Reducing Occupational Safety Incidents as a Precondition to Teaching Technology in Special Education

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Considering the safety culture is one of the key elements in teaching technology. However, different occupational safety risks, as well as disturbance and violence situations, are encountered in the safety culture of schools. A reporting culture that is a natural part of the staff's activities in high security areas has not yet emerged in schools. This study looked at the school safety from the staff's occupational safety point of view. The aim of the study is to provide new information on the type of incidents, like hazards, accidents and near-misses, that occur to the staff in the field of special education, in order to understand how to prevent these to facilitate technology education in the future. The research question in the study is what kind of incidents occur to the staff in a special education school. The data (N=60 incidents) was collected into a digital risk management system within one year in 2019. The data was analyzed by using qualitative content analysis. During the analysis and categorization process three sub-questions were formed: where did the safety incidents happen, which part of the body was hurt and in what way did the pupils behave violently?The results present an analysis of what kind of incidents happened at one comprehensive school in special education within a year. The results will help in incident management and safety culture management within occupational safety in special education. The results can be applied to reducing occupational safety incidents as a precondition to teaching technology in special education.

Key words: safety culture, incident analysis, occupational safety, special education, technology education, autistic spectrum

Introduction

The Finnish Basic Education Act (1998/628) states that a school should be a safe learning environment for pupils and the Occupational Safety and Health Act (2002/738) requires a safe working environment for the staff. However, teachers' and school helpers' practical reflections on their experiences from special education schools point out that pupils' violent behavior causes the staff to be constantly alert. The constant threat of violence causes mental strain, and the need for defusing and debriefing in the form of sick leave also costs money. That is why it is important to gain information on what kind of safety incidents happen at schools. By gathering safety incident information and analyzing it, it is possible to find out how to develop the safety culture.

Developing safety is a precondition to enhancing technology teaching in special education. If there is no understanding of how and why pupils behave in a way that causes safety incidents it is not possible to let them use hand tools, equipment and machinery in technology education (TE). However, According to Kramer (2003) more than half of the classroom injuries were related to equipment use. Staff and pupils can be hurt if some of the pupils behave aggressively or are occasionally violent. If there was knowledge about hazards at school this would probably enhance the opportunities to teach technology to pupils.

The current understanding of a safety culture in schools varies (e. g. Lindfors, Somerkoski & Kärki, 2017). By definition, safety is a culture of inspection and maintenance of facilities and monitoring everyday incidents. A safety incident may cause personal injury, material damage, or a circumstance that jeopardizes safety. A safety incident may also be an incident or a non-compliance of safety regulations or instructions. In addition, a safety incident may be a situation or event, which destroys perceived safety. (Teperi, 2018 et. al., 60).

This paper focuses on incidents that happened to teachers and school helpers in their working environment at special education schools during one school year. The incidents were reported in written format into a digital risk management system by teachers and school helpers. The aim of the multiple case study was to execute an incident analysis (N=60) in order to generate better understanding of everyday risks and hazards in special education. The paper gives a prior knowledge of incidents regarding what and where the incidents happened, in which part of the body the incidents occurred and in what way. This might make it possible to consider preventive actions to reduce the number of incidents and to enhance technology teaching also in special education.

Theoretical background

Safety culture in a learning environment can be considered from physical, social, psychological and pedagogical dimensions. The physical dimension includes the spaces and facilities with tools, materials, machines and equipment and their condition. The social dimension refers to socially acknowledged values, attitudes and behavior and the interaction and action based on them. The psychological dimension includes pupils' and staffs' personal values, attitudes, personalities, motivations, knowledge and skills, as well as experiences that are the basis for individual actions. The pedagogical dimension concerns the organization of teaching, content and learning opportunities, participation, affection, rules, justice, responsibilities and peer support (Lindfors, 2012; Lindfors and Somerkoski, 2018).

Mietola (2014) has looked at the relationship between normal and abnormal in the everyday life of a school as a practice of constantly rebuilding. According to her, the specialness and the normal appear quite distinct in the everyday life of a school and the difference between them is steep and wide. According to Mietola, the negative meanings that special education has sought to break away from in recent decades are still dominant, despite the sensitivities present in school culture and the tendency to challenge and break the stigma of specialty. Changing the meaning and distinction between normal and special requires new ways of working in schools. New ways of working can be created while developing a school safety culture.

For prevention and preparedness, information on safety incidents and hazards is needed, as well as models that can be used to develop a school safety culture. The EduSafe project (Teperi et. al., 2018) developed a comprehensive security management model for the education sector. Preparedness and prevention, situation management, recovery, and shared procedures are parts of operative safety culture. People are seen as resources that bring flexibility and resilience to systems in ever-changing work situations. (Teperi, 2018) In order to use the model to develop a safety culture, incidents need to be monitored, reported and analyzed. However, teachers themselves do not consider it to be important to file reports on their safety, or they think it is somebody else who should be doing this (Waitinen, 2011). The fact that educational institutions, as well as other organizations, are monitoring safety incidents is the starting point for the development of a safety culture. Safety incident analysis is a basic prerequisite for reducing hazards and preventing accidents. (Lindfors 2019, 2020; Teperi et. al. 2018.)

It is known from previous research that there has been violence in one in four (24%) of all educational institutions (Näsi, 2017) and that violence is especially common in special needs education (Teperi 2018, 72). In a special education school, most children in autistic groups have difficulties in interacting. The autism spectrum is characterized by challenges of interaction and communication and repetitive behavioral special interests. It is known from previous studies that behavioral disorders are present in

44% and anxiety disorders in 42% of autistic children. (Rämä 2015, 2). According to Parkkinen (2002, 74), physical violence is often preceded by a surprising situation, moving from one place or activity to another, and waiting. Autistic pupils have poor problem-solving skills (lack of creativity) and they need concrete tips to increase predictability. For example, different concretized (objects, pictures) timetables help to clarify the structure of the activity. The behavior of an autistic pupil becomes more difficult as the structure (order) decreases (Parkkinen 2002, 74). Pupil-specific skill profiles may be very uneven and change depending on time or context (Rämä 2015, 2). In the autism spectrum, some can cope with speech while others use substitute means of communication, such as signage or other physical gestures, picture boards, speech synthesizers, communication devices, etc. From a teaching point of view, these things require well-defined teaching. (Rämä 2015, 2)

The safety culture at school is understood as interactive activities and measures to promote the safety and well-being of pupils and staff in a learning and working environment. Promoting a safety culture is proactive and reactive in terms of responsibilities and implementation of safety competence of the staff and pupils (Lindfors, 2020; Lindfors & Somerkoski, 2016). Special education teachers generally report a pupil's lack of self-regulation as the cause of violence. Somerkoski (2017b) points out that some risks at schools are unpredictable, connected to human factors and caused by pupils acting against norms and regulations or using structures or products in a way they are not intended to be used. According to Teperi (2018), underestimation and normalization of violence situations seems to be typical for adults at school. Since school safety is a question of what schools know about their safety, how they monitor safety incidents, and how they understand their holistic safety culture to develop it proactively (Lindfors, 2020), monitoring and analyzing safety incidents is the most important method in considering what way TE could be implemented in special education with certain pupils and teachers.

Research design

The data of this study was collected from a digital risk management system (Safety monitor) of a large Finnish city. The school that was studied had about 130 pupils, 30 teachers and 60 school helpers, and there were 311 safety incidents reported in the school within a year. In the school, special education teachers are responsible for teaching. In addition, 1 to 4 school helpers work in one classroom, depending on support needs. All pupils have a special support program. The school has linguistic disability groups, broad learning disabilities groups, TEACCH (Treatment and Education of Autistic and related Communication impaired Children) teaching and area teaching groups. The school has a hospital school for pupils with psychiatric symptoms and pupils who, for one reason or another, are in any of the wards of the hospital. Pupils with intellectual disabilities also study at the school.

The TEACCH teaching groups are intended for autistic pupils in need of special support. The size of the teaching group is limited to six pupils. Pupils with intellectual disabilities are studying in the activity area. The pupils need special support for daily activities, self-management, communication, interaction, as well as motor, social and behavioral control. There is a small workshop for technology teaching in the school. However, it is used rarely since the risk of pupils causing hazards is seen as being high. Some technology is taught in the ordinary classrooms.

A typical procedure for reporting an incident is that a staff member writes a short description of an incident. This takes about 5 to 15 minutes. A total of 60 reports, 43 near-misses and 17 safety incidents, was chosen from all 311 descriptions to execute a preliminary analysis. Altogether 60 safety incidents (every fifth) were chosen from all descriptions as data. Together the amount of the incidents was sufficient to carry out this multiple case study and to execute a preliminary analysis of incidents to enhance understanding of occupational hazards met by teaching staff.

A document analysis (Bowen 2009) using data-driven content analysis as a method (Krippendorf 2013) was performed to draw repeatable and valid conclusions by systematically coding and interpreting the incidents.

One of the researchers visits the school regularly as a health and safety representative of the municipality. He is familiar with physical, psychological, social and pedagogical conditions and safety and security point of view (see Lindfors 2010) of this particular school. The other researcher analyzed the data without any connection to the school. The research was licensed by the city organization and the school. One of the researchers, due to his work, had access to the digital risk management system's incident and accident descriptions. Original descriptions were encoded in a numeric ID format (Table 1.) that did not identify the author.

First, the reports were read several times to create a holistic understanding on the incidents. The aim of the process was to create an understanding and interpretation of what the material reveals as an answer to the research questions (see e. g. Lindfors, 2019; Lindfors & Teperi 2018). Based on compressed original descriptions, pre-categories, sub-categories and categories were formed by the two researchers (Table 1). During the formation of the sub-categories, some of the incidents were negotiated between the researchers and rethought and moved to a more appropriate category. Finally, the finalized categories were formed and named. Accidents and near-misses towards the staff in the special education school (60 incidents) were categorized in two categories, two sub-categories and five pre-categories. To form a holistic big picture of the incidents, Table 2 was created, which describes where in the school building the incidents occurred, to which part of an employee's body the violence occurred and in what way the pupils behaved violently towards the staff.

Results

The analysis of the incident reports shows that the majority (95%) of the accidents and near-misses towards the staff were caused by pupils with violent behavior (Table 1). The category of Pupil's violent behavior was formed, with two sub-categories: A) Pupil's violent behavior when restricted by staff (58%) and B) Pupil's unexpected or unintentional violent behavior during lessons (37%).

The sub-category A has three pre-categories: (A1) Pupil's frequent and prolonged violent behavior. (15%), (A2) Pupil's violent behavior towards another pupil (8%) and (A3) Pupil's violent behavior as a result of a lack of cooperation (35%). Most of the incidents occurred in situations where a pupil acted violently towards him- or herself or towards another pupil. A typical scenario was that pupils' behavior was frequent and prolonged (pre-category A1). In these cases, the incident report pointed out violent behavior that happened many times during a school day or week. Sometimes a pupil's violent behavior happened against another pupil and a staff member got hit at the same time. However, most of the incidents in sub-category A happened as pupils were not cooperative with the staff (pre-category A3). The reason why a sub-category of Pupil's violent behavior when restricted by staff was created out of these incidents was that in these cases the staff had to intervene to take control or move a pupil out of the situation. This meant restricting a pupil's behavior. While restricting the violent behavior the staff got hit by the pupil. An example of the original expression in category A is presented in the following:

> We were getting inside and the pupil was already very angry and aggressive. The pupil turned against me and I had to grab him with my hands. The pupil was able to scratch my hands so that they started to bleed. I put him in a tranquility room to rest for a moment. The pupil calmed down after a while. (Incident 21)

Table 1. Safety incidents towards the staff in special education.

ID	Original incident description	Pre-category	Sub-category	Category	Main category
5	The pupil kicks, beats daily	A1 Pupil violent repeatedly and prolonged. (9)	A Pupil behaves violently when being restricted. (35)	Pupil behaves violently (57)	Accidents and near-misses involving staff working in special education school (60)
8	The pupil spits continuously, hits, stomps, kicks and tries to bite.				
15	I was restraining a pupil when another pupil hit me on the back several times and he also hit another pupil.	A2 Pupil behaves violently. Another pupil as a party. (5)			
18	I went to help another school helper in a getting dressed situation. The pupil kicked, hit, tried to bite and threw around clothes and shoes.	A3 Pupil violent as a result of lack of co-operation. (21)			
22	The pupil did not want to get out of the taxi in the morning. I needed help from another school helper. On the way to the classroom, the pupil screamed and kicked my leg.				
40	The pupil suddenly hit my arm.	B1 Pupil unexpectedly violent. (19)	B Pupil behaves violently in a situation where he is not restricted. (22)		
52	The pupil attacks as he passes by and scratches my forearm.				
60	We were on the floor on a mattress and the pupil accidentally kicked my stomach.	B2 Pupil unintentionally violent. (3)			
59	The pupil rocked his chair with the consequence that it fell over my leg.				
63	In the school yard, I slipped on a hill and fell on my back.			C Slipping and falling (3)	

The sub-category B has two pre-categories: (B1) Pupil's unexpected violent behavior (32%) and (B2) Pupil's unintentional violent behavior (5%). 32% of incidents which occur to the staff are (pre-category B1) caused by a pupil's unexpected violent behavior towards staff. At such an event, the staff did not know in advance that a pupil had violent tendencies, but for some unknown reason, the pupil behaved violently towards the staff. An example of an original expression in category B1 is presented in the following:

> The pupil bit my arm as he was guided to his place. The skin broke, so I had to visit the occupational health center. Blood tests were done and I received the first part of the hepatitis B vaccine. (incident 47)

Five per cent of the staff incidents (category B2) were due to unintentional violent behavior by pupils. The staff member was not prepared for the violence and the pupil did not mean to do harm. An example of the original expression in category B2 is presented in the following:

> The child kicked my stomach and I'm pregnant. We were lying on a mattress on the floor and the child kicked my stomach accidentally. (incident 60)

There was also a category C, Slips and falls. Only 5% of all safety incidents were slips and falls. These happened to the staff in the school yard and on the way from home to school. An example of the original expression in category C is presented in the following:

> I was in the school yard looking for the pupil's gloves. When I went down the hill I slipped and fell on my back. I hurt my lower back, I felt dizzy and injured my left arm. (incident 63)

Most of the events took place in the classroom, in the hallway, or when a pupil was taken to a "tranquility room". It is noteworthy that 35% of the events were in different transitions (table 2).

An example of the original expression in transition is presented in the following:

> The pupil did not want to get out of the taxi in the morning. I needed another school helper to help. On the way to the class, she screamed and kicked my leg. (incident 22)

In the original incident descriptions, several locations were attached to the same incident description. Because there were several venues per incident, the relative proportions of the different venues could not be determined. However, according to the incident analysis, most of the events occurred in classrooms, in hallways, in a tranquility room or when the staff was moving a pupil to the tranquility room. Elsewhere, for example in toilets or on a schoolyard, only single incidents occurred. In the incidents, the staff were hit, kicked, bit, scratched or hit by head (In what way did the pupils behave violently). The body parts affected were the head, body, hands or feet (which part of the body was hurt), but mostly the hands. The pupils also yelled into staff members' ears. Most of the pupils' violent behavior was hitting, kicking and scratching (table 2).

Table 2. Incidents in regards to the place, the hurt part of the body and the way of being violent.

Where the safety incidents happened? N=60	Which part of the body was hurt? N=60	In what way the pupils behaved violently? N=60
classroom 22	head 10	scratch 18
hallway 11	body 5	kick 18
tranquility room 11	hand 11	bite 9
transition 21	foot 8	yell 7
		hit 31
		hit by head 4

Discussion

The reason for forming the sample of 60 incidents from the total amount of 311 incidents was the need to execute a preliminary analysis to be able to handle the large amount of data in the future study. Based on the sample data set, the incidents were classified into two categories: the slips and falls that form only 5% of the incidents, and pupils' violent behavior that is 95% of all incidents (Table 1). The typical incidents that occur to the staff are caused by pupils' unexpected violent behavior. These events accounted for 32% of accidents. However, most of the incidents (61%) occurred in situations where a pupil was already violent towards him- or herself or another pupil, in which case the staff had to intervene to solve the situation or move the pupil out of the situation. The analysis made the incidents visible and more generally available.

This case study confirms the earlier observations (Somerkoski 2017) that most of the risks in a learning environment seem to be unpredictable. However, it shows the importance of and the need for proactive procedures and actions in the learning environment (see Lindfors, 2020; Teperi et. al. 2018). Even if a learning or working environment, or a certain space or equipment, are safe from a physical point of view (Lindfors and Somerkoski, 2016), there can be incidents that are similar to each other. The analysis revealed that without a comprehension of similarities between incidents and their typical traits, proactive actions in classrooms are not possible and a learning and working environment can be unsafe and hazardous. If teachers and helpers have to be confronted with violence repeatedly, it is not possible to

organize TE in TE workshops. We can conclude on the basis of the results that TE lessons should be organized on those school days that a pupil is not aggressive starting from the beginning of the day (Table 1). We can also assume that in TE a group of five pupils should be reduced to one or two pupils to avoid aggressive behavior between pupils. However, there were no incidents in the data that had happened in TE workshops, since they are practically not used with special education pupils. In this sense, we do not know what incidents e.g. the use of loud machinery would cause.

The results can be considered from the point of view of a learning and working environment (Lindfors, 2012; Lindfors and Somerkoski 2018). If the staff is able to consider the learning environment dimensions from physical, social, psychological and pedagogical points of view it might be possible to decrease the number of safety incidents. Pupils' violent behavior is a part of the social environment. Pupils' aggressive behavior is most often beating, scratching and kicking the hands, feet or head of an employee (Table 2). The way the staff behaves and acts in a challenging situation with pupils in special education is part of the pedagogical choices that are made. A significant proportion of violence during transitions (46%) lead to the question of whether transitions should be minimized?

This study was a multiple case study as there were many incidents from one school. However, the results might be beneficial by revealing the nature of incidents of violence caused by autism spectrum disorder pupils. Whether such events occur in general in various schools remains unresolved and beyond the scope of this study. In the future the staff member's role in recognizing and analyzing incidents should be emphasized. The categorization (Table 1) can be used to develop preparedness for various safety and security incidents at this school and other similar special education schools.

As this study is part of a larger research project, the next step is to analyze more incidents of this particular school and some other schools. Another step is also to carry out interviews or group discussions with the staff and principals and in that way to enhance understanding of the safety culture to promote risk management. This is a prerequisite for teaching technology.

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