mirroring method were conducted to 200 trainees in one time and had appropriate effects. However, he recommends that around 20 trainees are suitable for training using mirroring method because the method is including discussion among trainees. So the number of trainees in this study can be appropriate. Changing in self-evaluation skill comparing with before and immediately after training and behavioral changes of before, immediately, 1 week and 1 month after training are analyzed as the effect of traffic safety training using mirroring method in the traffic safety training using mirroring method. The procedure of the mirroring method in the traffic safety training has 3 stages indicated in Figure 2; (A) Material Correction, (B) Mirroring Session and (C) Measure the Effect. The details of each stage are indicated as following.



Figure 2. The Procedure of Mirroring Method

5-1 Material Collection

In the first stage of mirroring method, (A)Material Collection, questionnaire survey and taking video acquiring traffic safety behavior are conducted before conducting traffic safety training. Regarding to the "Questionnaire Survey I" which indicated as A-1 in Figure 2, consciousnesses of traffic safety behavior of each trainee are collected by self-evaluation. In the questionnaire, trainees evaluate their usual traffic safety behavior by themselves using 5 levels ("1. Don't do any time" to "5. Do it every time") in terms of the 5 of the most important points to cross on crosswalk. Questions are the 5 of the most important points for crossing on crosswalk; (1) do you always stop completely before crossing crosswalk?, (2) do you always see right and left side before crossing crosswalk?, (3) do you always raise your hand properly while crossing crosswalk?, (4) do you always across on crosswalk in a straight line?, and (5) do you always careful in car approaching while crossing crosswalk?. Concerning about the understanding of the questionnaire, the expression of the questionnaire for the lower grades is

set up more simply, and teachers explain the question to them, then the schoolchildren in the lower grades answer the question.

Traffic safety behaviors are taken by video for 4 days while going school and back to home. The location for taking video is un-signalized crosswalk located in front of the gate of the elementary school. The main purpose of "Taking Video of Traffic Safety Behavior I" indicated in Figure 2 as A-2 are (1) to make material which is shown in Mirroring Session indicated as (B) in Figure 3, and (2) for analyzing effect of traffic safety education using actual traffic safety behavior comparing with before and after traffic safety education, the actual traffic safety behavior before conducting traffic safety education is observed by video. Traffic safety behaviors taken by video are evaluated by 5 levels of 5 of the most important points for crossing crosswalk. Table 2 is shows the evaluation categories and definition of each level.

Proper identification of each schoolchild is very important for acquiring traffic safety behavior, thus 3 identification items, different colored strap, colored card kept in card-case put with strap, and colored baggage are distributed to the targeted schoolchildren, and they ware these items while the surveys are conducted.

Regarding to the training material (edited video), some examples of improper traffic safety behavior of each category (1~5 shown in Table 2) are chosen and captured to Microsoft Power Point with putting title of each category. Most of the schoolchildren's traffic safety behaviors are included into the materials.

| Category | Level | Definition |
|-------------------------|-------|--|
| 1) Stop before | 5 | Completely stop once before crossing by one's decision |
| crosswalk | 4 | Completely stop once before crossing by someone's indication/ |
| | | Stop once at far from crosswalk |
| | 3 | Stop for a instant |
| | 2 | Approach to crosswalk with slower speed, but don't stop before |
| | | crossing |
| | 1 | No decelerate and no stop before crossing |
| 2) Safety check before | 5 | Check both left and right side carefully |
| crosswalk | 4 | Have a glimpse of both left and right side |
| | 3 | Check only one side carefully |
| | 2 | Have a glimpse of only one side |
| | 1 | Don't have any safety check |
| 3) Rising hand while | 5 | Rising hand straightly all the time while crossing |
| crosswalk | 4 | Rising hand all the time while crossing, but NOT properly rising |
| | | hand |
| | 3 | Rising hand straightly but NOT all the time while crossing |
| | 2 | Rising hand NOT properly and NOT all the time while crossing |
| | 1 | No rising hand at all while crossing |
| 4) Position of crossing | 5 | Crossing on crosswalk straightly |
| on crosswalk | 4 | Crossing on crosswalk obliquely |
| | 3 | Crossing outside of crosswalk while crossing on crosswalk |
| | 2 | Crossing outside of crosswalk but near the crosswalk |
| | 1 | Crossing outside of crosswalk and the place is far from |
| | | crosswalk |
| 5) Safety check while | 5 | Check both left and right side carefully |
| crossing | 4 | Have a glimpse of both left and right side |
| | 3 | Check only one side carefully |
| | 2 | Have a glimpse of only one side |
| | 1 | Don't have any safety check |

Table 2. The Evaluation Categories and Definition of the Each Level

5-2 Mirroring Session

Mirroring session has been conducted as one part of the traffic safety training class at targeted elementary school. The flow of the traffic safety training class is indicated in Figure 3. Demonstration was conducted by Chiba police at school grounds. Simulated traffic environments using traffic signal, road, intersection, crosswalk and so on, were well prepared at the school grounds. The danger caused by inside-outside wheel difference of large-size car at intersection and impacts of collision occurred by running out into streets using dummy were demonstrated. And schoolchildren tried to find the driver's blind spots using real car. Then all of schoolchildren moved to gymnasium, and instruction by using ventriloquism was conducted by the police. In the instruction session, summary of demonstration session and general traffic safety behavior such as the proper way of crossing on crosswalk, the appropriate way of riding on bicycle and so on were lectured. The last of the training class, mirroring session was conducted by authors at the same place of instruction session.

The purpose of mirroring method is to make the opportunity to evaluate trainee's consciousness and behavior by themselves by knowing other's opinion and behavior. Thus, for showing one's and other persons' actual behaviors of crossing on crosswalk, the schoolchildren watched the edited presentation video by each of 5 topics, and discussed about dangers by each topic. After finishing watching and discussion, police give them some of proper explanations of each topic simply. Target is schoolchildren, thus simple lecture by police is one of the complementation to schoolchildren to consider their behavior properly. Then questionnaire survey II (B-3 in Figure 2) was conducted with distributing the same questionnaire sheet, and trainees modified their answer by themselves again using red marking.



Figure3. The Flow of the Traffic Safety Training Class

5-3 Measure the Effect

In the 3rd stage of mirroring method, Measure the Effect, self-evaluation and behavioral changes in terms of traffic safety affected by training are measured.

Regarding to self-evaluation changes, differences in the 2 questionnaires are analyzed. Ota (2000) mentions that proper self-evaluation skill lead to have ability to control their behavior correctly. Thus if trainee can evaluate their behavior by themselves properly, it means that there are appropriate effects by training using mirroring method. Thus validity of self-

evaluation changes is verified comparing with the actual behavior taken by video before traffic safety training using following criteria.

- A+ : Trainee evaluates his/her traffic safety behavior correctly from the beginning
- A : Immediately after the training, trainee evaluates his/her traffic safety behavior correctly corresponding with evidence of his/her actual behavior taken by video
- B : Self-evaluation become better than before taking training, however, the second answer is also not properly evaluated comparing with evidence of his/her actual traffic safety behavior take by video.
- C : There are large disparities among self-evaluation and his/her actual traffic safety behavior

Concerning with behavioral changing, trainees' traffic safety behaviors are taken by video after training at 3 periods; immediately after training, 1 week after training and 1 month after training as specified as C-1, C-2 and C-3 in Figure 2 respectively. These acquired behavioral data are evaluated by 5 levels regarding to the 5 of the most important categories indicated in Chapter 5-1. By the follow-up survey, behavioral changes before and after training are analyzed. It is assumed that traffic safety behavior might be changed depending on the traffic situation while crossing on crosswalk, therefore, behavioral changing affected by traffic situation are also analyzed. 3 traffic situations are specified as followings;

| Better (B) | : No parkir | ng cars | near the | targeted | crossw | alk, | which | makes | fine view | for |
|------------|---|---------|----------|-----------|--------|------|-------|---------|-----------|-----|
| | checking | traffic | safety | condition | , and | no | cars | passing | through | the |
| | crosswalk while trainee is crossing on the crosswalk. | | | | | | | | | |
| 37.1 . 0.0 | 0.1 | | | . 4 | 11 | | 1 / | • | • • | |

- Moderate (M) : Only one car parking near the crosswalk, and/or car is passing through while trainee is crossing on crosswalk.
- Worse (W) : More than 2 cars are parking near the targeted crosswalk, in some cases, car is sometimes passing while crossing additionally.

6. EVALUATION OF TRAFFIC SAFETY EDUCATION BY MIRRORING METHOD

6-1 Effect of Mirroring Method by Self-evaluation Changing

The results of self-evaluation changes regarding to traffic safety between before and immediately after traffic safety training using mirroring method are analyzed, based on the verification of traffic safety behavior, using 5 categories corresponding to the contains of questionnaire survey. About the tendency of all of the categories, there are no distinguishes by grades. The percentage of "No Effect" summarized by the number of categories is shown in Figure 4. There are proper effects to 24% of schoolchildren in all of categories. Moreover, the training is resulted as effective for more than 70% of schoolchildren in at least more than half of 5 categories. And there are no appreciable effects from training to NO schoolchildren, therefore, there are some proper effectiveness to schoolchildren by the traffic safety training.

Detailed effectiveness by each category is specified as followings, and the results of each category are indicated in Figure 5.

(1) Stop before crosswalk

18% of schoolchildren evaluate themselves correctly since before taking traffic safety training,

as indicated as A+. 46% of schoolchildren's self-evaluation skills are changed to be better off (A and B), however, 32% of schoolchildren could not evaluate themselves correctly even though after training.

(2) Safety check before crosswalk

It has similar tendency with Category (1). The schoolchildren who could evaluate themselves correctly from the begging are totally 12% (A+). 24% of schoolchildren could not evaluate themselves correctly even though after training (C). On the other hand, more than 50% of school children evaluate themselves better than before training (A and B).

(3) Rising hand while crossing on crosswalk

The ratio of "No Effect" to schoolchildren, 42%, is rather higher comparing with category (1) and (2). The ratio regarding to the schoolchildren who could evaluate themselves properly since before taking training, 18%, have similar tendency with category (1) and (2). And, only 34% of schoolchildren have something better changes in self-evaluation (A and B).







Figure 5. Result of Self-evaluation Changes

(4) Position of crossing on crosswalk

It has different tendency comparing with categories (1) to (3). Half of schoolchildren

evaluated themselves appropriately (A), and almost 80 % of schoolchildren could evaluate themselves better than before (A and B). And only 6 % of schoolchildren could not evaluate themselves correctly (C). Thus the training is resulted as good effects to schoolchildren.

(5) Safety check while crossing on crosswalk

The ratio of wrong self-evaluation, 56%, is comparatively higher than other categories. There are no schoolchildren who evaluate themselves correctly from the beginning, and 38% of schoolchildren changed their evaluation ability to be better off. Only in this category, more than half schoolchildren could not evaluate themselves correctly.

6-2 Effect of Mirroring Method by Behavioral Changing

The effects of mirroring method by behavioral changing are summarized by 5 categories. Some of categories have differentiations in traffic safety behavior comparing with going to school (morning) and go back home (afternoon) or depending of traffic situation. Results are indicated by each category as shown in Figure 6.

(1) Stop before crossing on crosswalk

There are no effects for stop before crossing on crosswalk in 30% and 38% of schoolchildren in the morning and in the afternoon behavior respectively. On contrary, 50% and 43% of schoolchildren have appropriate effects by training in the morning and in the afternoon behavior respectively. Moreover, around 20% of schoolchildren have temporal effects, example of behavioral changes is shown in the right side of Figure 7, they had proper effect only immediately after training and changed their behavior to be the same level as before taking training within 1 month. The reason of proper affect in the morning, 30% of schoolchildren have been done by proper traffic safety behavior in the begging (example is indicated in the left side of Figure 7), the ratio is much higher than it of afternoon 8%.

(2) Safety check before crosswalk

The tendency of effects among morning and afternoon has large disparities. In terms of morning behavior, the training is effective for 93% of schoolchildren, and it is not effective for 7% of schoolchildren. The effects in the morning, 73% of schoolchildren used to keep proper traffic safety behavior. On the other hand, the effects in the afternoon tend to be quite different comparing with it of morning, the training is not effective to 25% of schoolchildren, temporary effected to 18% of schoolchildren and appropriately effected to 57% of schoolchildren. In terms of proper effect, most of schoolchildren had proper traffic safety behavior to be proper and continue the proper level, as example shown in Figure 8 respectively.

(3) Rising hand while crossing crosswalk

The tendencies are quite different in morning and afternoon. More than half of schoolchildren have no effects by training. The reason of no effect in the morning is that behaviors of most of trainees tend to be contradictory, in the case of afternoon, most of behaviors have 2 kinds of tendency as shown in Figure 9 respectively. The behavior in afternoon is more than twice more effective comparing with it of morning, there are partially proper effects to 17% of schoolchildren and 11% of schoolchildren affected properly and continually.









Figure 8. Example of Behavioral Changes in Category (2)

(4) Position of crossing on crosswalk

The changing behaviors among morning and afternoon are resulted to be similar tendencies. 88% and 75% of schoolchildren had proper effect by training in case of morning and evening behavior respectively. The higher ratios are caused by the behavior which schoolchildren continually behave the proper traffic safety behavior since before taking training until after taking as example indicated in the left side of Figure 10. On the other hand, the main reason of ineffectiveness to behavioral change in the afternoon is some improper safety behaviors included even though they used to behave proper traffic safety behavior before taking training and after taking training, of which example is indicated in the right side of Figure 10.

(5) Safety check while crossing on crosswalk

There are large distinguish between the behavioral changes in morning and afternoon. In the morning, 89% of schoolchildren are resulted to be not effected by training. One of the main reasons is that the most of schoolchildren behaved improperly before and even though after training (as like shown in the left side of Figure 11). In the case of afternoon, 59% of schoolchildren have not to be changed properly, and tendencies of most of behavior were scattered as like indicated in the right side of Figure 11. In the afternoon behavior, 33% of schoolchildren had temporal effects by training, but the behavior changed again to be improper safety behavior within 1 month after training.



Figure 9. Example of Behavioral Changes in Category (3)



Figure 10. Example of Behavioral Changes in Category (4)



Figure 11. Example of Behavioral Changes in Category (5)

6-3 Result of Mirroring Method

As to self-evaluation skill, all of the targeted schoolchildren improved their self-evaluation correctly at least 1 of 5 categories. And around 80 % of schoolchildren's self-evaluation skill got better off at more than half categories. Especially, self-evaluation at the category "Position of crossing on crosswalk" has been highly modified. However, 50 % of the trainee could not evaluate their behavior correctly in the category "Raising hand while crossing on crosswalk".

In connection with traffic safety behavior, there are differences among going to school and going back to home. Schoolchildren behave more carefully for traffic safety in the morning while going to school comparing with back home. And traffic situation is not always effected to behavioral changes. Concerning about follow-up survey until 1 month after training, the most of schoolchildren changed their behavior to be better in the cases of "Stop before crossing", "Safety check before crossing" and "Position for crossing". In contrast, many of schoolchildren haven't improved their behavior to be better off after training in the cases of "Raising hand while crossing" and "Safety check while crossing".

There are no disparities among school year in both self-evaluation and behavioral changes, it can be said that traffic safety education by using mirroring method can be effective to elementary schoolchildren. It is considered that the proper self-evaluation skill can guide them to control their behavior correctly. Thus mirroring method is effective to lead their behavior to be changed appropriately.

7. CONCLUSION

Traffic safety training as a part of traffic safety education conducted at elementary school in Japan is basically carried out through the indication of the Ministry of Education, Culture, Sports, Science and Technology. However, detailed contents of traffic safety trainings have large disparities among each school. Details of traffic safety training contents are affected by differentiations of system of implementation, degree of remarkable traffic problem happened in school districts, as well as teacher's enthusiasm for traffic safety education. There are 2 kinds of purpose for traffic safety education; training emphasizes to acquire basic knowledge of traffic safety, or to recognize actual danger of traffic accident in real traffic environment. In the later case, traffic safety education is desirable to be conducted at public road, however, it is difficult to secure safety. Thus, most of elementary schools conduct traffic safety training at simulated traffic environment or watching traffic safety video substitutionally. The reason of this substation method is mostly affected by the number of schoolchildren. The school with larger number of schoolchildren have more difficulty to conduct traffic safety education at public road. Additionally, it is cleared that no elementary school have evaluate their training quantitatively.

To make contents of traffic safety education more effectively, it is quite important to evaluate training effects and feedback the valuable information to trainee and training contents itself. Furthermore, it is necessary to introduce this improvement loops as educational system as well as personal educational process. Thus, we focused on traffic safety education using mirroring method which is an appropriate psychological method to improve one's self-evolutional skill, and we actually conducted traffic safety training using mirroring method regarding to the way of crossing on crosswalk at Ootaki Municipal Oikawa Elementary School. And self-evaluation

and attitudinal changes comparing with before and after training were analyzed. As the result of self-evaluation skill evaluated based on the evidences of behavioral changes, no schoolchildren could not evaluate their traffic safety behavior properly. Thus, mirroring method can affect to schoolchildren's self-evaluation skill and correct self-evaluation can lead their traffic safety behavior to be better. In terms of behavioral changes according to the follow-up survey, training was affected to schoolchildren in some specific actions, however, it could be cleared that training was not effective to some the other specific actions, for example, the most of schoolchildren could not modify their traffic safety behavior in terms of "rising hand while crossing on crosswalk" and "safety check while crossing on crosswalk" properly in the training. So according to the evaluation of these effects, the emphasis point for traffic safety training can be revealed.

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