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Learning Outcome Assessment: Cross-curricular Theme Safety and Traffic in Basic Core Curriculum

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Abstract: *Aims:* Teaching and learning are under constant change creating new tasks for teachers. The curriculum for basic education is one of the governmental directives of the educational system in Finland. In the curricula of basic education one of the seven cross-curricular themes is "Safety and Traffic". The study analyses learning outcomes of this theme in order to further develop forms of safety pedagogics in Finnish schools. *Methods:* A learning outcome assessment was conducted for the 9th grade (n = 1198) students. *Results*: The study indicates that in the assessment of the learning outcome in the Finnish basic education the level of *knowledge* in the cross-curricular theme "Safety and Traffic" was fairly good but the *ability to act* was below average. *Discussion*: Firstly, this study indicates that schools need support in the process of making safety culture more visible and practical and secondly, safety pedagogics points of view should be considered a dynamic, ongoing and sustainable process of acts rather than a stable condition of plans or programs.

Key words: learning outcome, safety pedagogics, curriculum, cross-curricular theme, unintentional injuries

1. Introduction

Education is under constant change creating new and demanding tasks for schools. The curriculum for basic education is one of the governmental directives of the educational system in Finland. During the past few years the incidents of extreme violence in Finnish schools as well as the unintentional injuries and accidents have created situations where new safety procedures are needed. Injury is a leading cause of death in children and adolescents aged 0−19 years in Finland. If the figure of Finland could be reduced for instance to the level of Netherlands, one of the safest countries in Europe counted by the number of injuries, it is estimated that 64 (51%) of these lives could have been saved (European Child Safety Alliance, 2011). The number of people killed in road accidents in Finland was 255 in 2012 (Trafi, 2013).

Injuries are predictable and preventable, yet to prevent injuries both knowledge and skills are needed. Age-related limitations in physical motor coordination and cognitive thinking skills place children at risk for injury. Children lack the critical thinking skills to assess their surrounding environment for potential dangers and to initiate an emergency response when necessary. Learning is a core philosophy of injury prevention, all of the essential skills outlined above that help maintain a child's safety need to be taught and continually reinforced. (Inman, Bakergem, Larosa & Garr, 2011, p. 40; Klas, Vlahos, McCully, Piche & Wang, 2014, p. 3).

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Students' right to safety, security and welfare is mandated firstly in the Basic Education Act "A pupil participating in education shall be entitled to a safe learning environment" (Basic Education Act, section 29). This means that education provider shall draw up a plan, in connection with curriculum design, for safeguarding students against violence, bullying and harassment, execute the plan and supervise adherence to it and its implementation and secondly in Student Welfare Act "Pupil welfare refers to promotion of good learning, psychological and physical health and social well-being as well as activities geared towards improving the prerequisites for these. Pupil welfare comprises pupil welfare in accordance with the curriculum approved by the education provider and pupil welfare services, which include school health services. Pupil welfare concerns everyone working in the school community as well as the authorities responsible for pupil welfare services — (Pupil and student welfare act, 2-4)".

In the curricula of basic education in Finland one of the seven cross-curricular themes is "Safety and Traffic". The aim is to help students understand the dimensions of safety, guide them to avoid dangerous situations and teach them to act in a manner that promotes health and safety. Furthermore students are taught to act constructively when bullying occurs; act safely and responsibly in traffic and behave in an appropriate manner in crisis situations. In addition, safety is focused on in certain school subjects such as environmental science, biology, physics, chemistry and health.

2. The Concepts of Safety and Safety Identity

According to WHO, safety is a condition where factors that are a threat to a society are managed in such a way that citizens have the opportunity to gain welfare and well-being. Safety is also seen as a condition where one is free from danger. In English, the concept "safety" has two separate meanings. "Safety" implies a human aspect and freedom from accident or injury, while "security" implies deliberateness or intent, as well as being protected from dangers. The word "safety" is frequently used in connection with accidents and the word "security" is used refer to protection against undesirable threats (WHO, 1998; Somerkoski & Lillsunde, 2014, p. 44). Initially the concept of safety culture was adopted in occupational safety. Safety culture refers to safety practices within a community and it consists of beliefs, norms, attitudes, roles and technical procedures. Yet attention to personal safety is indicative of an individual's safety identity, which is linked to personal attitudes, social environment and cultural issues (Reason, 1997, pp. 191−196; Somerkoski & Lillsunde, 2014, p. 47).

The basic education curriculum reflects always the values of the surrounding society (Yrjänäinen, 2013, p. 120). One of these basic values is safety and wellbeing. This comprises physical, mental and social safety and security. There are no previous studies on a cross-curricular theme "Safety and Traffic". One of the rare researches on safety culture at schools was recently carried out. The study indicated that a well-developed safety culture at school included understanding of safety hazards, good safety management practices as well as open and communal safety-related work. The study indicated that safety culture and safety measures lie deeply on principal's shoulders and on the other hand, the level of safety culture varies a lot between the schools (Waitinen 2011).

The crux of the Finnish education system is the compulsory nine year basic education. The compulsory education in Finland has a very limited private sector as well as long history of central governance. Teachers in Finland are highly trained. In general education all teachers are required a Master's degree (4−6 study years). The high level of training is seen as necessary as teachers in Finland are very autonomous professionally. They have

the possibility to decide for instance which teaching methods and learning materials they want to use. The Finnish system is based on trust in teacher education. The objective is to produce teachers with a research-orientation. Teacher education offered at universities provides the teacher students with capabilities, skills and knowledge to guide the learning of students (FNBEb, FNBEc).

Enhancing the safety culture in schools means, not just theoretical background and attitude, but also ability to act. Therefore it is important to stress skills in safety pedagogics. Here the safety pedagogic point of view includes the structured learning environment, the people, the practical safety and security solutions made in the school as well as the curriculum that creates a cognitive and functional context for teachers' actions (Somerkoski, 2013, pp. 133−143; Lindfors, 2013, pp. 144−157). This paper discusses the student assessment of learning results concerning cross-curricular theme *Safety and Traffic* conducted by the Finnish National Board of Education (Loukola, 2004; Niemi, 2012). The learning outcome evaluation is here seen as a part of safety culture in Finnish schools.

Figure 1 The Safety and Security Pedagogic Frame of References Created by the Developing Network of Safety Culture in Schools

The national core curriculum has an important development role in the Finnish school system. The national core curriculum is the national framework on which the local curriculum is formulated. The local curricula are designed and based to these strategic documents. The national core curriculum contains the objectives and core contents of teaching for school subjects and also describes the mission and values of education. It describes the conception of learning and goals for developing the learning environment, school culture and working methods (Vitikka, Krokfors & Hurmerinta, 2012, p. 82).

Content of teaching, pedagogy and school practices should be reviewed and renewed in relation to the changes in the operating environment and skills. Competencies needed in society and working life have changed, requiring skills for building a sustainable future. (Halinen a) As earlier mentioned, teachers are very self-confident and there is neither school inspection system nor a national test after nine year comprehensive education. This is why the Finnish National Board of Education carries out an assessment study. The purpose of this assessment is to provide information for the decision-making concerning the development of education. The national-level

evaluation of educational result are carried out by reliable, neutral and autonomous researchers and the work is funded totally by the state (European Agency for Special Needs and Inclusive Education). The Finnish National Board of Education launched national learning result evaluations in 1998 and the activities have now been transferred to Finnish Education Evaluation Centre (FINEEC) that evaluates the attainment of learning outcomes related to the objectives of pre-primary and basic education core curricula. Learning is here seen as a combination of attitude, knowledge and skills. Learning outcomes are evaluated based on sampling so that they can be extrapolated to apply to the entire age group in pre-primary and basic education. Approximately 5–10% of the pupils in the age group to be evaluated will participate in the evaluation. The sample of schools providing education in the other official language Swedish is larger to improve comparability. The learning outcomes evaluation is based on objectives defined in the basic education core curricula. The evaluation exercises are first tested at schools outside the sample and after teacher feedback and section analysis, the exercises that are most reliable and capable of discrimination are selected for the actual evaluation. Sample schools and education providers receive feedback on the results proportioned with the national average. (KARVI)

The evaluation of study attitudes uses an established indicator to study the students' views on themselves as learners of a subject or syllabus, on the attractiveness of a subject or syllabus, as well as on the usefulness of studying a certain subject or syllabus. A report will be drawn up on the key results of the evaluation. In addition a summary will be drawn up for the needs of the Ministry of Education and Culture, the Finnish National Board of Education, Departments of Teacher Education, education providers, schools, teachers and other bodies (KARVI). The study presented in this paper is part of the study carried and fulfilled in 2012.

On the nation level in Finland there are various multi-sectoral target programs promoting safety and security. The most essential is the *Internal Security Programme* that aims to prevent injuries, accidents and crime and to increase the feeling of security, especially amongst the most vulnerable groups of citizens. The third Finnish Internal Security Program was launched in 2012 (Ministry of the Interior). Complementing the Internal Security Program the Ministry of Social Affairs launched *The National Programme for preventing injuries at home and in leisure 2014−2020.* The purpose of the programme is to strengthen the regional and local work on the prevention of injuries, and to put the prevention of injuries into practice. The municipalities and the Association of Finnish Local and Regional Authorities as well as NGO's are expected to carry out total 92 actions on injury prevention. These measures include for instance injury prevention education as part of the basic and supplementary training of the teachers. Injury prevention will and should be added to the early childhood education plan and safety plans for day care as well (STM 2013).

In traffic Finland ranked 12 in Europe with the number of road deaths per million inhabitants. A target program *Turning objectives into reality. Road traffic safety plan to 2014* was launched 2012 to decrease the number of road deaths and accidents (Trafi, 2013). The fourth crucial strategic program is *The national action plan for injury prevention among children and youth*. The action plan discusses what should be done to reduce health problems in key areas of the everyday lives of children and young people, such as preventing unintentional injuries in school environment, providing safety education, enhancing the safety culture in schools as well as educating the school personnel in safety and security (THL, 2009, pp. 83−96). It can be quite clearly stated that Finland has a strong leadership to support the existing infrastructure, learning and values on children's and adolescents´ safety, yet more emphasis should be put on implementation of the plans and programs. The following chapter describes some of the implementation acts conducted in Finland.

Firstly, The Developing Network of Safety Culture in Schools was established 2010 to advance a wide, systematic and open safety culture in schools. Especially school, youth and fire authorities as well as social workers, NGOs and researchers are welcome to join this open network. The strength of the network comes from its multi-agency and multi science co-operation. University of Turku, teacher education in Rauma unit and The Developing Network of Safety Culture in schools want to support the process of making safety culture more visible with the help of a pedagogic point of view on safety (OPTUKE). Secondly, there are many practical and local examples on the local level actions in the schools. Schools can quite independently decide how they want to gain the safety goals of the core curriculum. Many schools have their own crisis plan, intoxicant strategy and a policy for acting with bullying. The dangerous places near schools are mapped out and interfered (e.g., City of Hyvinkää). Some of the schools use digital applications to follow the level of unintentional injuries during the school day (see e.g., Ubiikki).

Presently the Finnish National Board of Education is renewing the core curriculum for pre-primary and basic education (6─16 years). The Finnish core curriculum covers also how to develop a good learning environment. It is seen as a pedagogical, holistic tool for teachers (Halinen b 2011). The new curriculum will be in use at the beginning of school year 2016─2017. The process involves all stakeholders, particularly education providers and education personnel. In the new core curriculum safety issues such as managing daily activities, knowing the basic safety signs and symbols, appropriate behavior in traffic, avoiding dangerous situations and all in all safe everyday life are emphasized. Before the renewal of the core curriculum the Finnish National Board of Education assesses the learning results of the old curriculum as mentioned before in this paper (FNBEa).

In the curricula of Finnish comprehensive school basic education safety is focused on in certain school subjects such as environmental science, biology, physics, chemistry and health. In addition the core curriculum contains seven *cross-curricular themes*. Cross-curricular themes represent central emphases of the educational and teaching work. Their objectives and contents are incorporated and implemented into various subjects. These themes are not necessarily taught in certain subjects but revealed in the school's operational culture and learning environment.

The goal of the theme "Safety and Traffic" is to help students understand the dimensions of safety, guide them to avoid dangerous situations and teach them to act in a manner that promotes health, safety and security. Each school has a plan for crisis situations and a plan for the student welfare. Furthermore students are taught to act constructively when bullying occurs; to act safely and responsibly in traffic and behave in an appropriate manner in crisis situations. The student will learn to recognize safety and health risks, to anticipate and avoid dangerous situations, and to act so as to promote health and safety; learn to foster non-violence and to act constructively when bullying occurs; learn to act appropriately in accident and crisis situations; learn to act safely and responsibly in traffic; learn to have an impact on the safety of the school environment, including the traffic environment; get to know the welfare services in society. The core contents are: protecting oneself from accidents, intoxicants, and crime in one's own living environment; environmental and occupational safety; action models that promote health, safety, non-violence and peace; dimensions of violence in the immediate community and the wider society; key traffic regulations and various traffic environments; considerate traffic behavior, safety of the traffic environment, and safety equipment; mapping out dangerous places in the immediate environment and improving safety; services that promote safety and home-school cooperation in promoting safety (POP, 2004; NCCBE, 2004). In 2010−2012 the learning results of the cross-curricular themes were assessed (Somerkoski, 2012, pp. 185−204). The results of the learning outcomes were used as a basis for designing the national-level

curriculum reform 2016. This paper describes the learning outcomes of the student assessment on the cross-curricular theme Safety and traffic.

3. Methods

The Finnish National Board of Education (FNBE) assessed learning outcomes in cross-curricular themes among 15−16-year-old students in the final 9th grade of compulsory basic education. The purpose of this assessment was to examine the extent to which objectives set in the National Core Curriculum for Basic Education had been achieved. A total of 1198 (n = 1198) students participated in an assessment of learning outcomes for cross-curricular themes. The study group consisted of 574 girls and 624 boys. Of the students 1063 attended school in Finnish and 135 in Swedish.

The cross-curricular theme Safety and Traffic follow-up evaluation was carried out by a questionnaire that included 68 questions on knowledge, skills and attitudes of safety and security.

Students were selected to take part in the assessment from the schools' 9th grades using systematic sampling done by the National Board of Education. The questionnaire was pre-tested in four schools (n = 467 students). There were two comparable series of questionnaire (A and B) to secure the level of the questions beforehand.

In the final version the knowledge section consisted of 21 multiple-choice questions. The questions were based on main goals of the national core curriculum on safety and traffic *knowledge* concerning for instance moped driving, traffic legislation, arson and bicycle helmet. The attitude section consisted of 20 statements (TABLE 1) on five step Likert scale (1 completely agree…completely disagree 5) The skills were measured with 23 yes-no-questions divided in three themes: fire safety, first aid and traffic safety skills. For instance "I know how to response if somebody is bit by a snake" or "I use bicycle helmet when I´m bicycling." "I know how to use a fire extinguisher."

The questionnaire was filled during one lesson in 45 minutes during the school day. The class teacher sent the unchecked forms to the Finnish National Board of Education. The answers were analysed with Pearson's correlation analysis, independent samples t-test and analysis of variance (ANOVA) with Tukeys' post hoc tests.

4. Results

Based on the Cross-curricular theme assessment of the basic curriculum (Niemi, 2012; Somerkoski, 2012) for the 9th grade (n = 1198) over 80% of the students seem to appreciate the safety and traffic issues. For this result two factors (Table 1) were created for the attitudes section: *F1 was Safety and security issues are important and useful (*Cronbach alfa $\alpha = 0.82$*)* and *F2 a safety and security risk* factor (Cronbach alfa $\alpha = 0.78$). The results indicated that most of the students, 84% of the answers, think that safety and security issues are important and useful (F1), whereas 8% stayed at safety and security risk factor (F2). However this does not appear to be quite the case when considering genders.

Of boys 78% and of girls 91% thought that safety and traffic issues were important and useful however boys seem to take bigger risks than girls concerning safety issues. The difference between genders was statistically very significant ($p < 0.001$).

Table 1 The Attitude Factors F1 and F2 on Cross-Curricular Theme of Safety and Traffic

Statement	Factor		
	Safety and security issues are important and useful F1	Safety and security risk F2	Communality
Safety and security issues are important for everybody.	0.65		0.48
I think safety and security issues are useful for me in the future.	0.57		0.32
I think it is important to have a functioning fire detector at home.	0.56		0.37
I think I need traffic skills in the future.	0.54		0.29
As a pedestrian it is important that car drivers notice me.	0.53		0.37
I think I don´t need too much of the things I have learned about safety.	-0.51		0.28
The safety regulations at my work are not too important for me.	-0.51		0.29
Students need traffic rules every school day.	0.51		0.32
It is important to memorize the emergency number.	0.41		0.18
The safety and security issues are one of the most important things you can learn at school.	0.39		0.20
I think safety and security issues are important.	0.38		0.19
It is all the same on which side of the street you are. On aivan sama, kummalla puolella tietä kulkee.	-0.35		0.18
Sometimes I think of what should I do at home in case of fire.	0.31		0.18
I think it is ok to try to play with fire.		0.62	0.45
I think that re-installing the speed-limitator to my moped is ok.		0.59	0.39
Sometimes things don't get ok with anything else than violence.		0.55	0.33
You should use a bike helmet.		-0.52	0.34
I think playing with burning candle is not dangerous.		0.50	0.36
I think it is important to avoid violence in all the situations.		-0.44	0.28
If somebody gets bullied at school is not very important thing.		0.37	0.21
Eigenvalue	3.68	2.64	
Proportional eigenvalues	16.00	11.49	

Table 2 The Assessment Scale Created by the Finnish National Board of Education is Used in this Study

% of Max points	Level of performance
0−40	weak
41−50	below average
51−60	moderate
61−70	satisfying
71−80	good
80 and over	excellent

In this study the assessment scale created by the Finnish National Board of Education is used (Table 2). The level of achieved knowledge can be considered good (mean value 73% of the maximum points). Instead the result of achieved skills was moderate (mean value 60% of max. points). Also here the gender difference was statistically very significant ($p < 0.001$). Mean value of the boys was 14.5 whereas the comparable figure for girls was 12.8. It needs to be pointed out that in some questions the level of knowledge was excellent: for instance 98% of the students could memorize emergency number 112.

Performance at the skills section was moderate (mean value 60% of the maximum points). Over 80% of the students reported they are able to test the smoke detector, but only 48% had actually done it. It needs to be noted that there were quite obvious gender differences between skills section: of the boys 91% stated that they can test the smoke detector whereas of the girls, only 66%. Of the boys 89% reported being able to use a fire extinguisher. The comparable figure of girls was 56.

5. Discussion

With the sample of 1198 students it seems clear that outcomes of the cross-curricular theme Safety and traffic are on good level the mean being 74% of the maximum points. The study gives signs that the level of *knowledge* in the cross-curricular theme Safety and Traffic was fairly good but the *ability to act* was below average. More efforts should be put in teaching the practical points so that the good level of knowledge would turn on to appropriate and decent skill. Teachers should encourage more effectively both genders, also the girls, to act for safety.

A minor part of the students (8%) who participated to the study indicated risk behavior. Teachers should better recognize this minor group of students to be able to help them with early intervention measures, before major consequences or damages. Teachers should be trained in the identification of risk-factors. The phenomenon might have connections to social marginalization, crime prevention, and personal safety identity.

Curriculum reflects our best understanding of humanity, society and learning (Halinen b 2011) as well as the values of the surrounding society (Yrjänäinen, 2013, p. 120). According to the target programs and visions safety and wellbeing can be seen as basic values of the society. Yet it is stated that more efforts should be put on program *implementation*. This might lead us to face international challenges, growth as a person and safety identity, tolerance and global citizenship. This study seems to reflect same kind of trend. To better enhance the values of the society there should be enough skill-related practical contents in the renewed basic core curriculum.

6. Future Challenges

The result of this study set some challenges to teaching safety and security issues in compulsory school as well as teacher education. Since also teacher education units hold their autonomy in Finland, new challenges are faced. On the light of this study it seems that more practical measures should be taken in safety pedagogics. This demands new attitude and measures for both the teacher and comprehensive education.

“Theoretical abstractions are of little interest unless they lead to improved safety” (Reason, 1997, p. 36). More studies are needed to find out what these practical measures and participation could be. This study indicates that safety pedagogics should be considered a dynamic, ongoing and sustainable process of acts rather than a stable condition of knowledge.

7. Limitations

Limitations in the study design or questionnaire may have blunted this study. The study indicates that learning outcomes after nine year basic education in Finland are on better level in knowing than skills. It has to be noted that this study does neither show how sustainable these learning outcomes are nor how much of the learning had actually happened in the classroom or school.

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