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Development of a Solution for Mortality and Injury Problems among Juvenile Using Motorcycles in Muang District, Nakhon Nayok

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Abstract

This study aimed to develop a curriculum for road safety education for juveniles using motorcycles, to implement the road safety education curriculum using a website for a learning center on solutions for mortality and injury, and to evaluate the effectiveness of implementing the road safety education curriculum for juveniles who use motorcycles in educational institutions in Nakhon Nayok province. The study found that assessing the effectiveness of implementing the road safety education curriculum for youngsters who use motorcycles at academic institutions in Nakhon Nayok province led to the development of the potential of leading teachers in the province. The effectiveness of the curriculum was evaluated regarding knowledge development and attitude towards safety among school teacher groups. A comparison was made on road safety knowledge based on the developed curriculum among 31 teachers (21 males and ten females) who underwent training before and after the implementation. The statistical method used was the dependent t-test. Most (74.2%) had a driver's license, and most (90%) had experience teaching students about safety. The results of the evaluation of the effectiveness of the test on knowledge about road safety according to the developed training course for teachers, using a dependent t-test to test the research hypothesis, showed a statistically significant difference at the .05 level (p=.00, t=11.32). The average knowledge score after training was higher than before training. Before the training, the average score was 13.4, and after the training, the average score was 24.0. The evaluation result of the website for a learning center on solutions for mortality and injury among juveniles who use motorcycles was overall at the highest level ($\bar{x}$=4.43, S.D. = 0.45).

Keywords: Mortality and Injury Problems; Among Juvenile; Using Motorcycles, Web Application.

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Introduction

The problem of fatalities from road accidents is a significant issue in Thailand. Based on the analysis of data on fatalities from 3 sources, it was found that the age group with the highest number of fatalities was juveniles aged 10-19 years old, with a very high death toll of 26,126 people over the past nine years, or an average of 2,902 people per year. Based on the time series analysis of road traffic accident fatalities in the age group of 10-19 years old, it was estimated that over the next ten years (2021-2030), without serious interventions and target-setting, there will be 37,321 fatalities among Thai juvenile, averaging 3,732 deaths per year. If interventions and targets were set, it would be possible to reduce deaths of children and youth from road accidents by 5% per year, according to the Roadmap for road safety article. In addition, it is possible to reduce the loss of children and adolescents by up to 14,752 individuals over ten years, or an average reduction of 2.7-4.5 per 100,000 population per year, to achieve the target of reducing overall fatalities caused by motorcycle accidents in the age group with the highest occurrence. The survey found that motorcycle accidents mainly occur in the age group of 15-19 years, accounting for 68%. The second highest age group was 10-14 years, accounting for 28%. Most juveniles started practicing driving motorcycles at the age of 13-15, accounting for 49%, followed by the age group of 10-12 years old, accounting for 48%. From learning about motorcycle driving, it was found that most juveniles learn to drive from their parents, relatives, siblings, and friends, accounting for 72% while practicing driving themselves accounted for 28%. Regarding safe driving training, 87% and 86% of the respondents did not receive formal training and did not have a driver's license, respectively.

From the deep analysis of data to identify the causes of juvenile mortalities, it was found that there were still gaps in injury prevention measures that specifically target this age group. Thailand implements various measures to prevent injuries and fatalities from road accidents. However, most measures often aim to deal with the problem in general and regarding risky behavior issues. For the high-risk group, there are currently no specific measures in place due to the multiple factors involved, such as being novice drivers without a license, engaging in unsafe driving behaviors, limited enforcement of laws with restrictions (Gqdek-Hawlena, T, 2019), or even parents needing to purchase motorcycles for their children or grandchildren to ride to school. Therefore, the safety of children and youth is a target group that should be studied and developed with effective problem management models (Chantith, C, and Author, 2021) to reduce the mortality of juveniles and establish a culture of safety starting from childhood to become a sustainable future adult (World Health Organization, 2017).

The researchers thus recognize the importance of the problem of road traffic accident deaths among Thai juveniles. Therefore, a research project was conducted to develop a model for addressing the issues of mortality and injury among juveniles who use motorcycles in Mueang district, Nakhon Nayok province, which consists of three parts: 1) developing a curriculum for learning management and developing solutions for mortality and injury among juvenile who use motorcycles in Mueang District, Nakhon Nayok Province, 2) developing the capacity of teachers and trainers in Mueang district, Nakhon Nayok province, to effectively teach "Life-saving Road Safety Skills" to the juvenile who use motorcycles, and 3) developing a website for the learning center on the solution to mortality and injuries in juveniles who use motorcycles to develop effective problem-solving methods for training and promoting attitudes and appropriate tools for problem-solving. Therefore, research was conducted with the participation of people in the community of Nakhon Nayok province by developing a problem-solving approach to reduce the number of mortality and injuries among juveniles who use motorcycles, along with the use of a learning center website for addressing the issue of motorcycle-related mortality and injuries among juvenile in Mueang District, Nakhon Nayok province.

Research Methodology

Population and samples

The research utilized the Participatory Action Research (PAR) process involving individuals with a stake in the Mueang district, Nakhon Nayok province community. The sample group consisted of 12 people, including one police officer, five health officials, five teachers, and one injury prevention specialist from the Department of Disease Control. The researchers designed a curriculum corresponding to the context of using roads for children and youth. The draft curriculum was jointly reviewed and evaluated by the community members using the participatory action research (PAR) process, and the researchers used the feedback to improve the curriculum. In addition, they collaborated to review the content and instructional methods for the learning program, and the researchers used their feedback to improve and adjust the program for use in the following testing stage.

Purposive sampling

The experimental group consisted of 2 groups of students and scholars from 2 leading educational institutions – Nakhon Nayok Technical College, with 86 participants, and Ban Nanayok Pittayakorn School, with 67 participants. The comparative group was 91 participants from Nakhon Nayok Witthayakom School. A mixed-methods approach was

employed in this research project, incorporating both quantitative and qualitative methods.

Development of a road safety management curriculum

The research data from the study conducted by the research team on "Investigating fatalities and injuries from motorcycle accidents in children and adolescents" of the Department of Disease Control was used to develop a road safety management curriculum for children and adolescents, as well as a skills book to combat the crisis of accidents. First, the road safety curriculum was adapted from the aviation sector, and a draft of the road safety learning curriculum for juveniles was prepared. The researcher used a Participatory Action Research (PAR) approach that involved stakeholders who had both positive and negative impacts, including teachers, police officers, nurses, and road safety experts. The researcher designed a curriculum contextualized to the road use of juveniles to jointly review the draft curriculum and improve it based on stakeholders' feedback. Next, the researchers developed the potential of the school's leading teachers by using the curriculum to manage road safety learning for juveniles. We evaluated the effectiveness of the development in terms of knowledge and attitudes toward road safety content. Then, pilot testing of the road safety curriculum was conducted in selected areas, and assessed the effectiveness of the curriculum in teaching road safety to juveniles who use motorcycles in collaboration with trained teachers. Next, a website for a learning center was analyzed, designed, and developed to address the issue of motorcycle-related fatalities and injuries among juveniles. Finally, the effectiveness of the experimental implementation of the road safety curriculum for youngsters who use motorcycles was evaluated.

Research instrument and qualification

The research instrument was the "Survival Skills in Road Hazards" test. It consisted of 30 questions that covered a basic understanding of danger perception, risk assessment, and risk management when using roads and vehicles. It also assessed human limitations and the use of vision while driving, situational awareness, risk evaluation and prediction, decision-making, blind spots, and dangerous attitudes. Data on the effectiveness of the curriculum was collected through quantitative research using a test based on the course curriculum and training principles (Labib, S.M., 2017), with data collected before and after the training (pre-test and post-test) in both experimental and control groups.

Data analysis

General data analysis included age, gender, education level, mode of transportation to school, possession of a driver's license, incidents of

arriving late to school, and experience with accidents. In addition, scores of road safety knowledge were analyzed according to the curriculum for students who had received training (experimental group) and those who had not (control group). Finally, knowledge of road safety according to the training course curriculum between students who passed the training (experimental group) and those who did not pass the training (control group) were compared using independent t-test statistical analysis. In contrast, the training scores were analyzed with dependent t-test statistics before and after.

Results

From Table 1, general information on the leading school teachers in Nakhon Nayok province who had developed the capacity to manage road safety learning for juveniles according to the curriculum, a total of 31 teachers were included in the study, consisting of 21 males and ten females. The majority (74.2%) held a motorcycle driver's license, and 87% had no experience with road accidents. In addition, most (90%) had experience teaching students about road safety.

Table 1 General data

Variables	Frequency	Percent
1. Gender		
Male	21	67.7
Female	10	32.3
Total	31	100.0
2. Driver's License		
Have	23	74.2
Not Have	8	25.8
Total	31	100.0
3. The Experience of Having an Accident		
Used 1 Time	2	6.5
Used 2 Time	2	6.5
Never	27	87.1
Total	31	100.0
4. Teaching Experience in Road Safety for Students		
Used to	28	90.3
Never	3	9.7
Total	31	100.0

From Table 2, the average scores of the road safety knowledge test according to the curriculum before and after training among the teacher group who underwent capacity development training were found to be 13.4 and 24.0, respectively.

Table 2 Average score of the test results on road safety knowledge according to the curriculum

Variables	Pre-test / Post-test	Mean	N	Std. Deviation
Safety Road Curriculum	Pre-test	13.4	31	2.94
	Post-test	24.0	31	4.85

Table 3 The comparison of results of the road safety knowledge test according to the curriculum

Paired Samples Test								
	Paired Differences							
				95% Confidence Interval of the Difference				
	Mean	Std. Deviation	Std. Error Mean	Lower	Upper	t	df	Sig. (2-tailed)
Pair 1 Pretest-Posttest	10.58	5.20	.93	8.67	12.48	11.32	30	.000

*** Significant level at .05 level.

Table 3 compares the road safety knowledge test results according to the curriculum among teachers who had undergone capacity development through training before and after the training. Again, the dependent t-test was used to test the research hypothesis. The statistical significance level was found to be .05 ($p = .00$, $t = 11.32$), indicating a significant improvement in knowledge scores after the training compared to before the activity.

Evaluation of the effectiveness of the road safety curriculum for juveniles, with the following details:

General information included age, gender, education level, mode of transportation to school, possession of driver's license, incidents of arriving late to school, and history of road accidents. General information, the entire sample group was 153 people consisting of students from Baan Na "Nayokpithayakorn" School (86 people) and Nakhon Nayok Technical College (67 people). Males accounted for 68.0%, and females accounted for 32.0% of the total sample size of 153 students, aged between 14-19 years old and enrolled in secondary levels ranging from grade 9-12 (or vocational certificate-diploma

levels). It was found that the vast majority (90.8%) had a driver's license, and 56.9% traveled to school by other means of transportation. Only a small percentage (15.0%) traveled to school by motorcycle. The majority (64.1%) had never been in a road accident, followed by those who had experienced 1-2 accidents (27.5%).

Table 4 Number of students receiving training about road safety learning management, separated by educational institutions

School		Frequency	Percent
1	Baan Na "Nayokpithayakorn" School	86	56.2
2	Nakhon Nayok Technical College	67	43.8
	Total	**153**	**100.0**

Table 5 Number of students receiving learning management separated by gender

Gender		Frequency	Percent
1	Male	104	68.0
2	Female	49	32.0
	Total	**153**	**100.0**

Table 6 Number of students receiving learning management by age

Age		Frequency	Percent
1	14	47	30.7
2	15	22	14.4
3	16	30	19.6
4	17	28	18.3
5	18	18	11.8
6	19	8	5.2
7	**Total**	**153**	**100.0**

Table 7 Number of students receiving learning management, categorized by grade level.

Educational Level		Frequency	Percent
1	Vocational Certificate, Year 1	11	7.2
2	Vocational Certificate, Year 2	24	15.7
3	Vocational Certificate, Year 3	19	12.4
4	High Vocational Certificate, Year 1	13	8.5
5	Secondary Education, Year 3	66	43.1
6	Secondary Education, Year 4	6	3.9

7	Secondary Education, Year 5	5	3.3
8	Secondary Education, Year 6	9	5.9
	Total	**153**	**100.0**

Table 8 The rate of road accidents that occurred in the past two years

The Experience of Having an Accident		**Frequency**	**Percent**
1	1 - 2 Times	42	27.5
2	More Than 2 Times	13	8.5
3	Never	98	64.1
	Total	**153**	**100.0**

Table 9 Patterns of motorcycle use among students

Patterns of Motorcycle Use Among Students		**Frequency**	**Percent**
1	Used together with family members.	88	57.5
2	Personal use by a single person.	49	32.0
3	None/borrow from friends or relatives.	2	1.3
4	Not have a motorcycle	14	9.2
	Total	**153**	**100.0**

Table 10 Driver's license

Driver's Licence		**Frequency**	**Percent**
1	Have	14	9.2
2	Not Have	139	90.8
	Total	**153**	**100.0**

Table 11 School Traveling

School Traveling		**Frequency**	**Percent**
1	By Walking	1	.7
2	By Parent	14	9.2
3	By Friend	2	1.3
4	By Bicycle	2	1.3
5	By Bus	23	15.0
6	By Motorcycle	87	56.9
7	By Car	2	1.3
8	By Shuttle Bus	7	4.6
9	Don't Know	5	3.3
	Total	**153**	**100.0**

2. Analyzed the average scores of road safety knowledge according to the curriculum of students who had undergone training (experimental

group) and those who had not undergone training (comparison group), with 30 questions.

Table 12 The average score of road safety knowledge according to the curriculum of students who had undergone training (experimental group) and those who had not undergone training (comparison group).

School	Pre-test / Post-test	Mean	N	Std. Deviation
Baan Na "Nayokpithayakorn" School (Experimental Group 1)	Pre-test	8.75	86	5.62
	Post-test	19.93	60	4.71
Nakhon Nayok Technical College (Experimental Group 2)	Pre-test	13.41	67	6.25
	Post-test	20.35	56	4.42
Nakhon Nayok Witthayakhom School (Comparison Group)	Pre-test	13.28	91	7.07

From Table 12, the average scores of the road safety knowledge test based on the curriculum of students who received training (experimental group) and those who did not receive training (comparison group) before and after the training were analyzed. The results showed that before the training, the average score of the students from Baan Na "Nayokpithayakorn" School in the experimental group was 8.75, and after the training, it increased to 19.93. On the other hand, Nakhon Nayok Technical College students' average score before the training was 13.41. After the training, it rose to 20.35, higher than the comparison group from Nakhon Nayok Wittayakom School, with an average score of 13.28.

Table 13 Independent t-test was a statistical analysis used to compare the means of two independent groups. In this case, the study compared road safety knowledge to the curriculum of students who had undergone training (experimental group) and those who had not (comparison group).

Independent Samples Test Baan Na "Nayokpithayakorn" School (Experimental Group 1) and Nakhon Nayok Witthayakhom School (Comparison Group)									
								95% Confidence Interval of the Difference	
	F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Equal variances assumed	11.309	.001	6.398	149	.000	6.64762	1.03902	4.59451	8.70073
Equal variances are not assumed.			6.929	148.973	.000	6.64762	.95946	4.75172	8.54352

*** Significant level at .05 level.

Table 13 shows the results of comparing the knowledge of road safety according to the curriculum between students who received training (experimental group) and those who did not (comparison group) at Baan Na "Nayokpithayakorn" School (experimental group) and Nakhon Nayok Witthayakhom School (comparison group) using Independent t-test statistics. It was found to be statistically significant at the .05 level (F = 11.309, t = 6.398), with the mean knowledge score of the experimental group (19.93 points) being higher than the comparison group (13.28 points).

Table 14 Independent t-test was a statistical analysis used to compare the means of two independent groups. In this case, the study compared road safety knowledge to the curriculum of students who had undergone training (experimental group) and those who had not (comparison group).

Independent Samples Test Nakhon Nayok Technical College (Experimental Group 2) and Nakhon Nayok Witthyakhom School									
								95% Confidence Interval of the Difference	
	F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Equal variances assumed	16.177	.000	6.712	145	.000	7.07143	1.05355	4.98913	9.15373
Equal variances are not assumed.			7.458	144.951	.000	7.07143	.94815	5.19744	8.94541

*** Significant level at .05 level.

Table 14 shows the results of comparing the knowledge about road safety based on the course curriculum of students who had received training (experimental group) and those who had not received training (comparison group) at Nakhon Nayok Technical College (experimental group) and Nakhon Nayok Witthayakhom School (comparison group) using Independent t-test. The statistical significance level was .05 (F = 16.177, t = 6.712). The average knowledge score of the experimental group (20.35) was higher than the comparison group (13.28).

Table 15 Comparing the results of a test on road safety knowledge based on a curriculum for students who underwent training (experimental group) before and after the training.

Paired Samples Statistics					
Experimental Group		**Mean**	**N**	**Std. Deviation**	**Std. Error Mean**
Baan Na "Nayokpithayakorn" School (Experimental Group 1)	Pre-test	12.77	57	5.532	.733
	Post-test	20.26	57	4.506	.597
Nakhon Nayok Technical College (Experimental Group 2)	Pre-test	12.75	44	5.562	.839
	Post-test	20.57	44	4.305	.649

Table 15 shows the average road safety knowledge test scores based on the training program for the students who had undergone training (experimental group) before and after the training. It was found that students of the Baan Na "Nayokpithayakorn" School sample group had an average score of 12.77 before training and an average score of 20.26 after training. Meanwhile, the students from Nakhon Nayok Technical College had an average score of 12.75 before training and an average score of 20.57 after training.

Table 16 Comparing the results of the road safety knowledge test based on the curriculum among students who have undergone training (experimental group) before and after the training, using dependent t-test statistical analysis.

Paired Samples Test								
	Paired Differences					t	df	Sig. (2-tailed)
	Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
				Lower	Upper			
Baan Na "Nayokpithayakorn" School (Experimental Group 1)	7.491	5.513	.730	6.028	8.954	10.258	56	.000
Nakhon Nayok Technical College (Experimental Group 2)	7.818	6.199	.935	5.933	9.703	8.365	43	.000

From Table 16, the results of the comparison of road safety knowledge test scores before and after training using a dependent t-test indicated that experimental group 1, Baan Na "Nayokpithayakorn" School, had significantly higher after training mean scores than before training mean scores at a statistically significant level of .05 ($p = .00$, $t = 10.258$). Similarly, experimental group 2, Nakhon Nayok Technical College, had significantly higher mean scores after training mean scores at a statistically significant level of .05 ($p = .00$, $t = 8.365$).

Website design and development results

In this research, a website for a learning center to address the issues of traffic accidents and injuries for juveniles who use motorcycles in Mueang District, Nakhon Nayok Province, has been designed and developed. The development of this system followed the Object-Oriented Analysis and Design Software Engineering principles using

the Unified Process methodology. Unified Process (UP) is an iterative and incremental development process that involves detailed analysis, construction, and transition phases. The building, refining, and changing processes are divided into time-boxed iterations (the Inception phase may be divided into iterations for larger projects). The iteration process results in incremental development, which introduces a system with increased functionality or improvement compared to the previous version.

Table 17 Unified process

Phase	**Phase I : Inception**	**Phase II: Collaboration**	**Phase III: Construction**	**Phase IV: Transition**
Work Flow	Steps of system analysis, planning and proposal writing, preparation, responsibility assignment, and data collection.	Analyze system requirements, design system interface, design database, design algorithms, and create requirement specifications.	Develop the system, select the language and tools used in web programming, and test the system according to the requirement specifications.	Data transfer, installation, system configuration, and user training.
Time Line	(January - February)	(March-May)	(June - October)	(November - December)

The website development involved creating a web application using a responsive design that could accommodate various devices. The system was developed using PHP programming language and MySQL database. The web application development included the development of a responsive web application system that could support the usage of three user groups, which were: 1) General users, including students and teachers, could visit the website, register as members, view various activities and videos, learn about the website's content, and take before and after tests, including hazard perception tests. 2) System administrators would manage member registration, various testing, and manage event calendars, pictures, and videos. 3) The system administrator was responsible for assigning usage rights to administrators and managing general system data, updating news and information, and adding, deleting, or modifying system data to keep the system up-to-date. The details of the website are as follows. The website URL is http://www.thaisafeyouths.com/.

Fig.1 Main Screen

Fig.2 Before and After Learning Test Screen

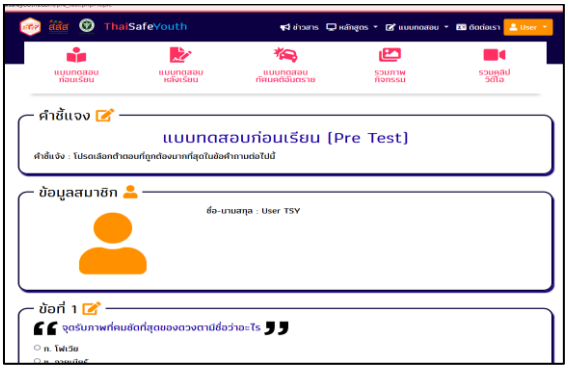

Fig. 3 Test-Taking Screen

Table 18 User satisfaction evaluation of website usage

Assessment Issues	Satisfaction Evaluation Result		
	$\bar{x}$	*S.D.*	Satisfaction Level
Content Aspect			
1. Complete and Comprehensive Content	4,56	0.34	Very Satisfied
2. Compatibility with All Devices for Display	4.32	0.32	Very Satisfied
3. Consistency of Content Throughout the Website	4,54	0.57	Very Satisfied
4. Appropriate and Clear Font Size	4,48	0.43	Very Satisfied
5. Appropriate and Clear Font and Image Colors	4.11	0.48	Very Satisfied
6. Navigation System and Internal Links Within the Website	4,27	0.35	Very Satisfied
7. Navigation System and External Links to Other Websites	4,76	0.62	Very Satisfied
Mean	4.43	0.44	

Usage Aspect			
8. Attractiveness and Modernity of the Application	4.33	0.41	Very Satisfied
9. Easy to Use, Not Complicated	4.65	0.46	Very Satisfied
10. Has a System to Maintain Security when Accessing the Website	4.17	0.47	Very Satisfied
Mean	4.38	0.44	
Efficacy Aspect			
11. Display of the Test Presentation System	4.62	0.49	Very Satisfied
12. Display of the Score Reporting System	4.22	0.56	Very Satisfied
13. Display of the Activity Image Presentation System	4.35	0.38	Very Satisfied
14. Calculation and Display of Before and After Tests	4.34	0.47	Very Satisfied
15. Calculation and Display of Attitude Test Scores	4.37	0.31	Very Satisfied
Mean	4.38	0.44	
Effectiveness Aspect			
16. The Website Displays Results Accurately and Precisely	**4.59**	0.48	Very Satisfied
17. The Website Displays Text and Images Appropriately and Suitably	**4.32**	0.53	Very Satisfied
18. The Website is Capable of Displaying Results on All Devices	4.74	0.45	Very Satisfied
Mean	4.55	0.48	
Total Mean	4.43	0.45	

Discussion

The age group that should start learning safe driving and participating in safe driving training should learn driving skills, traffic rules, and survival skills in road hazards, attitudes, and awareness. The appropriate content of learning should be considered for each level and group. Typically, juveniles learn how to drive from their parents, relatives, siblings, and friends and then practice driving themselves without proper training in safe driving. Therefore, it is necessary to consider how to organize a suitable system for training and educating safe driving in each appropriate age group. Establishment of secure driving education institutions or organizations and promote good attitudes, learning about travel hazards, driving skills, and decision-making to produce quality drivers on the roads. A deep analysis of

current safe driving training methods showed that there was still a focus on teaching motorcycle driving skills and road traffic regulations as a primary concern. However, most children and teenagers learn from individuals who may only have genuine knowledge if they learn critical thinking skills to analyze the causes of accidents, survival skills in road hazards, and develop a safety-minded attitude when using the road. Therefore, it is necessary to establish institutions or organizations that teach safe driving and instill good attitudes, promote awareness of dangers on the road, and cultivate skills in decision-making to produce quality drivers on the road.

The opinion of teachers who have undergone training and development in road safety knowledge through the relevant curriculum is that the training program should be improved by developing the driver training curriculum and its content at appropriate levels for different age groups. It is necessary to determine the age group at which learning safe driving and road safety training should begin. One should learn driving skills or traffic rules and how to survive on the road. Age groups for learning safe driving and survival skills on the road are suggested as follows: age group 13-15 years (lower secondary education) to learn driving skills and road safety survival, including analyzing the causes of accidents and assessing risks; age group 16-19 years (upper secondary education and vocational education) to learn driving skills and road safety survival including analyzing the causes of accidents and assessing risks.

The learning management format derived from the training experiment, the development of safety management formats for children and adolescents, the development of problem-solving designs at the individual level, and the development and experimentation of training curriculum using aviation safety guidelines and human factor concepts and learning the causes of road accidents, predominantly caused by drivers (Liveware) who learn to drive from parents, relatives, siblings, and friends or practice driving themselves. The curriculum is designed to develop the analytical skills of children and adolescents in identifying the causes of accidents as a means of learning safe driving practices, beginning with learning to ride motorcycles safely to develop the necessary skills and mindset in driving. Driving is inherently dangerous, requiring situational awareness skills to assess risks and avoid potential accidents. Learning to survive accidents on the road is in line with (Akuh, R. and Author, 2022).

A research study comparing road safety knowledge among students who underwent training according to the curriculum, before and after the training (experimental group), using dependent t-test statistics, found that the experimental group had a significantly higher average

score after the activity than before the training. This finding is consistent with (Sabato, E. and Author, 2023). The sample group demonstrated the ability to accurately measure road safety knowledge, leading to a safe attitude and expertise in using road vehicles for children and youth.

Developing a training program for vehicle driving practice is based on the human factor concept derived from the aviation industry. This program focuses on developing learning and experience management methods, analyzing the causes of road accidents, developing hazard perception processes for survival in dangerous situations, and enhancing skills in situation awareness/risk assessment and decision-making. In addition, the most important things are the capacity building of trainers and learning managers (Train the Trainer), implementation of road safety measures at the school level, having qualified safety teachers (Safety Teacher Team), and research and development centers at the provincial/district level (Road Safety Learning Center) that are consistent with (Morimoto, A. and Author, 2022).

Conclusion

In conclusion, the effectiveness of the training program for developing the capacity of teachers in leading schools in Nakhon Nayok province in the use of the road safety learning management curriculum for juveniles, and the evaluation of the development of knowledge and attitudes toward road safety among the teacher group in schools, by comparing their knowledge of road safety before and after the training. The result of knowledge and attitudes toward road safety in school teachers showed significant differences. The evaluation of the effectiveness of the road safety learning management curriculum among juveniles increased after training. The website development project resulted in developing an information system for managing the website in a responsive web application that can be used on all devices. Overall, the evaluation results indicated high satisfaction with the website

Recommendations for future research

Regarding policy development for motorcycle riding learning and training methods, there should be a management policy for systematic training of safe motorcycle riding for children and youth. This management includes establishing institutions or organizations that provide safe driving and survival training from road accidents— additionally, developing standardized learning curricula for driving and

analysis skills for the causes of accidents at educational institutions. These are essential skills for safe driving, starting from learning to ride a motorcycle. The aim is to learn safe driving as a necessary skill and to cultivate a mindset for survival and safety on the road. Additionally, it is essential to have skills in evaluating situational awareness and risk perception. Since the majority of children and adolescents learned how to drive a vehicle from their family and practiced driving on their own, the contents included developing courses, instructional design methods, developing skills in analyzing the causes of road accidents, developing hazard perception techniques to survive dangerous situations on the road, and decision-making skills. In addition, research should be conducted to create road safety learning and driver training programs for juveniles, including the training of teachers and trainers in road safety education (Train the Trainer). Furthermore, the development of school-based road safety measures should also be implemented, with quality-trained safety teachers responsible for overseeing them (Safety Teacher Team). Moreover, research should be conducted to develop and establish road safety learning centers at the provincial/district level.

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