Risk assessment in infrastructure in educational institution: A study in Malaysia

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Abstract. This particular study was conducted to assess the hazard exposure in education institution and to highlight the possible risk level available. The assessment utilised is Hazard Identification, Risk Assessment and Risk Control (HIRARC). There was a 2008’s form in order to determine the risk level of the hazard. There were over 111 of education institutions were selected around Malaysia to perform this assessment. Area chosen for each institution was office, playing field, canteen, classroom, toilet and drainage. By referring HIRARC Guideline 2008, the determination of risk rank is measure based on the formula likelihood multiply severity and the rank need to refer from risk matrix standard. There are several hazard have be found and shows the high, medium and low of risk level. The higher level of risk was discussed in the study which is hazard found in playing field and hazard in office. There several hazard that need to be control by education management to avoid increase of case accident in Education Sector, Malaysia. As conclusion, the exposure hazard among the staff and educators is high and further action and control are needed. Further study need to explore the best recommendation for control measure of the hazard exposed by education institution.

1. Introduction

An education institution is considered as a place of work as stated in the Occupational Safety and Health Act (OSHA) 1994, “place of work” means premises where persons work or premises used for the storage of plant and substance [4]. In Occupational Safety and Health Act (ACT 514), stated in section 1(2), OSHA 1994 should apply throughout Malaysia to the industries specified in the First Schedule [20]. There were 10 sector in Malaysia. Based on Article 132 Federal constitution, Education Institution was under Public Services and Statutory Authorities [24]. Besides, Education Institution is divided into preschool education, primary education, secondary education, post-secondary education and tertiary...
education [25]. Therefore, this study only covered results from schools due to the increased number of accident cases reported.

In Malaysia, the disclosure of occupational safety and health aspects in school, especially among teachers and parents, is very low compared to another sector. This aspect has been underestimated because it is considered can delay a job and wasted. However, since 2005, local news reports the news of the accident involving the school and students. Statistics accidents have been recorded daily based on reports by local newspapers. From January 2016 to May 2017, there were 54 accidents that have been reported in schools. Here is a summarization of statistics based on the accident that occurs at a school that have been recorded from newspapers (Table 1). Besides NIOSH Chairman, Tan Sri Le Lam Thye pointed out that, safety of school children should not be taken lightly in view of recent incidents where a few cases of primary school pupils were killed after being hit by cars or heavy vehicles while crossing the road in front of the school [27].

### Table 1. Statistic of accident occur in school 2016.

| No | Hazards                        | No of cases |
|----|--------------------------------|-------------|
| 1  | Epidemic tuberculosis         | 1           |
| 2  | Hit by goalpost               | 1           |
| 3  | Sexual harassment             | 1           |
| 4  | Fall from high                | 3           |
| 5  | Biological- snake bite        | 3           |
| 6  | Structural failure            | 3           |
| 7  | Fire                          | 7           |
| 8  | Food poisoning                | 9           |
| 9  | Accidents due negligence      | 11          |
| 10 | Mercury spill                 | 15          |

*sources: collection from newspaper*

School safety means students and staff should feel themselves free in physically, psychologically, and emotionally manners [7]. The basic reason why schools exist is because of the students and their education. Therefore, school safety provides a social and physical environment that effect appropriate behavior of the students. The physical environment includes the way in which the building and the school’s routines are managed to prevent problems [1]. Young people are more vulnerable to accidents when entering any of the workplace, compared to older people [8]. Therefore, the community of school need to conduct safety program to avoid from unexpected situation occur in the workplace [2].

Schools become one of the largest categories of workplace because children, young people, teachers and other staff spend a lot of their daily time in schools where variety of risk and hazards can occur including physical, psychical and social that may negatively affect their health and wellbeing [2]. Meanwhile, the school area is not only for teachers, management and staffs, even parents also are people who should be protected because they send and co-opted their children in school area. According to Japan Sport Council, a largest set of school injury data in Japan, approximately one million injuries occur in elementary, junior high and high schools each year and this remains relatively stable year by year. School accidents causing injuries have not been as widely investigated as those occurring at home or in road traffic accidents [3]. This is due to the general belief that children are relatively protected in school because of the safe environment and supervision.
Thus, the probability of the risk and hazard occurred in school is high. The risks and hazards that occur may negatively affect the health and behaviors of the students. In order to prevent danger situations in schools, safety condition in school are need to be considered in all of aspects which is the school physical environment and also the social environment [2]. Today, safety has become a central issue which has been growing in the social context that increasing the concern for prevention of danger situations [5]. Certain safety conditions are being explored in entirely life scopes which are related to quality and welfare. One of the scopes for ensuring safety is from the educational activities in school. Children, young people, teachers and other staff spend most of their time in school. In Turkey, previous study reported that the period of students spend their daily in school is about 180 days of a year and 6 hours [6].

Under OSHA 1994 [20] stated that the responsibility of the employer to ensure and provide a safe workplace for their workers. School management also is able to set the priority in improving their school area that will benefit to the educators, staff, students and visitors. The success of the system and safety of workplace can be achieved with the full commitment of all levels of the organization. Ideas, cooperation and commitment of employees in the workplace can help the education institution to reduce accidents number. Perceptions and opinions of the staff, educators and students are important to improve the level of risk at the workplace [22-23]. Therefore, management must take corrective action in order to ensure hazards in controls and appropriate measures should be taken. Simultaneously, assessment should be carried out to identify and improve level of risk in education institution in order to reduce accidents. By doing this, the management of school will be able to identify which area in school that can be considered as safer zone environment [21].

Risk assessment conducted to make sure that no one gets hurt or becomes ill. Accidents and ill health can worst lives and affect an output or product of process. Therefore, carrying out risk assessment, and provide corrective action will prevent workers from accident happens [19]. The main objective of this paper is to highlight the findings on risk assessment and identification of hazard exposed to staff and educators in education institution. Further measurement the level of risk was conducted by using risk matrix to highlight the higher risk found in education institution.

2. Methodology
Data collection was collected by walkthrough observation and calculated by using Hazard Identification, Risk Assessment, and Risk Control form. Educational institution made up from universities, colleges, secondary schools and primary schools. Therefore, collection of data was collected over 111 of schools randomly in Kelantan, a state located in the East Coast of Peninsular Malaysia which 53 primary school and 58 secondary school. The observation area included 6 areas available in schools which are office, playing field, classroom, toilet, canteen and drainage. To determine the risk level, the formula ‘risk=likelihood x severity’ was utilised. By referring to the Guidelines of HIRARC 2008, Table C, page 12, the risk level were obtained through multiplying the severity and likelihood. The relative value can be used to prioritize necessary action that can be taken in order to improve the effectiveness the management of workplace hazards available in education institutions. The higher risk level was discussed further.

3. Results and Discussions
The finding tabulation in Table 2 which the data analyzed by using formula, rating of severity multiply to likelihood rating. There are 5 groups of severity rating; catastrophic-5, fatal-4, serious-3, minor-2, negligible-1 and likelihood rating; most likely-5, possible-4, conceivable-3, remote-2 and inconceivable-1. Ranking hazard represent by number. First ranking (1) indicates that hazard in playing field was the highest compare to another area. Office or teacher’s room indicates second ranking which differ one point to risk at playing field. Canteen (3), classroom (4) and toilet (5) were shows medium level of risk followed by the lowest (6) result shows to drainage.
Table 2. The result of hazard identification and risk analysis at selected schools area.

| No | Area          | Possible hazards                     | Consequences        | L  | S  | LXS | Risk ranking |
|----|---------------|--------------------------------------|---------------------|----|----|-----|--------------|
| 1. | Playing field | Hit by goalpost; habitat of venomous | Body fractured; hit | 4  | 4  | 16  | High (1)     |
|    |               | animals; snake                       | goalpost; snakebite |    |    |     |              |
|    |               | -                                    | -                   |    |    |     |              |
|    |               | -                                    | Death               |    |    |     |              |
| 2. | Office/Teacher’s room | Ergonomic hazard | Muscle stress; mental stress; workload demand | 5  | 3  | 15  | High (2)     |
|    |               | Psychological hazards                |                      |    |    |     |              |
|    |               | Eye strain and glare                 |                      |    |    |     |              |
|    |               | Slip, trip and falls hazards         | Body injured; falls  |    |    |     |              |
|    |               | Wire tangled                         |                      |    |    |     |              |
| 3. | Canteen       | Broken pipe leakage; slippery floor  | Minor injury; body  | 4  | 3  | 12  | Medium (3)   |
|    |               | ergonomic ventilation                | fractured; muscle    |    |    |     |              |
|    |               | -                                    | stress               |    |    |     |              |
| 4. | Classroom     | Slip, trip and falls hazards         | Body injured and    | 5  | 2  | 10  | Medium (4)   |
|    |               | Broken chair and desk                | fracture             |    |    |     |              |
|    |               | Heat                                 | Not focus and cannot concentrate |    |    |     |              |
|    |               | Glare                                | Facility damaged     |    |    |     |              |
|    |               | Sharp object: scissors, stapler      |                      |    |    |     |              |
| 5. | Toilet        | Slippery floor; line pipe leaks in   | Slip, trip and falls| 5  | 1  | 5   | Medium (5)   |
|    |               | ceiling                              |                      |    |    |     |              |
|    |               | air and smell not retained           | mouldy ceiling; smelly |    |    |     |              |
|    |               | toilet clog                          | cannot use; waste and dirty |    |    |     |              |
| 6. | Drainage      | Slippery floor                       | Falls                | 4  | 1  | 4   | Low (6)      |
|    |               | Object falls into drain              | Minor injury; body fractured |    |    |     |              |
|    |               | Hand trapped at drain covered        |                      |    |    |     |              |

*Source: DOSH Guidelines 2008

According to the Table 2, hazard at the playing field is the highest compared with other areas. Playing field or sport field is an outdoor sports ground for various sports. Local press had reported the death of a student who hit by the goal post during playing football [13]. During walkthrough observation conducted, there are two types of goalposts was used; planted in the ground (Figure 1b) and mobile goalposts (Figure
1a). However, most of the goalposts were found in poor condition which is rusted and broken (Figure 1c). During observation, some of playing field was placed behind the bushes which may attend by venomous animals; snake. According the verbal communication with person-in-charge, state that their workers found snake on the tree. Besides, local press reported there were 3 cases were recorded students bitten by snake [17-18].

Besides, the risk level in office is high but lower than risk level at playing field. Among the hazards that are found in the office is ergonomic. Employees have their own workstation but not safe to use. In terms of ergonomics concept and Guidelines on Occupational Safety and Health in Office, sitting shall have legroom to ensure worker’s leg can be moveable. However, the room had been misused illustrate in Figure 3, by placing books and papers [14-16]. Ergonomics in workplace is important in providing an appropriate and comfortable working area [14]. Space of legroom important to avoid leg muscles stress.

Another hazard that found in school office was photocopiers and laser printer. Normally the modern photocopiers and laser printer, Figure 4, fitted with an ozone filter do not present any hazard to health, provided they are properly maintained. It is recommended that photocopiers are not placed on or in close proximity to the personal workstations of office workers because of possible discomfort from the heat, light and noise generated during the photocopying process [14]. The exit of ozone may cause to fatigue and sleepy in short term effect.

![Figure 1](image1.png)

**Figure 1.** The condition of goalposts: (a) mobile goalpost, (b) Planted goalpost, (c) rusted goalposts.

![Figure 2](image2.png)

**Figure 2.** Playing field behind the bushes (a) Fenced invaded by animals, (b) Field archery near bushes.
Figure 3. Condition under the desk. a) A pile of paper under the desk, b) Things storage under the desk, c) No space for legroom.

Figure 4. Photocopiers and laser printer was placed behind the workstation area. a) Photocopiers and workers in the same place, b) Photocopiers behind the workstation.

4. Conclusions
In conclusion, the risk of hazards found was high and potential to cause harm and accident to employer, employees, students and visitors. Based on the findings of the study, there are some unsafe and risky and deadly situations which were rusted goalposts and school field near the bushes or forests. Compared to the reports of accident in school, accidents hit by goalposts and bitten by snakes were the highest cases after the road accident cases. As a conclusion, the result of the study shows that the cause of accident was caused by a rotten and decayed goalpost and falls on students. Besides, school fields near the forest or bushes infested with poisonous animals unnoticed. Therefore, schools management need to monitor every single of risky area of the school by fencing the area with safety tapes or placing warning signs as a warning, so that students were cautious and aware of risky areas.

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