Inception Report

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ATRANS

ASIAN TRANSPORTATION RESEARCH SOCIETY

Integration of Road Safety Education with Engineering Design for Safer Routes to School

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CHAPTER 1 Introduction

1.1 Introduction

During the last few years, ATRANS Common Research Projects have been attempting to understand traffic safety culture of Thai youngsters. The studies related to youngsters' driving behaviour (2017-2018), road safety education for youngsters (2018-2020), and safe routes to school program (2021-2022).

It was found that students (mainly motorcyclists) are less likely to perceive road accident as "my serious problem". So, they value the cost of accident less than convenience of unsafe driving behaviours, e.g. not wearing helmet, speeding, and drunk driving. Road safety education could change road user and driver behaviour, but it must be a structured process. Road safety education should not only provide knowledge of traffic rules and driving skills, but also influence attitudes and perceptions toward risk awareness. Safety education by instructional and supportive interventions can encourage knowingly risky behaviour and knowingly safe behaviour, while motivational interventions can influence fluently safe behaviour. However, in the previous ATRANS project, the designed motivational intervention to encourage habitual behaviour seems not to be successful, because the designed activity is not attractive. Thus, new design of motivational interventions is needed.

Developing a safe routes to school (SRTS) program involves looking at the journeys that students make to and from school and how the safety on these routes can be improved. The ATRANS SRTS project found that the majority uses motorcycles to school (even living very near school), but some of students are interested to walking, cycling, or using public transport to schools. However, there are some required needs that should be take care to improve routes to schools, particularly physical infrastructure should be safe, comfort and attractive. It also found that youngsters are less likely to evaluate where and how the current infrastructure is unsafe. They have been using their routes to school every day, and have been very familiar with the traffic situation and infrastructure. They are not rather clear what are safe and unsafe infrastructure and speed. This may be one of reasons that they perform risk driving behaviours. Moreover, those who have basic knowledge on highway engineering have more awareness of safe system and speed than those who do not have (some students cannot identify safe and unsafe road infrastructure and speed).

These findings lead to an assumption that:

- students will behave safely on provided road infrastructure if they have knowledge on road safety assessment and basic engineering design, and
- involving road users in auditing road safety and redesigning road infrastructure may be an effective motivational intervention for road safety education.

In short term, this integration of road safety education with engineering design, may motivate students to comply with traffic rules, avoid risks, act safely, and then survive on the unsafe infrastructure. In long term, it may influence students' attitudes towards risk awareness and habitual safe behaviour.

1.2 Objectives

The objectives of this research are:

- to educate students on road safety assessment and basic engineering design
- to allow students having experiences in auditing road safety and redesigning safer routes to school

1.3 Outputs of the projects

A key outcome of the project is whether the integration of road safety education with engineering design could motivate changes of unsafe driving attitudes and behaviours towards risk awareness.

CHAPTER 2 Review of Designing Safe Routes to School

Safe routes to school (SRTS) program has been interested and implemented in many developed countries. Successes of the previous programs have been reported, for example:

- Alexander LM, Inchley J, Todd J, Currie D, Cooper AR, Currie C. The broader impact of walking to school among adolescents. BMJonline 2005;331(7524):1061-2.
- Chillón P, Evenson KR, Vaughn A, Ward DS. A systematic review of interventions for promoting active transportation to school. International Journal of Behavioral Nutrition and Physical Activity 2011;8:10.
- Davison KK, Werder JL, Lawson CT. Children's active commuting to school: Current knowledge and future directions. Preventing Chronic Disease 2008;5(3).
- DiMaggio C, Li G. Effectiveness of a Safe Routes to School Program in Preventing School-Aged Pedestrian Injury. Pediatrics 2013;131(2):290-296.
- Hume C, Timperio A, Salmon J, Carver A, Giles-Corti B, Crawford D. Walking and cycling to school: predictors of increases among children and adolescents. American Journal of Preventative Medicine 2009;36:195–200.
- Johnston C, Moreno J. Active commuting to school. American Journal of Lifestyle Medicine 2012;6(4):303-305.
- Kerr J, Rosenberg D, Sallis JF, Saelens BE, Frank LD, Conway TL. Active commuting to school: associations with environment and parental concerns. Medicine and Science in Sports and Exercise 2006;38:787-794.
- Larsen K, Gilliland J, Hess P, Tucker P, Irwin J, He M. The influence of the physical environment and sociodemographic characteristics on children's mode of travel to and from school. American Journal of Public Health 2009;99:520–526.
- Lubans DR, Boreham CA, Kelly P, Foster CE. The relationship between active travel to school and health-related fitness in children and adolescents: A systematic review. International Journal of Behavioral Nutrition and Physical Activity 2011;8:5.
- Mendoza JA, Watson K, Baranowski T, Nicklas TA, Uscanga DK, Hanfling MJ. The walking school bus and children's physical activity: A pilot cluster randomized controlled trial. Pediatrics 2011;128(3):e537–e544.
- Muennig PA, Epstein M, Li G, DiMaggio C. The Cost-Effectiveness of New York City's Safe Routes to School Program. American Journal of Public Health 2014;104(7):1294-9.
- National Center for Safe Routes to School (NCSRTS). How Children Get to School: School Travel Patterns from 1969 to 2009. Chapel Hill, NC: NCSRTS; 2011.

- National Center for Safe Routes to School (NCSRTS). Shifting modes: A comparative analysis of Safe Routes to School Program elements and travel mode outcomes. Chapel Hill, NC: NCSRTS; 2012.
- Orenstein MR, Gutierrez N, Rice TM, Cooper JF, Ragland DR. Safe routes to school safety and mobility analysis. Berkeley: UC Berkeley, Traffic Safety Center, California Department of Transportation (Caltrans); 2007.
- Ragland DR, Pande S, Bigham J, Cooper J. Ten years later - examining the long-term impact of the California Safe Routes to School Program. Berkley, CA: UC Berkley, Safe Transportation Research & Education Center; 2013.

One of the best guidelines for designing safe routes to school is a report titled “Designing Street for Kids” by National Association of City Transportation Officials, NACTO (2020) [14]. This focuses on the specific needs of children as pedestrians, cyclists, and transit users in urban streets. It provides clear guidelines and examples for cities to implement streets that are safe and healthy, comfortable and convenient, inspirational and educational streets that not only for kids but for everyone.

Some important issues that learn from this report and can be taken to design safe routes to school are:

- Knowing children’s needs from streets,
- Identifying challenges, and
- Setting street design strategies.

Along to routes to school, children not only need safety and security, but also many other aspects, for example [1]:

- Reliable mobility choices
- Space
- Places to pause and stay
- Social interaction
- Visibility
- Play and learning
- Security
- A safe environment

There are many challenges should be identified in order to design safe routes to school, for example [1]:

- Fast-moving traffic

- Lack of infrastructure
- Noise pollution
- Lack of exposure to nature
- Poor visibility
- Vehicle design
- Poor water management
- Lack of maintenance
- Personal safety issues
- Urban heat island
- Lack of mobility options

Designing routes to school that meet all the children's needs and be able to tackle the challenges is a difficult task. Street redesign fitting with local contexts should at least consider improving infrastructure quality, slowing vehicles, and protecting pedestrians and cyclists. Multiple design strategies are suggested [1], for example:

- Upgrading streets to meet basic standards of safety and accessibility at a minimum of adequate facilities for walking, cycling, and taking transit
- Designing for appropriate speeds
- Reallocating space for people, sustainable and efficient mobility: walking, cycling and public transport

These design strategies are very useful for designing safe routes to school. They are considered for developing the study methods in Chapter 3.

CHAPTER 3 Methodology and Case Study

The project is divided three tasks, including

1. Organising training courses on road safety assessment and basic engineering design
2. Assessing road safety and redesigning safer routes to school
3. Monitoring change of attitudes and intentions

3.1 Organising training courses on road safety assessment and basic engineering design

Training courses will be divided into two parts, including:

- Training courses on road safety assessment, and
- Training courses on basic highway engineering design

Training courses on road safety assessment will be provided for students. The road safety assessment will be based on Road Safety Audits (RSA) and Safe System Assessments (SSA) [2-4]. RSA is to ensure that no hazards are built into the road environment, usually focusing on the likelihood of a crash, regardless of severity, while SSA evaluates a project's alignment with Safe System principles and identifies ways to improve the alignment with a focus on minimising fatal and serious injuries [5]. RSA and SSA should complement each other to maximise the road safety outcomes, as presented in Table 3.1. Moreover, activities of road safety assessment will be based on Hiyari Hatto method using Atrans Safety Map Web-based Application.

Training courses on basic highway engineering design will also be provided for students. This is to allow students to understand basic concepts of highway engineering, e.g. road hierarchy, hierarchy of road users, allocation of road space, highway characteristics, vehicle characteristics, road user characteristics (perception and reaction time, vision), etc.

Table 3.1 Scope of Road Safety Audit and Safe System Assessment [5]

Scope	Road Safety Audit	Safe System Assessment
Identifies issues that impact the likelihood of crashes	✓	✓
Identifies issues that impact the severity of crashes	sometimes	✓
Identifies issues that impact the exposure to crashes	×	✓
Provides recommendations for improved road safety outcomes	✓	✓
Considers all road users	✓	✓
Focuses on fatal and serious injuries only	×	✓
Focuses on all crashes (fatal, serious injury and other injury)	✓	×
Investigates safer vehicles	×	✓
Investigates safer people	sometimes	✓
Investigates the impact on maintenance	sometimes	✓
Investigates the impact on post-crash care	×	✓
Makes recommendations to redesign the project if required	×	✓
Encourages innovative design to improve harm minimisation	×	✓

3.2 Assessing road safety and redesigning safer routes to school

This part will participate students to assess the current routes to school, and redesign safer routes to school. This would be based on the knowledge provided in the training courses. It is expected that students will be able to evaluate where and how the current infrastructure is unsafe, and propose measures to create safer routes to school. Meanwhile the infrastructure has not been upgraded, students should be more capable to adapt their behaviours to avoid risks, act safely, and survive on the unsafe infrastructure.

3.3 Monitoring change of attitudes and intentions

Monitoring process will be based on self-questionnaire surveys (before and after). This will cover various perspectives of the program, for example: road safety assessment methods, basic highway engineering design, redesigning safer routes to school, changes of attitudes and intentions of students to the current and redesigned routes to school, and particularly, changes of attitudes towards risk awareness.

3.4 Case studies

There are two case studies (Figure 3.1), including:

- Thaluang Cementhaianusorn Technical College in Saraburi province, and
- Suphanburi Technical College in Suphanburi province.

Figure 3.1 Locations of the two case studies

CHAPTER 4 Works Planned

The activities are planned and presented in Table 4.1.

Table 4.1 Timeframe of the project

Task	2022						2023					
	Apr	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**	**Jan**	**Feb**	**Mar**
1. Project preparation												
2. Organising training courses												
3. Assessing road safety and redesigning safer routes												
4. Collecting data												
5. Data analysis												
6. Presentation												
Interim						✓						
Final									✓			
7. Report												
Inception	✓											
Interim						✓						
Final												✓

References

1. National Association of City Transportation Officials – NACTO (2020) Designing Street for Kids, Global Designing Cities Initiative (GDCI) program, Island Press.
2. Austroads. 1994, Road safety audit. Sydney: Austroads National Office.
3. Austroads, 2009, Guide to Road Safety Part 6: Road Safety Audit, Austroads, <https://www.onlinepublications.austroads.com.au/downloads/AGRS06-09>.
4. Austroads, 2016, Research Report AP-R509-16 – Safe System Assessment Framework, Austroads, <https://www.onlinepublications.austroads.com.au/items/AP-R509-16>.
5. VicRoads, 2018, Safe System Assessment Guidelines, Transport For Victoria.
6. Austroads, 2015, Research Report AP-R498-15 – Improving the Performance of Safe System Infrastructure, Austroads, <https://www.onlinepublications.austroads.com.au/items/AP-R498-15>.
7. Austroads, 2017, Technical Report AP-T330-17 – Safe System Infrastructure on Mixed Use Arterial Roads, Austroads, <https://www.onlinepublications.austroads.com.au/items/AP-T330-17>.

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