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<b>PAPER TITLE</b>	<b>CHANGES IN COMPLIANCE STATUS OF TEMPORARY STOP RULES FOR COMMUTING BICYCLES BY TRAFFIC SAFETY EDUCATION, IN THE PERIOD OF 2015 - 2018, IN THE CASE OF SHUNAN CITY, JAPAN</b>		
<b>TRACK</b>	Road Safety		
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Road Safety, Commuting Road, Risk Awareness, Traffic Safety Education, Bicycle, Junior High School

**ABSTRACT:**

In Japan, many students go to elementary school and junior high school by walking, and transportation by bus is extremely rare. For that reason, public schools do not provide school bus ownership. In junior high school students, schoolchildren from the range beyond the walking area are allowed to go to school by bicycle. In the suburban schools, the school district is wide and there are cases where more than half of the students come by bicycle.

In Japan, from a generational perspective, among the traffic accidents involving bicycles, the most frequent age of victims is the generation of junior high and high school students. Therefore, securing traffic safety of bicycles at school is a social issue.

In the position of Yamaguchi Prefecture School Safety Advisor, the traffic safety education that I carry out explains the 7 rules of traffic safety and 5 rules of bicycle safety use in the 50 minutes lecture, confirms the implementation situation. In the future, we will confirm the intention of observing the rules.

Among 5 rules of bicycle safety uses, there is little recognition that adherence to temporary stops at intersections is low and consciousness to strive to protect is low. In the survey by video observation, it turned out that there are several stages of things, just stopping the bicycle, stopping and checking the left and right and so on. In order to make safer traffic behavior, I explain these differences in the lecture and encourage change of behavior.

In this paper, I will consider the following through examples of implementation at two junior high schools in the local city of Shunan city in Japan. First, as behavioral change of the pause itself, in three years, the implementation rate of temporary suspension has changed from 14% in advance to 41% in the future, further 75%, furthermore 95%, introducing cases and considering the reasons. The other is a case where almost 200 bicycles are temporarily stopped, I introduce that contents of pause can be divided into 3 stages, and consider the change of stopped contents.

# CHANGES IN COMPLIANCE STATUS OF TEMPORARY STOP RULES FOR COMMUTING BICYCLES BY TRAFFIC SAFETY EDUCATION, IN THE PERIOD OF 2015 - 2018, IN THE CASE OF SHUNAN CITY, JAPAN

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## 1 INTRODUCTION

### 1.1 The Situation of the General Means of Commuting to School in the World

In general, school buses are used to commute by primary and junior high school students. Buses are used as a means of transportation for commuting to school for various reasons.(Photo.1)

However, in Japan, going to school by bus is not common. Rather, a school bus is a special case. In the case of an elementary school, it is often within walking distance in Japan. It is usual that communities are formed around the elementary school district unit.(Photo.2)

In addition, regarding the setting of elementary schools, we go back to the school system announcement of 1872 (beginning of the school education system in Japan). Many primary schools were created, with old temples and the places of private lessons. When there were multiple elementary schools in the community, along with the correction of the school system, consolidation was repeated, and one primary school was set up in one community, as is the case today.

### 1.2 Characteristics of the Means of Commuting School in Japan

#### 1.2.1 It is Common to Go to School by Walking

In elementary schools that tend to be built in walking areas, walking to school is common. Therefore, because there is an elementary school within walking distance, we go to school by walking.

#### 1.2.2 Two Types of Primary School Students, Walking Alone and Group Commuting

There are group commutes and individual commutes for primary school children. In group commutes to school, a cross-school grade school commuting group is formed by people who live close to each other, and students commute with the group. Individually commuting to school means that a child walks alone and goes to school without going in a group.

Because the population density of the community is relatively high, there is a primary school within walking distance, and there is a mutual surveillance system of local residents.



Photo.1 School Bus



Photo.2 Commuting by walk



Photo.3 Volunteer activities

### 1.2.3 Some Junior High School Students Have a Bicycle Commute to School

In general, school districts for junior high schools consist of several elementary school districts. As a result, it is common for school attendance areas to be necessarily wide and for school commuting distances to be long. Some schools allow some students to go to school by bicycle, and encourage them to do so.(Photo.4, 5)

As a result, bicycles and pedestrians will be mixed in the space along the school route. The school route in Japan has that how to arrange the mixture of these pedestrians and bicycles.

### 1.2.4 Monitoring Children's Commute to School by Members of the Community

In Japan, the community has been formed around primary school units, and it is characteristic that many primary school district units have events and activities that are seen by the community. It is also customary that primary schools are regarded as the core of community facilities.

Therefore, posting volunteers to primary schools is often performed for the observation of the local community, and members of the community are often systematically working on observation at schools as a volunteer activities.(Photo.3)

As a result, primary school students can go to school by walking alone. There is also a problem that as the aging of the community progresses, these observation volunteer members are aging and losing.

### 1.3 Eighty Percent of Sidewalk Pedestrians on a Major Road are School Children

When I investigated a certain main road, approximately 400 people used this road to commute to a nearby primary school. There were a total of 800 people traveling to and from school. The total number of pedestrians in this section of road was about 1000, and 80 percent of all pedestrians were commuting to or from school.

In other words, if you consider pedestrian safety measures, it would be possible to cover up to 80% of the issues if you think about safety measures at this school.

### 1.4 Safety Measures for Roads Used for Commuting to School Lead to Safety and Security of Major Walking Spaces

Eighty percent of pedestrians in the walking space of the main road were commuting to or from school, and there is also an issue with separating the bicycle and the pedestrian's passage space.

By pursuing safety measures for commuting on school roads, it is possible to cover most pedestrian safety measures in walking spaces, and it can be understood that this leads to the separation of bicycle and pedestrian passing spaces. From the above, it is thought that the safety measures for commuting on school roads leads to the safety and security of the main walking space.



Photo.4 Bicycle Commuting to School



Photo.5 Bicycle Commuting at the Intercross

## 2. EFFORTS AS A STUDENT SCHOOL SAFETY MEASURES ADVISOR FROM 2015

The author has been appointed by the Yamaguchi prefecture government as a security adviser for school commute routes for five years from 2015. Through this position, the school, the local community, the governmental agency and I work together to improve the safety of school routes. Here are some of the things that have been noticed as a result of that effort.

### 2.1 Accidents of Bicycles and Pedestrians on the National Road No. 2 Sidewalk in the Katsuma District of Shunan City

In 2012, there were two bicycle and pedestrian contact accidents on the national road No. 2 sidewalk in the target area. In each case, the bicycle went downhill and was in contact with a pedestrian. The width of the sidewalk was only 1.5m, and the bicycle rider is supposed to get off for a section where the bicycle should be pushed by hand.

Why did this accident happen? Is it the fault of the pedestrian or the fault of the bicycle rider? I speculate that both sides did not follow the correct rules. If the pedestrian was on the correct side of the road, the bicycle was passing through the road, and if the pedestrian approached and the rider got off the bicycle, no accident should have occurred.

From the situation of this accident, it was decided that we should prepare traffic safety education to be conveyed to the students.

### 2.2 Traffic Safety Education: A device to prevent students from being victims or perpetrators

In 2015, the supervisor of the Shunan City Board of Education pointed out that the roads in this area have a lot of passing traffic and also that the percentage of large vehicles is high. He complained that it was necessary to devise ways to prevent junior high school students from being victims of traffic accidents and also from being perpetrators of traffic accidents for walking children. These recommendations were from a former junior high school teacher in the target area. Five years have passed, and he is now the principal of this school, focusing on traffic safety.

We thought that it was necessary to make children and students recognize the correct rules again and to urge them to change to safer traffic behavior.



Fig.1 Location of Yamaguchi Prefecture

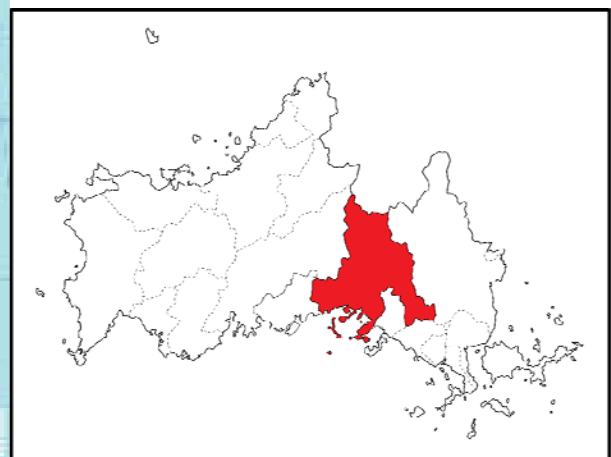


Fig.2 Location of Sunan City in Yamaguchi Pref.

### 3. JAPAN'S FIVE SAFE BICYCLE RULES

The Five Rules of Safe Use of Bicycles are those known by the National Police Agency, which set the following five rules for bicycle traffic.

Rule 1: In principle, cyclists should ride on the street and sidewalks only in exceptional cases

Rule 2: Cyclists should ride on the left side of the street (In JAPAN, Cars go left side of street)

Rule 3: Cyclists must reduce speed on sidewalks and give pedestrians the right of way.

Rule 4: Cyclists must obey safety rules. Specifically, there are the following seven rules.

Riding double is prohibited.

Riding side by side is prohibited.

Cyclists are prohibited from riding under the influence of alcohol.

Cyclists must use bicycle light at night.

Cyclists must obey traffic lights at intersections and check for safety after coming to a full stop.

Cyclists must not use umbrellas or talk on mobile phones when riding.

Parents and guardians must ensure that children wear a bicycle helmet in the following cases:

When a child under the age of 6 is riding in the children's seat of a bicycle.

When a child under the age of 13 is riding a bicycle.

Rule 5: Children must wear a bicycle helmet.

### 4. SUMMARY OF EFFORTS IN TWO DISTRICTS OF SHUNAN CITY, YAMAGUCHI PREFECTURE

Since 2013, I have implemented traffic safety education for both primary school students and junior high school students in three districts of Shunan City, Yamaguchi Prefecture. Before and after that, we grasped how the traffic safety awareness and traffic behavior at the time of school commutes of children and students changed.

In this paper, the Kumage district was surveyed for four years from 2014 to 2017 and is referred to as the A district. The Kikugawa district is currently surveying continuously from 2015 as the B district. We then organized the results and. The activity in the Heta district is limited to 2015, so it is not used here as a comparative material.

The survey was assembled by combining traffic safety education for primary school children (45 minutes for lecture time, 50 minutes for junior high school students), questionnaire surveys before and after, and traffic observation surveys before and after. These are repeated every year, and the change of danger awareness of children and students and the change of traffic behavior are evaluated.

In addition, these results were reported to the school operation councils of each district before and after the implementation of traffic safety education etc., and the opinions of local residents and administrative agencies were sought to make necessary adjustments. Among these, the results that lead to the improvement of traffic safety by the local community, such as the change of the school route and strict rules of the passage position, have been decided.

### 5. SUMMARY OF ACTIVITY RESULTS

#### 5.1 Change in Risk Awareness by Traffic Safety Education

##### 5.1.1 Change in Risk Awareness by Traffic Safety Education in the A district (2015-2017)

The risk awareness improved by traffic safety lectures as a whole can be continued as the student progression through the grades. The risk awareness of current third graders is low at any grade level. However, the only exception is in the sixth grade of primary school. It is thought that the awareness as the top class student made the risk awareness higher.

In addition to this, it was found that while they tended to increase their risk awareness during primary school children, once they became junior high school students, their risk awareness tended to decrease significantly. It was confirmed that the sense of danger is high when looking at Katsuma alone, and that the traffic safety lecture is effective as the student progress in grades.

From these things, it is necessary to carry out a traffic safety lecture in cooperation with primary schools and junior high schools.

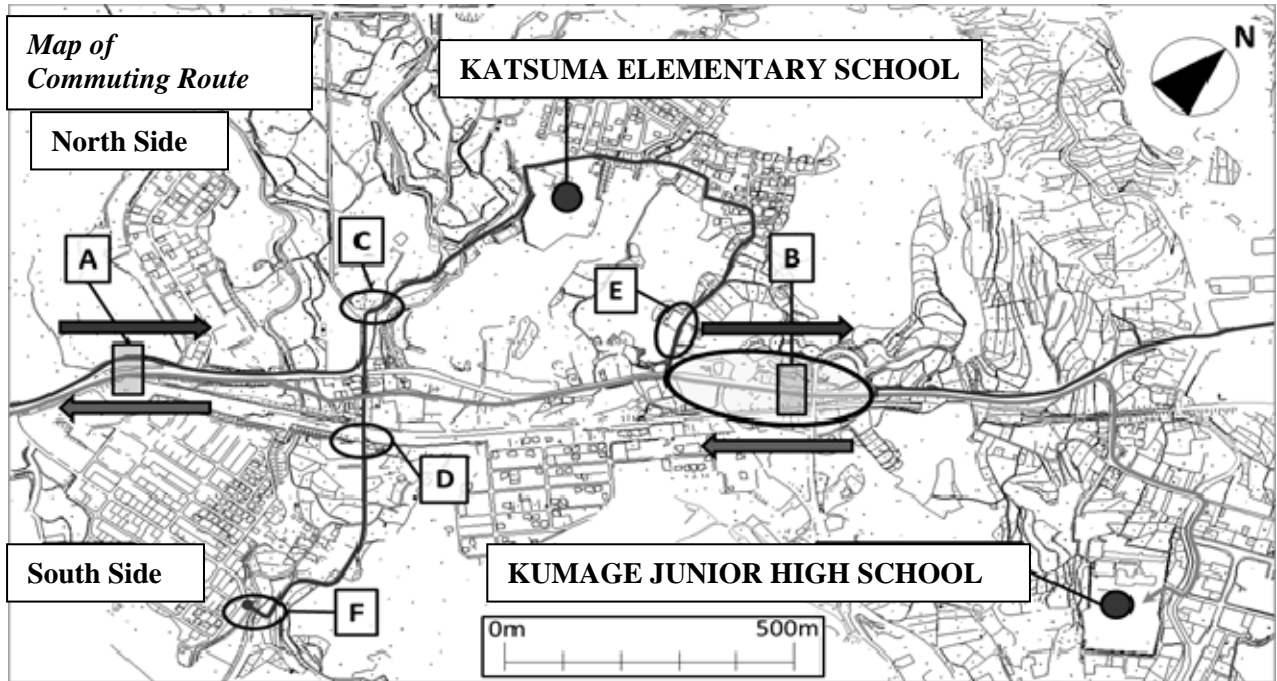


Fig.4 Location of Katsuma Primary School and Kumage Junior High School in the A district

### 5.1.2 Change of Risk Awareness by Traffic Safety Education in the B district (2016-2018)

Primary school children are more aware of danger as their grade level goes up, but when they become junior high school students, it turns out that risk awareness suddenly drops. It was also found that the risk awareness immediately after the traffic safety lecture was not continued until the next year's lecture.

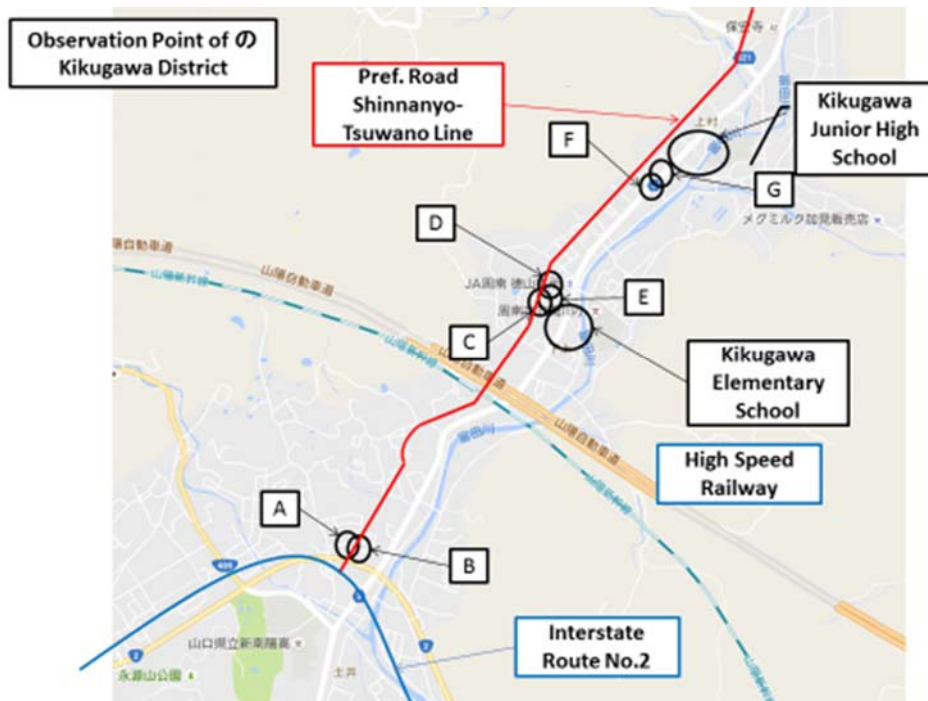


Fig.5 Location of Kikugawa Primary School and Kikugawa Junior High School in the B district

### 5.1.3 Change in Safe Traffic Behavior Intention by Traffic Safety Education (2015-2018)

In both A district and B district, at the preliminary stage, recognition to "limited to what bicycle traffic in the sidewalk is exceptionally permitted" was as low as about 50%, but after the class, the recognition rose to about 80%. In addition, when a bicycle passes along the sidewalk, it is "from the roadway", and the recognition that "bicycles must ride slowly" also rises after the course.

## 5.2 Changes in Compliance and Intention to Improve Junior High School Students in the Pre-Post Survey

### 5.2.1 Changes in Junior High School Students' Compliance Status and Intention to Improve in the district A

Among the junior high school students in the district A, "Cyclists must reduce speed on sidewalks and give pedestrians the right of way" was about 65% in advance, but increased to about 80% after attendance. Although 77% had "Cyclists must obey traffic lights at intersections and check for safety after coming to a full stop" in advance, it increased to approximately 88% after the course. About 81% of children had to wear helmets in advance, but had increased to 89% after the course. "Waiting for the traffic signal" was about 90% in advance, but increased to 90% after the course.

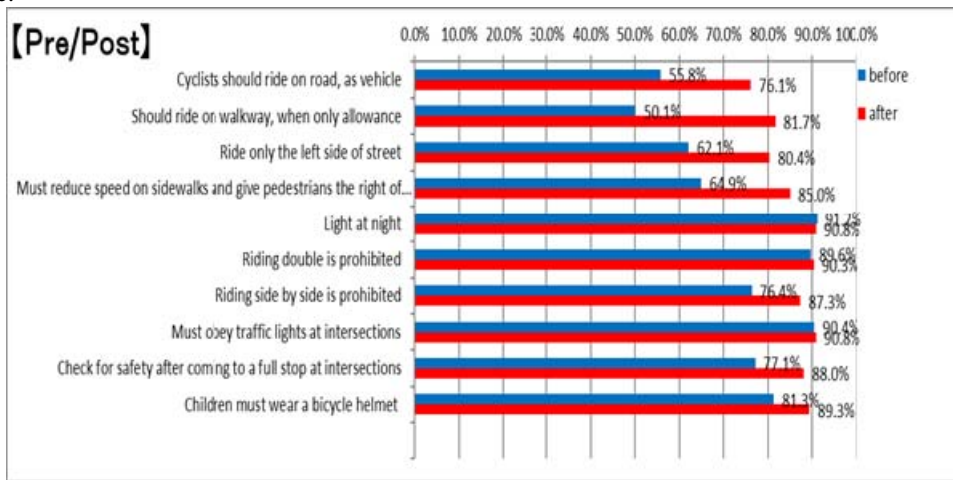


Fig. 6 Compliance of Five Rules for Safe Use of Bicycle, Kumage Junior High School, 2016

### 5.2.2 Changes in Junior High School Students' Compliance Status and Intention to Improve in the district B

In district the B, "Cyclists should ride on the street and sidewalks only in exceptional cases" increases by about 38% compared to before the class, and in terms of all items, there was nearly 86% intention to change.

"Cyclists must reduce speed on sidewalks and give pedestrians the right of way" increases by about 20% compared to before the class, and in terms of all items, there was nearly 86% intention to change.

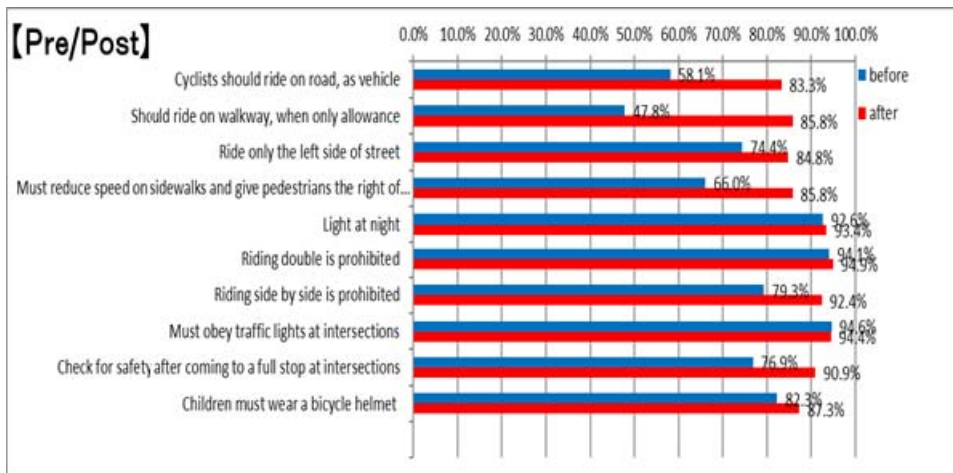


Fig.7 Compliance of Five Rules for Safe Use of Bicycle, Kikugawa Junior High School, 2016

### 5.3 Examples of the Suspension of Junior High School Students Commuting to School by Bicycles and the Compliance Status of Passing Locations as Seen from Observation Survey

#### 5.3.1 Situation of Suspension of Bicycles in the district A and Changes after Traffic Safety Education

As a result of observation survey in the district A, the following was found.

There was sidewalk widening work in 2016, and it is easy to go to point B. In this case, junior high school students are walking by pushing a bicycle, and when comparing 2016 and 2017, the percentage passing through the correct passing position increased from 58% to 82%. The increase was 24%.

Point D is the point where primary school students and junior high school students using bicycles cross each other. The crossing guards may cooperate with you, and they are considered to be able to pass safely. Here too, junior high school students are walking by pushing their bicycles. At intersections, you must stop temporarily and check left and right before passing. In response to this, 2017 was classified into four levels of suspension. As a result, the bicycles that follow all the rules have grown from 29.6% before the course to 43.5% after the course. The increase was 13.9%.

#### 5.3.2 Situation of Suspension of Bicycles in the district B and Changes after Traffic Safety Education

We organized video observation for the situation that the bicycles of the junior high school students comply with stopping at the intersection. The results of the survey were organized in five stages: stop, get off the bike, stop at the left and right, stop at the bike, get off the bike and stop at the left and right, stop.

In the 2015 preliminary survey, only 14% of the pauses were observed in the rules, but in the ex-post survey of that year, 41% came to obey the rules. In 2016, 45% of the rules followed the rules in advance, and 72% later. In 2017, 59% followed the rules in advance, and 95% follow it.

One bicycle that did not stop was considered to be late because it passed through the intersection at the very last moment of morning time. If you are in a hurry, there is a high possibility that you will cause an accident when not observing the traffic rules, so it may be necessary for safety to go to school in the morning with some time to spare so that rushing is not necessary.

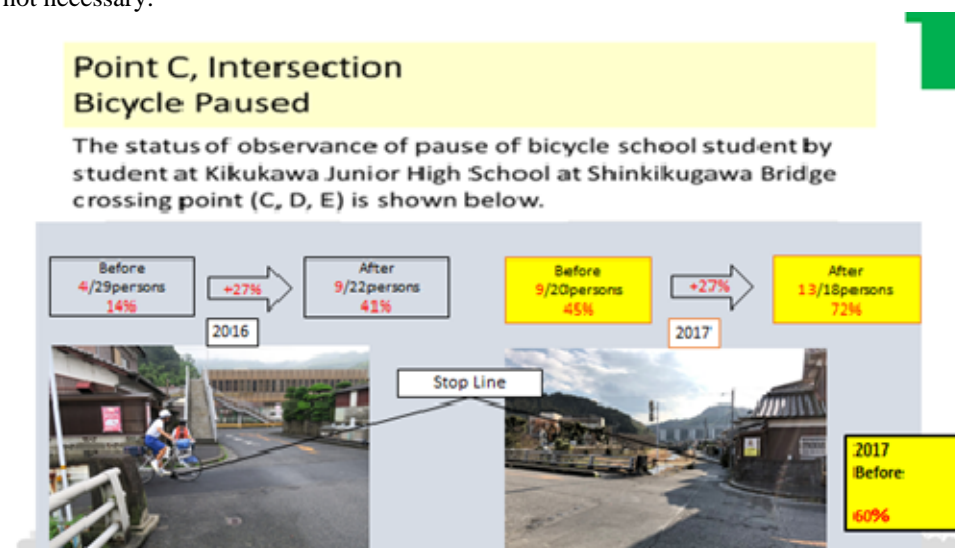


Fig.8 Point C, Intersection Bicycle Paused

### 5.4 Problems on the Sidewalk Traffic of Bicycles from the Observation Survey

#### 5.4.1 Sidewalk Traffic Rules for Bicycles Originally found in the district A

In district A, Route No. 2 (2 lanes, some dorms have sidewalks) is used as a school route. In the section where sidewalks are installed on both sides, primary school children and junior high school students on foot walk on the sidewalk on the north side and junior high school students on bicycles walk on the sidewalk on the south side. The passage space was properly separated.



A contact accident between a junior high school student riding a bicycle and a walking primary school child occurred in a section where a sidewalk was installed on only one side.

#### 5.4.2 Maintenance of Bicycle Traffic Spaces in the district A and Changes in Manners Thereafter

In the district A, there are traffic safety issues during two school hours.

The first is to prevent the crossing of bicycles and pedestrians on the sidewalk in advance.

As the width of 1.5m was expanded to 3.5m by the sidewalk maintenance of 80m, the passage position in this walking space came to be protected. In the future, it is an issue to maintain the situation here.

The second is the reliable implementation of a temporary stop at the intersection. This means that there is a lot of car traffic during commuting hours, and the time when elementary school students go to school and the time when many school bicycles go to school overlaps, and it is easy to get crowded around the crowded area of the intersection. It can make things difficult. .

#### 5.4.3 Progress of Maintenance of Bicycle Lanes in the district B and Change of Manners Thereafter

In the district B, the maintenance of bicycle lanes on major roads is in progress, and the traffic environment of the whole area is about to change greatly.

Therefore, after maintenance of the bicycle passage, separation of bicycle and pedestrian's passage space is expected by adherence to the passage position.

In the district B, at point E, 100% of pedestrians and bicycles changed to follow the passing position after attending classes, but at point B, 79% of pedestrians and 75% of bicycles followed the correct passing position. At point C, 80% of pedestrians and 86% of bicycles came to follow the correct traffic position, but did not reach 100%.

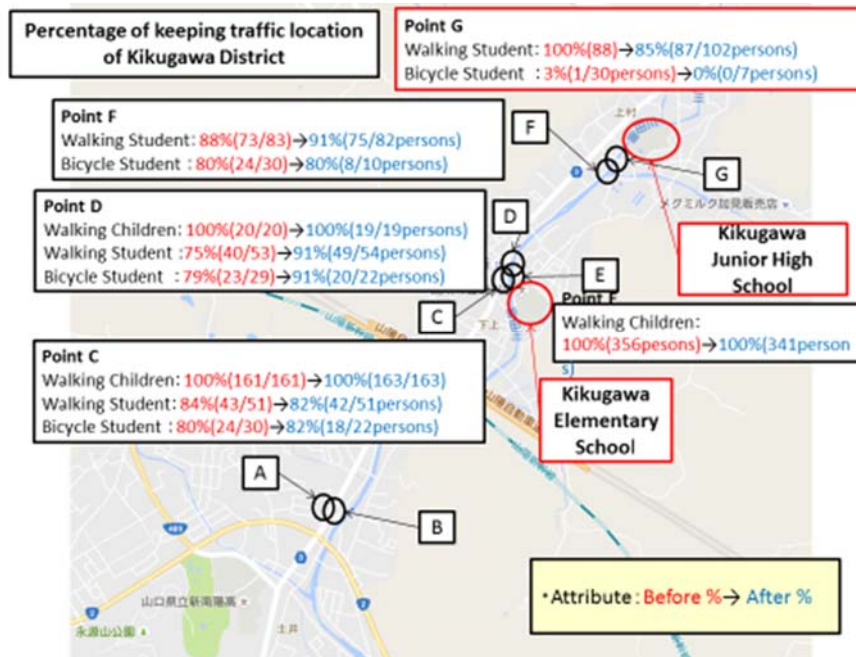


Fig.9 Pre- and Post-Survey: Allowance of Traffic Rules

#### 5.4.4 Studying Direction of Future Bicycle Route Change in the district B

By expanding the network of bicycle lanes in the future, we believe it will be possible to reorganize school routes, including a review of bicycle routes. It is expected that the risk will be greatly reduced if bicycles and pedestrians are separated from situation where cars, bicycles and pedestrians coexist in a narrow road space of about 6m at present.

## 6. CONCLUSION

### 6.1 Changes in the Status of Compliance with Suspension Regulations by Traffic Safety Education

Through the cases in two districts, it was found that traffic safety education has definitely improved the compliance with the suspension rules.

However, only half of them have been completely shut down and their safety has been confirmed. This number should be close to 100% to eliminate the risk of traffic accidents at intersections.

### 6.2 Consideration of the Relationship between Behavior Intention and Actual Behavior Change

Although the recognition of the correct bicycle passing position and the intention to comply with the traffic rules have been improved to 80% from the pre- and post-surveys, in reality, it can-not be said that the traffic rules are sufficiently adhered to.

On the other hand, as in the case of the intersection in district B, 95% of the actual behavior maintained the suspension while the intention to comply with the traffic rules was only about 80%. By raising awareness of compliance with rules, I would like to promote change to correct behavior.

### 6.3 Consideration of Relationship between Road Infrastructure Maintenance and Compliance with Regulations

In district B, according to the sidewalk maintenance (maintenance of the bicycle passage with section extension 0.68km) of the main road, the compliance situation of the passage position of the bicycle was observed.

In the section where the bicycle lane was maintained, the compliance with the rules was surely improved, and the compliance rate exceeded 80%. On the other hand, in the section where the traffic zone was not developed, the compliance rate was only 40%. What does it mean that there is a big difference in bicycle passing manners in adjacent sections depending on the presence or absence of colored pavement in the passing zone? It means that the rule is not observed where there is enough road infrastructure, and where it is not.

### 6.4 Road Maintenance First, or Improvement of Manners First

If possible, I would like to improve manners together with road maintenance. As a practical matter, since infrastructure development takes time and money, it will be to measure manner improvement while sharing wisdom in the area as a software measure.

### 6.5 For the Continuation of Future Activities

We would like to continue our efforts to provide traffic safety education for both primary and junior high school students.

I would like to continue study and coordination at the school management council as a means to share issues and solve problems in schools and local communities.

Depending on future social changes such as the market opening of Japan and the acceptance of foreign workers, as with other countries, the form of attending school by school bus may become more common. However, for the time being, there is no alternative but to solve the problem of commuting to school with community involvement. As part of these activities, I would like to continue to be involved for further improvement.

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