

Fire safety education for staff members - case study

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Abstract

Changing people's attitude towards fire safety is the most important goal in this research. Looking closely how the fire safety education effects the peoples response in unannounced evacuation drill was the aim of the study. Constant changes in the process of the training made the improvements possible and weaknesses were identified. The staffs' attitude towards fire safety changed to the better and behaviour of the participants taking educational training shows that staff acts correctly, e. g. instructs the students or give directions to evacuate and do not lose unnecessary time for leaving the building.

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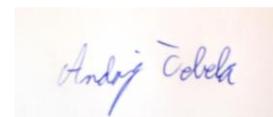
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30 of April, 2012

A rectangular box containing a handwritten signature in blue ink that reads "Andrija Čobela".

Abstract

Training is present in many areas, e. g. military, aviation, management, etc., in order to obtain a specific set of skills needed for an explicit job. Training is used extensively in emergency preparedness trainings, which are rare events and need special attention. In the past as well as recently, many severe accidents happened in which people lost their lives and property damage was enormous, partly, due to lack of training.

The aim of this case study is to introduce a different type of fire safety educational training and measure how it influences the attitude of the faculty staff. The results will hopefully show that the decision making process was more precise, including the elements of the educational training into the evacuation situation.

The research will look closely on training of staff at Lund University. An observation of situations was done in 2008, 2010 and 2012 year. An unannounced evacuation drill was performed where participants filled out a questionnaire afterwards which was measuring their attitude towards fire safety and the perceived seriousness of the fire alarm. Possible improvements are presented in the report.

Staff attitude towards fire safety changed to the better as a result of the training. Constant changes in the process of training make the improvements possible and weaknesses were identified. The behaviour of the participants of educational training changed from the start of the case study in 2008 until 2012. More people act correctly and they do not lose unnecessary time for evacuating from the classroom. Instructions from faculty staff are given to the students clearly during the evacuation while staff made sure that everybody left the classroom.

Finally, research needs to be expanded to other countries with different norms and current attitude towards fire safety. Implementation in existing models for evacuation of gathered data should be made. There is still plenty of space for improvements and further changes.

Povzetek (summary in Slovenian)

Usposabljanje se uporablja v številnih področjih, npr. vojski, letalstvu, administraciji, itd., za pridobitev posebnega sklopa spretnosti, potrebnih za določeno delovno mesto. Usposabljanje, se v veliki meri uporablja pri treningih pripravljenosti na izjemne primere, ki so izredni dogodki in potrebujejo posebno pozornost. V preteklosti in v zadnjem času, se je zgodilo veliko hudih nesreč, kjer so ljudje izgubili življenje ali pa je nastala velika materialna škoda in morda bi lahko s tovrstnim treningom minimizirali število žrtev v požarih.

Cilj študije je predstaviti drugačen način treninga za požarno varnost in pri tem meriti učinek odnos osebja. Iz merjenja odnosa do požarne varnosti se upajmo da ugotovilo da proces pri odločitvah veliko bolj jasn in natančen, vključujoč elemente teoretičnega treninga za dogodek evakuacije. Raziskava je potekala na fakultetnem osebju na Lund Univerzi. V letih 2008, 2010 in 2012 so se izvajala opazovanja in nenajavljene evakuacijske vaje, kjer so udeleženci izpolnili vprašalnik. Vprašalnik je meril odnos do požarne varnosti in resnost do evakuacijskih vaj. V poročilu bodo predlagane potencialne izboljšave.

Spremljanje odnosa ljudi do požarne varnosti je najpomembnejši cilj v tej raziskavi. Stalne spremembe v procesu usposabljanja, omogoča izboljšave in identifikacijo pomanjkljivosti. Obnašanje udeležencev se je s pomočjo izobraževanja spremenilo od začetka študije, pa do tega leta. Več ljudi se odzove pravilno in ne izgublajo časa za zapustitev stavbe. Fakultetno osebje je jasno posredovalo navodila, kako se evakuirati iz stavbe, študentom in pred zapustitvijo učilnice so se zaposleni prepričali, da so vsi zapustili učilnico.

V prihodnje bi bilo potrebno raziskavo razširiti na druge države, ki imajo drugačne norme in sedanji odnos do požarne varnosti, ter kasnejšo implementacijo rezultatov v obstoječe programe za simulacijo evakuacij, kjer je še veliko prostora za nadaljnje izboljšave.

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"When first training for Health and Fire Safety at work in my country was performed, a questionnaire was given to me by external fire safety company official, explaining that we will go through, examine the questions and discuss them. It was feeling like we already had all the solutions and this was done purely because of the legislative reasons. Conversation was a little bit about the evacuation routes, emergency exits and fire extinguisher and its use. No one said anything about the fire in an enclosure and human reactions on emergency situations." (Author, 2012)

In the first place, I would like to thank my mentor, Daniel Nilsson, for all the support and guidance in this master thesis research. Without educational training in fire safety and data collection in previous years this study would not be possible. The importance of working alone and trusting your own decisions made me become prepared for the future.

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Family and friends, it is never too late to take the step towards what you believe will make you happy and more knowledgeable. You were always there when I needed you for a conversation or advice.

To me, you did it! You've overcome your fears & it is time to do whatever you want...

Table of Contents

1. Introduction.....	1
1.1 Past accidents.....	1
1.1.1 Our Lady of Angels school fire.....	1
1.1.2 King's Cross fire in 1987	2
1.1.3 MGM Grand Hotel Fire, Las Vegas	3
1.1.4 Past accidents conclusions	4
1.2 Training, drill and other terms	6
1.2.1 Training.....	6
1.2.2 Design of training	7
1.2.3 Drill	8
1.3 Recommendations from handbooks and legislation	8
1.3.1 British handbook	9
1.3.2 Swedish legislation	10
1.3.3 Italian legislation	11
1.4 Other areas of training	12
1.4.1 Industrial and Commercial training.....	13
1.4.2 Aviation and astronaut training	13
1.4.3 Military training.....	14
1.4.4 Training railway operation staff	14
1.4.5 Emergency response training.....	15
1.5 Aim.....	15
1.6 Method.....	16
1.6.1 Questionnaire A.....	16
1.6.2 Questionnaire B.....	16
1.6.3 Observations	17
1.6.4 Video cameras	17
1.6.5 Interviews.....	17
1.7 Limitations.....	18
2. Method.....	19
2.1 The setting- Holger Crafoords Ekonomikum (EC).....	19
2.2 Techniques to collect data	21
2.2.1 Chronological description of case study	21
2.2.2 Questionnaire A.....	23

2.2.3 Questionnaire B.....	25
2.2.4 Observers	25
2.2.5 Cameras.....	26
2.2.6 Interview	26
2.2.7 UED staff preparation and plan.....	27
2.3 Feedback to the evacuees in EC by management.....	28
2.4 Changes in the EC during the years.....	29
3. Results	31
3.1 Based on Questionnaire A.....	32
3.1.1 Demographic data	32
3.1.2 Attitude towards fire safety through years.....	34
3.1.3 Seriousness about alarm and evacuation drill	36
3.2 Observers reports.....	36
3.3 Video recordings for UED	38
3.4 Based on Questionnaire B	39
3.4.1 First part - individual level.....	39
3.4.2 First part - organizational	41
3.4.3 First part - environmental	41
3.4.4 Second part	42
3.5 Interview results.....	43
3.5.1 Interview A	43
3.5.2 Interview B	44
4. Discussion	45
5. Conclusions.....	47
6. Future research	49
Appendix.....	55

Table of Figures

Figure 1. The Training cycle (Arnold, 2005).....	8
Figure 2. Staff training in Italy for high hazard risk of fire (Decreto Ministeriale, 1998, p. 25)12	
Figure 3. 3D representation of EC (Norén, 2012)- reprinted by permission.....	20
Figure 4. Timeline of the whole experiment.....	21
Figure 5. Research procedure of the case study	23
Figure 6. Position of the cameras in EC3 during UED (Norén, 2012)- reprinted by permission	
.....	26

Figure 7. Timeline of the UED in EC that was handout to the ES.....	27
Figure 8. General floor plan for ES with all the positions of the personal (Norén, 2012) - reprinted by permission	30
Figure 9. Educational training for staff member in EC in different years	31
Figure 10. Number of evacuees in UED in 2008, 2010 and 2012.....	33
Figure 11. Number of students, teachers and other staff members in UED experiments	33
Figure 12. Knowledge in fire safety procedures	40
Figure 13. Type of training received before training for staff on EC	40
Figure 14. Message communicated to the staff from someone else about fire cues	41
Figure 15. Queues inside of the EC	42

List of Tables

Table 1. Grading scale for the questionnaire A.....	24
Table 2. Number of evacuees who participated in filling in the questionnaires	32
Table 3. Number of students, teachers and other staff members in UED experiments.	34
Table 4. Average age and standard deviation for participants in 2008, 2010 and 2012.	34
Table 5. Attitude response towards fire safety in UED after theoretical training.....	35
Table 6. Seriousness towards fire safety drills	36
Table 7. Perception of fire safety in 2012 of trained staff	42

1. Introduction

Human behaviour in fire field developed markedly since the late 50's when the first research was done by Bryan. Obtaining deeper knowledge about why people behave the way they do help fire safety engineers to change and design for better process of evacuation when fire situation occurs.

In many research papers it is mentioned that training could have the key influence on successful evacuation of the people outside the buildings. There is no scientific literature that would prove this and show the effectiveness of fire safety training. There is also a question about what kind of training, the period and the content of such fire safety education should be provided to the people in different environment.

People need to feel protected and safe in any time or occasion. With a special type of fire safety education on fire issues, an improvement can be made towards better and safer working environment.

1.1 Past accidents

In the past, many severe fire accidents have occurred which should be an example for what could go wrong and what could be done well. Besides technical disadvantages that led to the untenable fire conditions there was lack of fire training of the staff and their response to the extreme, fast evolving events which were followed by making the wrong decisions. The next three cases are given as examples to illustrate the lessons that we, as a society, hopefully have learned and the last case will show that the staff influenced only a minority of non-staff members. A different strategy to inform the people about the fire would be required.

1.1.1 Our Lady of Angels school fire

The fire started in a Catholic school in Chicago on December 1958 just a short period before the end of the lectures. The causes of death for ninety pupils and three nuns were smoke, heat and fire. The heavy toll was unnecessary and could be avoided. The fire was referred as

"Our Lady of the Angles School Fire", and is a valuable lesson to learn from (Babcock & Wilson, 1959).

The building was considered as a "firetrap" because there was no separation into fire areas with fire resistant doors. The fire was first noticed by a few pupils who reported that they smelled smoke (time 00:00 of the fire cue). The teacher's first response was to tell the children that they should remain seated and afterwards she went to the next room for advice. The colleagues response was to run to the principal's office and alert her. Time had passed and no other teacher was notified about the smoke and no general alarm was raised. The teachers who knew about the smoke evacuated their pupils and at that time the smoke was already at the head level. 12 minutes elapsed from the first notification of smoke to this part (Babcock & Wilson, 1959) and not all of the staff inside the school were aware of the situation. From the analysis of past fire accidents it is evident that there is a strong connection between late response and the number of the deaths. The training for fire emergencies was inappropriate and from the fire report it is evident that school staff acted incorrectly in the early stage of the fire (Babcock & Wilson, 1959).

1.1.2 King's Cross fire in 1987

King's Cross Underground fire in 1987 is another example where there was not sufficient education in fire prevention. Report by Fennell (1988) stated that there was no continuous planning for the risk situation and that was why staff was not prepared. Fire safety officials acknowledged the situation in their report:

"London Underground has recognised that the King's Cross fire revealed the need for more and better training in fire prevention and evacuation procedures, more on-the-job training at stations, more practical training, and joint training exercises with the emergency services." (Fennell, 1988, p.131)

Fennel (1988) identifies critical points in improving the personal, organizational and environmental features, namely lack of adequate training, lack of a plan for the evacuation of the station, no utilization of communication equipment and no supervision from a control

centre. Under current guidelines for Underground staff members, a fire had to be tackled by them and the fire outbreak was regarded as something usual that can happen any time (Fenell, 1988). The legislation in Great Britain pertaining to how to proceed in fire emergencies in metro systems has changed enormously following the King Cross' fire. By understanding what people would do, react, safety measures were designed to improve fire safety.

1.1.3 MGM Grand Hotel Fire, Las Vegas

Accident investigation revealed that the staff members of Hotel did not respond correctly and did not report the fire to fire authorities right away. Especially, staff did not notify the guests about the fire before the fire department arrived and this is clear indication of lack of training and shortage of emergency procedures. The fire was a severe one with a lot of casualties.

National Fire Protection Association (NFPA) commissioned a study on the MGM Grand Hotel Fire and how people responded was investigated. 1960 guests were registered in the computer base of the hotel and to all of them a questionnaire was sent. The analysis was based on the response of 554 respondents (Bryan, 1983). The majority of guests were with their spouses when the fire started.

Guests became aware of the fire very differently by a variety of physical stimuli including seeing or smelling the smoke and psychological stimuli such as being notified by others, hearing a knock on their door or people yelling. There was no simultaneous notification about the fire because there was no alarm bell. Many of the guests became aware of the fire when the fire department arrived. This period is referred to as the alarm phase. Guests did not leave immediately after becoming aware of the fire, instead they prepared first. They got dressed, got out of the bed, notified roommates or opened the doors, looked out the windows and made attempts to phone. Only 44 % were successful in the first 15 minutes of becoming aware of the fire, while over 50 % were evacuated in more than an hour later. A lot of them decided that evacuation is not possible at that time and the choice of defending inside the place was made (Bryan, 1983).

Staff could have had a significant role in notifying the guests about the fire but from the questionnaire results it is clearly seen that most of the guests were still in their rooms and did not have any interaction with the hotel staff. Only 15 guests reported receiving evacuation assistance from hotel staff (Bryan, 1983). There was no emergency plan to be executed and notification about the fire was delayed (Best, 1982). Staff did not precede accordingly:

"There was no evidence of the execution of a fire emergency plan, and there was some delay in notifying occupants and the fire department. Following discovery of the fire (7:05 - 7:10 am), the Casino level fire announcements were not given until 7:15 or thereafter. There was no evidence of a fire evacuation alarm signal alerting high-rise tower occupants." (Best, 1982, p.60)

The fire took the lives of 85 people who were located in different floor levels and in various locations. The spread of smoke to the upper levels of the hotel was because of ventilation shafts and other openings which did not separate the floors(Bryan, 1983).

From the report it is clear how the staff was proceeding to extinguish the fire and notify the guests in the same area. What is not clear is whether the staff tried to get in touch with the guests in the rooms which were most likely asleep.

1.1.4 Past accidents conclusions

In many past reviews of the fire accidents a part with staff response can be seen. From big fires, like the King's Cross Metro Fire an immediate change in the legislations and procedures to proceed in the event of fire were made. MGM Grand Hotel Fire in Las Vegas led to the change of the rules in the Hotel industry by removing flammable materials and replacing them with non-flammable ones. A procedure in staff response was implemented and all the parts of the building had to have an automatic alarm system. From the guests' reports it was obvious that they became aware of the fire too late and some were even not aware of it at

all. Training for emergency response in case of fire was not in place and the notification of guest was not issued right after fire was discovered.

From the latest report of The World Trade Center evacuation study (Gerson, 2009) risk factors were identified and recommendations for improvement by categories were given. Study identified three categories that coincide with training needs analysis (Arnold, 2005):

1. Individual level
2. Organizational level and
3. Environmental (structural) level

A delay of evacuation is made by the following factors (Gerson, 2009):

- seeking out others to form a group for mutual support and information-sharing
- personal concerns about own health and ability to evacuate
- individual behaviours that delay initiation of evacuation
- uncertainty about which evacuation route to take including: exit locations, staircase, endpoints, roof access, locked re-entry points, when to use elevators

Risk factors that influence length of time to evacuate (Gerson, 2009):

- lack of knowledge and poor emergency preparedness
- footwear that inhibit rapid exit down stairs and through debris field
- staircase characteristics
- complex building design cause confusion
- suboptimal workplace emergency safety climate
- inadequate communication system infrastructure
- procedures for evacuation of persons of health conditions or disabilities

When assessing risk factors in the company recommendations can be made on individual, organisational and structural level.

1.2 Training, drill and other terms

There are some components that are imperative for understanding the research process, e. g. training, drill, etc. In the following section a description of these terms is made. Current legislation is described to show present measures about fire safety training in different countries.

1.2.1 Training

To train is to prepare oneself or come into a state of efficiency for a race, match, etc. (Hayward & Sparkes, 1982). Training is the process of learning the skills you need to do the job (Oxford Dictionary, 2010). It can also be the process of training or being trained; instruction; a course of special exercises, practice, food, etc., to keep sportsman or animals healthy and fit (Longman, 1987) or the education, instruction or discipline of one who or that which trains (Webster's, 1989). All the definitions of the word training are correct.

Kuligowski (2009) has identified a series of factors relevant for human behaviour in fires. A response or an action of a person is the result of a behavioural or decision-making process. Occupants' response is determined by following processes: 1) awareness of the cues, 2) interpretation of the situation and risks, 3) making a decision about action and 4) action performance. A variety of factors will influence a decision making process, such as experience with fire, familiarity with the environment, knowledge of language and many others including the training for fire safety emergencies (Kuligowski, 2009).

Training should be designed for different types of occupancies in a form of theoretical practice, exercises (e. g. evacuation from a room in 10 s), drills, preparation for unexpected events, etc. A study was done (Huseyin & Satyen, 2006) to explore the importance of fire safety training in enhancing fire safety knowledge and response to the fire. The study assessed the current level of fire safety knowledge within general community. By providing fire safety training to all of the participants fire safety knowledge increases and the accuracy of response to a fire scenario increases also. Studies argued that with proper fire safety training a reduction in the rate of fire casualties could be suggested (Huseyin & Satyen, 2006).

1.2.2 Design of training

It is more and more important for the organization to adopt continuous preparation for everyday operations in the work place. A prominent role of training to obtain certain skills and abilities is recognized as a key parameter in the working environment.

Traditionally in Europe training was strongly linked to craft apprenticeship. Individuals obtained a set of skills which were not going to change during the course of their working period, and due to that people stayed with one company their entire working life, the training was performed for specific type of work in designed area (Arnold, 2005). For example, a young trainee who just started his work as a glass blower had to be taught how to use tools, preparation of the char and many other precision details about the profession. He had vague knowledge about the fire safety, etc.

Since then much has changed and people nowadays switch jobs or sectors much more easily and quickly than in the old days. Organizations cannot afford to train a specific employee for a longer period of time e.g. five years like in apprenticeship. The speed of changes in the industry and technology increase, and development of new jobs has created an environment where an individual has to continually learn new techniques, usages of system, adopt obtained skills, etc. to progress. Flexibility of organization is achieved by moving sideways into new roles in order to develop a diverse range of skills for their employees, which can be adapted easily and effectively (Arnold, 2005). Military, for example, which with a development of new weapons, tactics, drills with other nations, invests a lot of resources in developing techniques for obtaining specific type of skills (Fletcher, 2009).

However, the process of the training should not be taken lightly and with carelessness. Focus has shifted from individual needs to creating continual learning environment where employees can obtain specific needs. Nevertheless, training can occur at any point - as part of observing and learning from the others. The department responsible for training has to carefully design the process by performing training needs analysis (TNA), training design (TD)

and training evaluation (TE). Together, these three components establish The Training Circle, see Figure 1, (Arnold, 2005).

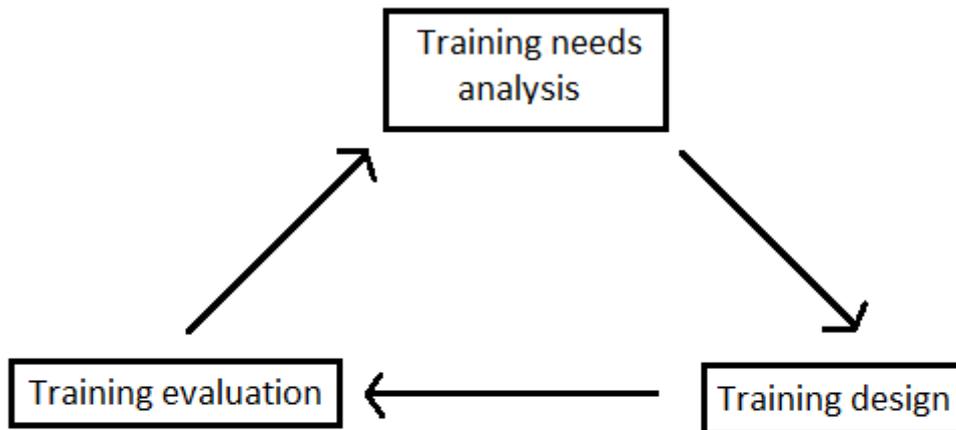


Figure 1. The Training cycle (Arnold, 2005)

1.2.3 Drill

Drill is a way of learning something by means of repeating exercises. It can also mean a practice what to do in an emergency, for example if there is a fire (Oxford Dictionary, 2010). It can also mean training and instruction in a subject or for a purpose, esp. by means of repeating and following exact orders (Longman, 1987). It is a very common way to practice for evacuation from the building, especially office building but could not improve a lot if you do not tell people what to do and prepare them for the evacuation (Goedken, 2007). Evacuation drill, besides practicing for the evacuation, could be a very good tool to identify weaknesses in the system, critical points that can make evacuation unsuccessful.

1.3 Recommendations from handbooks and legislation

From European Directive 89/391/ EEC activities have to be established to ensure health and safety of the workers by the employer. The employer has to provide information and training to (89/391/ EEC):

- avoid risks
- give appropriate instructions

- adapt working condition
- in addition, if there is immediate danger to the workers a first aid, fire-fighting and the evacuation must be established.

Handbooks frequently state that some kind of training should be provided to the people inside of specific organization, but there are no conclusive data that this is really making people respond better in the fire emergency situation. A few examples will be given throughout British, Swedish and Italian legislation.

1.3.1 British handbook

British guidelines are referring to several guidebooks where some help is provided:

"All staff must receive adequate training based around a prepared emergency plan of action for the place of work" (Coules, 2000, 222-243).

The emphasis would be on "adequate". What is sufficient training for considered work environment and can this be measured? Does training in the form of theoretical lessons really increase the response to fire cues and how effective it is? On the other hand, many people consider fire safety to be general knowledge among the population and assume that people know how to react in similar situations. A closer look at human behaviour and fire development shows that information on what is going on in the fire has to be communicated and previously explained to the staff members (Coules, 2000).

People with impairment, the public and the visitors who may be in the building during the time of the evacuation drill or a real fire - the staff is obliged to direct them towards the exits, especially because of their unfamiliarity with the building. Information on how the non-staff members should be handled has to be given on the training course (Coules, 2000). A general staff training description was proposed to fit the company. Employees should receive basic briefing on fire safety in short beginning time period. Basic criteria to formulate staff training, which suits companies' environment, was proposed (Coules, 2000):

- explanation of the emergency procedure and its description

- special type of hazard identified on work place
- staff duties and responsibilities
- past risk assessment findings

Some handbooks proposes a two hour course without any reference to why two hours would be effective in the training (Coules, 2000). Effectiveness of this kind of training is questionable and people do not usually agree with the way how they are presented.

Staff response in evacuation emergencies will depend on many factors, e.g. on the training that people receive in a form of theoretical lecture, practical training, evacuation drills, etc. On the other hand, it is argued that event attributes such as rarity, uncertainty, disruption and urgencies are going to influence people's decisions (Gwynne, Au, Purser & Boswel, 2011). To illustrate this the following case is presented:

Faculty staff can easily ignore a disruption (alarm bell) by saying to all of the students to stay in their position and do not respond on a given cue. Disruption commands to abandon the activities in progress and carry out the evacuation procedure. An authority, which wants to finish the class, will do anything to keep students in the classroom (Tong & Canter, 1985).

Staff response will depend on the nature of the event, technical and human resources, nature of the space and procedures in place. The event is a big disruption of normal operations in the building and it can cause several responses, as staff prevarication, procedural ambiguity, communication and misinterpretation which influences actions to delay evacuation (Gwynne, Au, Purser & Boswel, 2011).

1.3.2 Swedish legislation

Swedish legislation is very open. AFS:1993:56 applies to the events that might occur and the employer is responsible to provide sufficient knowledge to the employees, e. g. instruction how and when an employee should evacuate. In legislation it is stated that evacuation should be practiced regularly in periods that are necessary for individual institution,

providing detailed written description of all taken steps (AFS:1993:56). Providing evacuation procedures is not the only way:

"Exercise may be replaced with information about the data yield equivalent knowledge evacuation drill." (AFS:1993:56, p. 7)

A previous statement gives other possibilities to arrange the fire safety training in different way. AFS:2001:1 specifically imposing that someone in the organisation or outside consultancy has to be responsible for health and safety of the workers. Information have to be provided about environmental risks, preventive measures and measures to appoint, train and equip the employees for evacuation, etc. (AFS:2001:1).

1.3.3 Italian legislation

Another example of legislation for staff training in fire emergencies are Italian codes which separates risk into low, medium and high. Based on which rang the institution is, e. g. high risk activities are in Hotels with more than 200 beds, schools of all levels with over 100 people present, etc., the period and the topics of the training are described (Decreto Ministeriale, 1998). For example (see Figure 2):

COURSE C: COURSE FOR EMPLOYEES IN FIRE ACTIVITY - A RISK OF FIRE HIGH (DURATION 16 HOURS)

1) The fire and fire prevention (4 hours)

- Principles on combustion;*
- The main causes of fire in relation to the specific working environment;*
- Extinguishing agents;*
- The risks to people and the environment;*
- Specific measures to prevent fires;*
- Behavioural measures to prevent fires;*
- The importance of control of the workplace;*
- The importance of checks and maintenance on the fire-fighting.*

2) The fire protection (4 hours)

- Passive protection measures;*
- Escape routes, compartmentation, apart;*
- Equipment and extinguishing systems;*
- Alarm systems;*
- Safety signs;*

- *Electrical safety;*
- *Security lighting.*
- 3) *Steps to be taken in case of fire (4 hours)*
- *Steps to be taken when you discover a fire;*
- *Procedures to be adopted in case of alarm;*
- *Mode of evacuation;*
- *How to call the emergency services;*
- *Working with the fire brigade in case of intervention;*
- *Exemplification of an emergency situation, and procedural and operational.*
- 4) *Practical (4 hours)*
- *Having read and clarifying the main equipment and extinguishing systems;*
- *Having read about personal protective equipment (masks, self-protector, suits, etc..)*
- *Tutorials on the use of the equipment off and individual protection.*

Figure 2. Staff training in Italy for high hazard risk of fire (Decreto Ministeriale, 1998, p. 25)

From Italian legislation would be interesting to see if this training syllabus is supported with some research.

1.4 Other areas of training

Training is effectively used in preparing the staff in certain areas like aviation industry, military, schools and many other fields where the system needs a certain period of acceptance. In the light of modern business companies are recognising the importance of specialised training.

Flexibility, active participation, an environment conducive to learning, networking and interaction can augment training and effectively increase the transfer of the knowledge to obtain a specific set of skills. Staying competitive is one of the reasons why the companies are investing a lot of resources into training. To reflect, an employee should be treated as a customer, as the level of the service provided. Opening new questions will deepen the understanding and break the myths on human behaviour in fires (Schraeder, 2009).

Some of the areas where training is widely accepted are discussed in the following paragraphs.

1.4.1 Industrial and Commercial training

An Indian company for power distribution and transfer is one of the many who believe in the excellence of training program. Individual performance and professional growth has to be improved by the training. In the training results analysis the management part of the group found that hand-outs and training manuals are valuable tools for learning. The non-management part of the group was pleased only with exercises and activities provided. For the observers this seemed logical because non-managerial staff is performing tasks on operational level. Interesting part of the analysis showed that the majority of the trainees felt prepared to go and perform the task. A difference in time when the training was performed was observed for managerial and non-managerial staff. Non-managerial staff needed more time to absorb what has been taught than managerial staff. In general a vast majority felt that this programme was worthwhile in terms of money and their time (Ghosh, Joshi, Satyawadi, Mukherjee & Ranjan, 2011).

Research on this case study yield factors important for the content (Ghosh, Joshi, Satyawadi, Mukherjee & Ranjan, 2011):

1. trainer's clarity
2. trainer's communication
3. practical application

1.4.2 Aviation and astronaut training

Candidates for astronauts participate in an intense two year training program by NASA's Johnson Space Centre in Houston. Their training consists of shuttle and space station systems, guidance and navigation, orbital dynamics and material processing, mathematics, geology, meteorology, oceanography, astronomy and physics. On the other hand, land and sea survival, scuba diving, space suits, and weightlessness are also part of the trainee program. Training needs to be successfully accomplished to be designated as NASA career astronaut (Britannica- astronaut training, 2012). Training has different meaning and volume. For a career astronaut it is very complex and it takes longer time.

In the Second World War Japan and Germany started with exceptionally well-trained aviators, however, as it turned out later, their capacity to train the replacements was inadequate. This worked to the advantage of British Commonwealth and the United States because of the established large, well-organized air-crew training programs. Pilots were training in different plane sizes and on variety of places (Britannica- aircraft training, 2012). Continuity in company training for employees has vital impact on performance and capability to deliver services to the customers.

1.4.3 Military training

Military contributed to the development of various educational and training technologies. Crew, units and teams are educated and trained as a collective. New technologies that are extensively used are computer-assisted instructions and simulations. Their goal in developing these tools was to increase portability and reusability of these systems. Training for "incredibly complex tasks" became one of the advantages of simulations which cannot be performed in real time. For example, learning how to apply sophisticated knowledge of oceanography in using an advanced sonar to detect submarines or how to apply operational procedures and tactics in making collaborative decisions in confused time-pressured environment (Fletcher, 2009)

1.4.4 Training railway operation staff

In Hong Kong an increase in passengers in the railway system was excessive, which is why a new training was designed to explain crowd dynamics and human behaviour. Identifying that ignorance of crowd behaviour dynamics and complacency cannot be overlooked when moving large numbers of people. A study was performed on staff and passengers by observation and, in addition, the safety features, ergonomics, physical conditions on station, platform, escalators, concourses and in carriage were considered. A two-day modulus on passengers' behaviour and management training was introduced for all operating, management and supervisory staff (Marsden, 1998).

1.4.5 Emergency response training

Emergency training varies from flammable liquid spill to earthquake disaster, therefore, all of these situations needs emergency trained personnel.

"Skills and knowledge that are rarely used must be applied to problems that may present greater risk" (Schroll, 2002).

The emphasis is on doing it right for the first time because poor decisions and actions cannot be changed. Emergencies are fast-paced and dynamic, which makes them harder to predict. Paying attention to all the details will minimise the surprise factor, especially because one emergency situation differs from the other. Training should be as realistic as possible and effectively balanced with safety. In this kind of learning environment mistakes are encouraged because trying it again will the participants abilities to do it right. Training is a continuous process and evaluation should be designed like that (Schroll, 2002).

1.5 Aim

The aim of this case study is to investigate if educational fire safety training influences behaviour and attitude of the trained staff members. On the other hand, to introduce a different type of fire safety educational training and measure how it influences the attitude of the faculty staff members from the 2008, when no one had any training, until year 2012. The purpose was also to describe a fire characteristics and different theories on human behaviour to the faculty staff. Additional aim was to show that the decision making process of staff personnel was more precise.

Diversity of research methods made this case study open for other aspects of human behaviour in fire, but a hypothesis that were set in the beginning needed to be confirmed or denied. Following hypothesis were made:

- attitude towards fire safety will increase with providing educational training
- staff response time on fire cues will be shorter and evacuation from the building will take shorter period with increased training
- staff will assume leadership role and take the initiative to evacuate if trained

1.6 Method

The thesis research will look closely on training of staff at the Lund University institution. An observation of two situations was done. First one was how people behave in a fire situation and the second, how much would two hours of theoretical lecture of fire safety education influenced the staff decision making process. Theoretical lessons consisted of fire characteristics in an enclosure and human behaviour in fires. For detailed description of theoretical training see Appendix A.

An unannounced evacuation drill (UED) was performed where participants filled in a Questionnaire A which was measuring their attitude towards fire safety and their seriousness of the fire alarm. An important step in a process of fire safety, is recognizing the lack of skills and knowledge which would minimise the response time of the occupants. The experiment was taking place through several years, starting in 2008, 2010 and 2012. Another questionnaire, Questionnaire B was developed to see the knowledge of staff members and attitude towards fire safety. The observers were put inside of the classroom together with cameras and interviews were used to illustrate the case study.

1.6.1 Questionnaire A

A questionnaire A was developed in 2008 with cooperation of management of EC and Department of Fire And System Safety, LTH. The Questionnaire was prepared to test the hypothesis that faculty staff attitude towards fire training will increase from 2008 further, by performing educational training.

1.6.2 Questionnaire B

A second questionnaire, Questionnaire B, was designed in year 2012, to check, fire safety knowledge and attitude towards Individual, organizational and environmental levels in the institution, for the staff members who were having an educational fire safety training. The questions were designed to see if participants of the educational training had any previous knowledge of the fire situations and the way how they should respond on it. To make it

clearer, in which area the improvements should to be made, a subsections were made, measuring:

- faculty staff personal level of the knowledge and their attitude towards fire training
- faculty staff opinion towards organizational mechanisms and if information were transferred, to support institution's role in knowing what is going on where they are working, e. g. instructions from security or other teachers
- faculty staff knowledge about their working environment and the attitude towards it

Groups of faculty staff fulfil the first part of the questions (measuring the knowledge about fire safety) before and second part (measuring attitude towards fire safety training) on the end of theoretical lesson.

1.6.3 Observations

Observers were put inside of the classrooms in 2008, 2010 and 2012, pretending that they are a part of a group. Observing the reaction of the students and especially the behaviour and the response of the teacher who was in the classroom was their task.

1.6.4 Video cameras

Cameras were installed in all of the classes where observers were posted in year 2012. Comparing and upgrading the reports from observers, to the video records, will make the analysis of the events more detailed. A precise time was transcribed and can be helpful for future research.

1.6.5 Interviews

Three interviews were made after UED with staff members of the EC. Two of them had educational training and the third was a guest lecturer, who did not receive any training from the EC. Two interviews were compared and analysed to other observed data. This method is helpful to get the alternative perspective.

A comparison between years was made to see if any significant changes were made towards fire safety. Observation of their response on the cues when the fire alarm went off was analysed. In conclusions some connections and links between educational training and response of staff in UED will be made for this study case.

In history there was many cases where mistakes were repeated and lives were lost. Management of EC recognised a need in improving the fire safety level and approach a Department of Fire Safety Engineering, LTH, which has experts with knowledge and experiences. The process of fire safety training was revised each year and modifications were made.

1.7 Limitations

This case study is limited on a specific type of occupancy (university institution) where people are awake in most cases familiar with the building layout. The educational training was performed in 2009, 2010 and 2012 and UED was done starting in 2008, where no one had the training and continuing in 2010 and 2012. In 2010 no notification of staff members inside the classroom had the educational training was made and the filled out questionnaires from the evacuees were not saved. This is a big disadvantage and the limitation of doing a comparison of several years.

The case study is focusing only on linking the fire safety education to response on the UED and do not examine the other important factors in evacuation, like speed of movement or occupancy characteristics which also influence the capability to evacuate from the building.

Improvement of the training and modifying the parts of the method will be described throughout the text, as part of constant changes in the institution environment throughout the years.

2. Method

A variety of methods chosen in this case study, made it interesting to see how the same perspective can be observed in different ways. The most important is the questionnaire which is measuring the attitude and seriousness of the evacuees in different year when educational fire safety training was performed.

2.1 The setting- Holger Crafoords Ekonomacentrum (EC)

This study was performed at The School of Economics and Management (EC). The School is part of Lund University and it lies in Lund, Sweden. The buildings are located in the east part of the city and consist of building 1 (EC1), building 2 (EC2), building 3 (EC3) and Alfa building (see Figure 3).

The faculty, was created in the late 1980s when the first part of the campus (EC1) was built by a generous donation of the Holger Crafoord Foundation. A change was made in the organisational establishment and The School of Economics and Management became independent in 2004. The increase of students made them extend the study area to the adjacent building called Alfa (Csanta, 2012).

The experiment focused on buildings EC 1, EC 2 and EC 3 where the majority of students are located. Most of the classes are conducted in the buildings and faculty staff has their offices there.

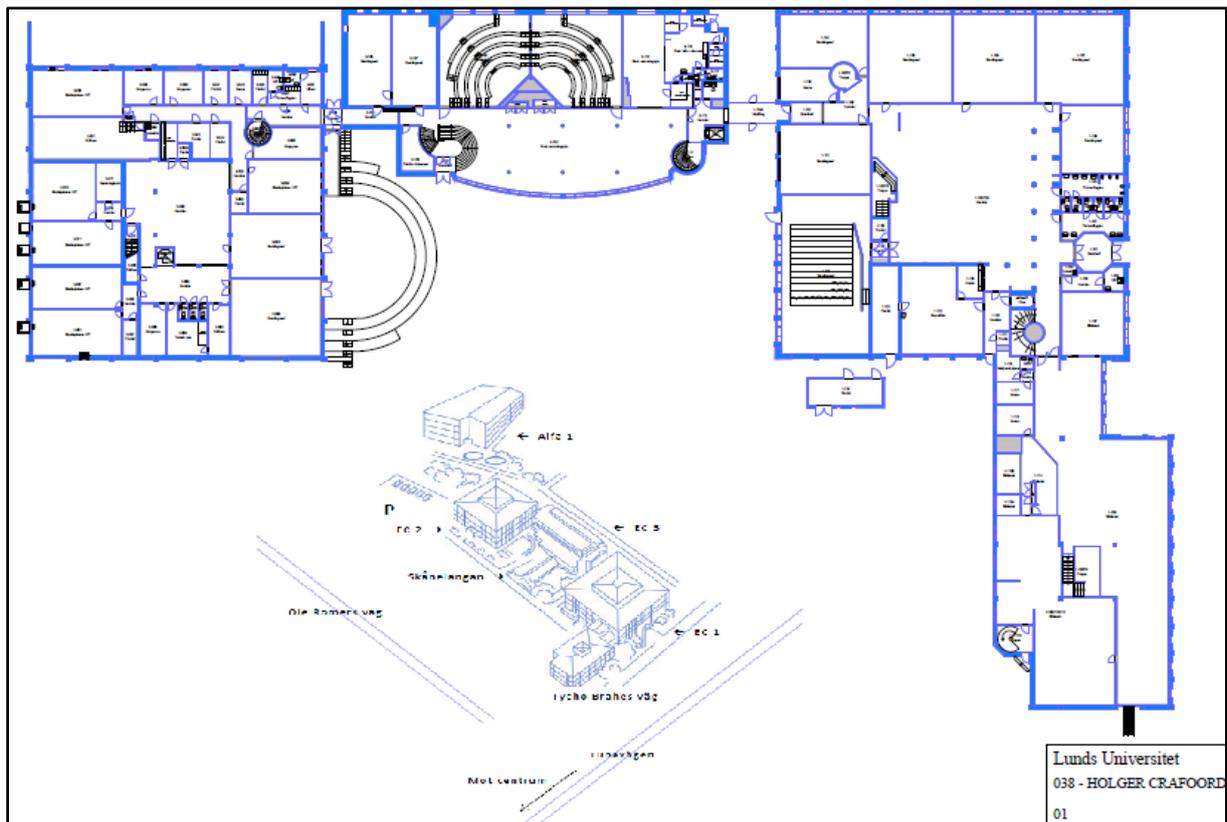


Figure 3. 3D representation of EC (Norén, 2012)- reprinted by permission

The School of Economy and Management conducted a joint project with Department of Fire Safety Engineering at Lund University. The study intends to connect the attitude of faculty staff members, providing them educational/theoretical training of fire safety, and afterwards an UED was performed. For EC, a fire safety training was managed by Department's of Fire Safety Engineering expert, which designed the course schedule and the topics presented to the listeners. Syllabus was made in cooperation with the management of the EC. An important change in conducting this kind of training was that different theories were presented to the faculty staff members and then they could decide on their own if they believed the research based fire safety endeavours (see Appendix A). Explaining how people behave in fire situation and giving examples of behaviour that led to right or wrong decisions made this training very diverse.

A single year was not enough to observe changes in the attitude and consequently in behaviour, which is why the research was planned for the period of 5 years and the re-evaluation will be performed at the end of the study (see Figure 4).

2.2 Techniques to collect data

Experiment started in 2008 before the first staff members were educated in fire and human behaviour theories. Building management decided that faculty staff do not show any initiative when the fire alarm is triggered. Real fire situation can occur at any time, which is why a manager of the EC buildings decided to invest in training of the faculty staff members and to analyse the results. A plan was proposed to the outside consultancy with a background in fire development and human behaviour in fires, to take over the teaching part (educational training) and monitoring the progress.

2.2.1 Chronological description of case study

Starting before April in 2008, a educational training was designed. Consisting of fire development and human response in fires topics (see Appendix A), two hour lecture was given to the staff members. In this year, on 9th of April, also first monitored evacuation drill was performed. During the UED the response of evacuees was investigated by observers inside the classroom EC3:108, EC3:109 EC3:207 and EC3:211 and questionnaire A was distribution to all of the evacuees outside the building. The results were analysed and collected.

In 2009, a small group of staff members was educated with the same training (see Appendix A), but no UED was performed. There were no observations or distribution of questionnaires this year. This increased the number of faculty staff members who were educated.

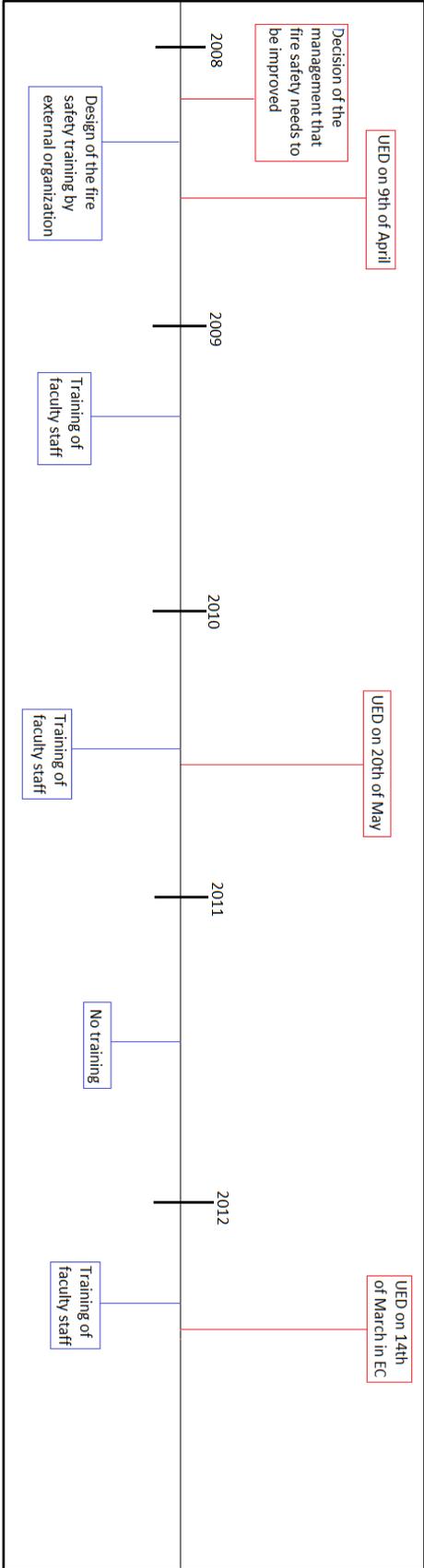


Figure 4. Timeline of the whole experiment

In 2010, the next group of faculty staff was educated (see Appendix A) and the UED commenced on 20th of May. Observers were posted inside the classrooms EC3:108, EC3:109, EC3:207 (two observers). Questionnaire A was distributed to all of the evacuees outside the building and cameras were posted in certain locations in the corridors to observe merging flows. The cameras were not posted inside of the classrooms and comparison to observers report cannot be made.

In 2011 there was no training or UED performed to the staff members.

In 2012, an extension of case study was made and collection and comparison of all the data was made. Educational training was performed on the same manner (see Appendix A), only this time a Questionnaire B was given to the participants. First part of Questionnaire B was given to them before and second part on the end of the lecture. Afterwards, UED was scheduled. On 14th of March, evacuation commanded in EC. Questionnaire A was distributed to the evacuees around the EC. Also, observers were posted in the classrooms EC3:207, EC3:210 and EC3:211, and cameras were placed in the same classrooms to compare the results. In addition three interviews were conducted with the staff members, but two were included into the case study report.

Each year the research procedure was executed in the similar way to obtain as similar results as possible. From previous years weaknesses in staff behaviour were identified and improvements were made to test new hypotheses, like analysing the response of the people to the alarm bell (see Figure 4).

The important part is the cooperation between the management part of EC and the outside institution bringing independent opinion and knowledge about fire safety (see Figure 5). Incorporating fire safety training for the environment of the EC is necessary. As a result, staff can identify with the presented theories. This approach follows a training cycle (Arnold, 2005) in Figure 1.

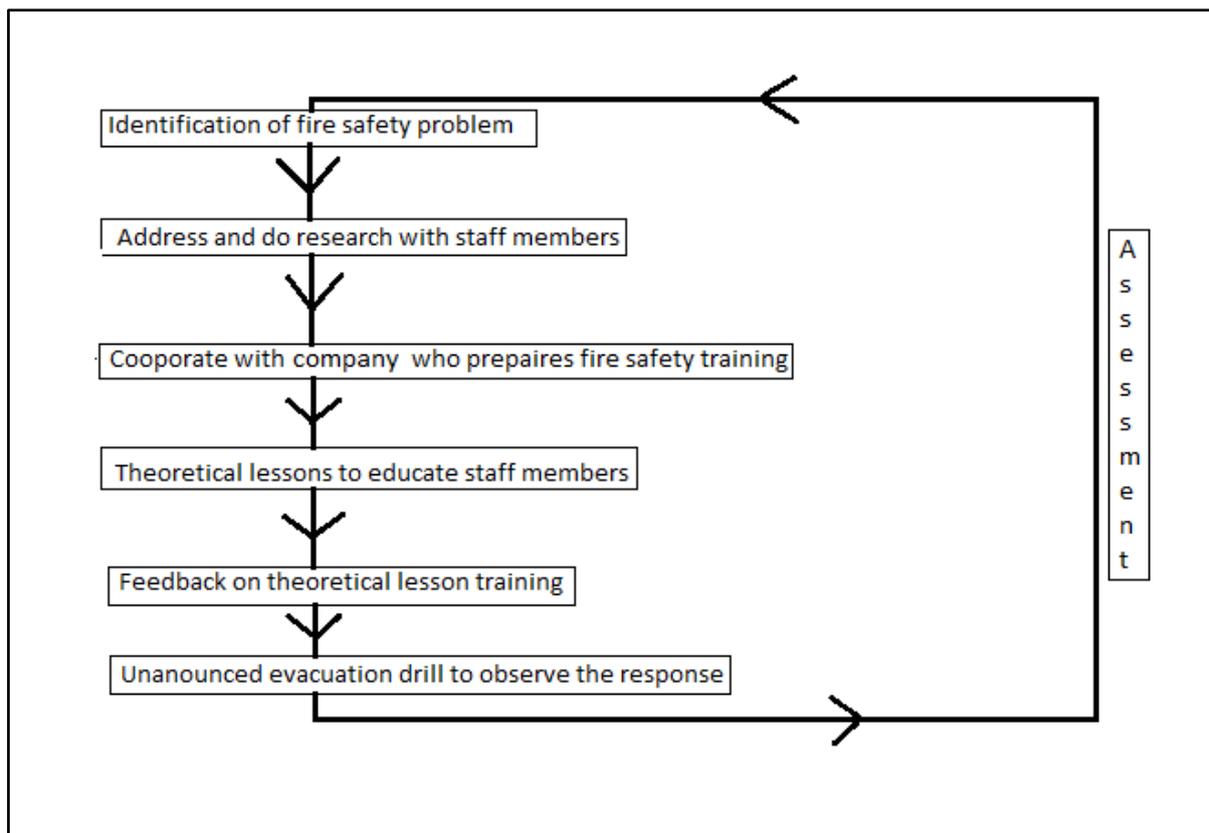


Figure 5. Research procedure of the case study

UED is commonly used in training for the case of real fire scenario in a building. What is rare is that the company's management takes a lead to improve and measure the changes in human behaviour and the attitude of staff with this kind of training. It is normal that a reaction of the individual is the same as group reaction, but what if the trained staff would take the initiative and start the evacuation procedure first.

An overview of the events was described in previous sections. Looking closely on the case study conducted in 2012 year, a serious of method was used to describe and measure staffs' response. In following sections a research methods are described in detail.

2.2.2 Questionnaire A

To observe this case study a questionnaire was developed to check staff attitude and seriousness towards fire safety on the day of the UED (see Appendix B). With this questionnaire, hopefully, a trend of positive increase would be seen among evacuees and especially among faculty staff members. Every second year a bigger percentage of staff was

educated, and that is why the hypothesis is that this will improve response to fire safety emergencies.

The first part of the questionnaire was comprised of some demographic information, e. g. gender, occupation, age and location prior to evacuation. The second part consisted of specifically designed questions to measure the participants' attitude and seriousness towards fire safety. Questions 5.1, 5.3, 5.5 and 5.7 were measuring only attitude and the final score was obtained by summing 5.1 and 5.7, and deducing 5.3 and 5.5 (e. g. $5.1 - 5.3 - 5.5 + 5.7$). The questions 5.2, 5.4, 5.6 and 5.8 measured the seriousness of the alarm at the UED. To determine the seriousness of the UED answers 5.2 and 5.4 were summed and deduced from the sum of 5.6 and 5.8 (e. g. $5.8 + 5.6 - 5.4 - 5.2$). Question 5.9 has been added in 2012 year because the management of the building wanted to test a separate hypothesis that is not consistent with this thesis report but is crucial for the EC and further improvements. This part can be answered by the evacuees in following grading scale from 1 to 4:

strongly agree	(1)
agree	(2)
disagree	(3)
strongly disagree	(4)
Do not know	(not included)

Table 1. Grading scale for the questionnaire A

The third part of the questionnaire was asking for specific knowledge about the assembly points and if there were some difficulties during the evacuation from the building. These questions were open text and evacuees could write freely.

Questionnaire was distributed to evacuees in English and Swedish because it was assumed that there are many international students or faculty staff inside the building. Providing two options of language choice gave equal opportunity to fill in the questionnaire for the all evacuees.

2.2.3 Questionnaire B

Another questionnaire was developed in 2012 with the first part measuring the knowledge of staff members in the beginning, before taking educational training, and the second part measuring attitude towards the individual, organizational and environmental levels of fire safety emergencies, which was distributed to them on the end of the lecture (see Appendixes C). What do they think about the training, organisation of staff inside the building and features of the building was the main aim of the questionnaire and possible improvements to the training could be made.

In the first part of the questionnaire a calculation of frequencies for each answer was done and the ones where faculty staff had to write something were evaluated separately. With this part of the questionnaire an assessment of the knowledge of the participants before the lecture had been made.

The second part was measuring their attitude towards fire safety (for individual, organizational and environmental level). A Likert technique (Albert, 2005) was changed for easier calculations (and because the following scale is a version of Likert's 5-level scale) from given scale level from 0 to 4 into following scale: 0 = 1, 1 = 2, 2 = 3, 3 = 4 and 4 = 5. With this change there will be easier to interpreting the results and answers by the evacuees were graded with following scale from 1 to 5:

- strongly disagree (1)
- disagree (2)
- neither agree or disagree (3)
- agree (4)
- strongly agree (5)

All the results were summed for one response, one person and averaged for all samples. The levels, individual, organizational and environmental, were not compared among each other.

2.2.4 Observers

Observers were posted inside the classrooms to observe in particular the teachers' response during the UED in 20008, 2010 and 2012. The questionnaire they received was focusing on what the teachers and the students did and on their actions taken just after the fire alarm.

The observers were most of the time PhD or other students from Lund University. This was done all three years of the experiment. See Appendix D for Observers Questionnaire layout.

Observers were assembled before the start of the lectures. Their position demanded that they had to be part of the students who were attending the lecture and, unknowingly to the others, they had to write down all the events that were happening inside the classroom by replying to questions prepared in advance. It is very important that the observers did not influence the evacuees' decisions, observing was their only task. The cameras filming were with a wide angle video.

2.2.5 Cameras

In year 2012 cameras were placed inside the classroom to check the response of the teachers and to make comparison between the observers report and what actually happened (see Figure 6). Camera type was Oregon Scientific ATC-2K, 2007.

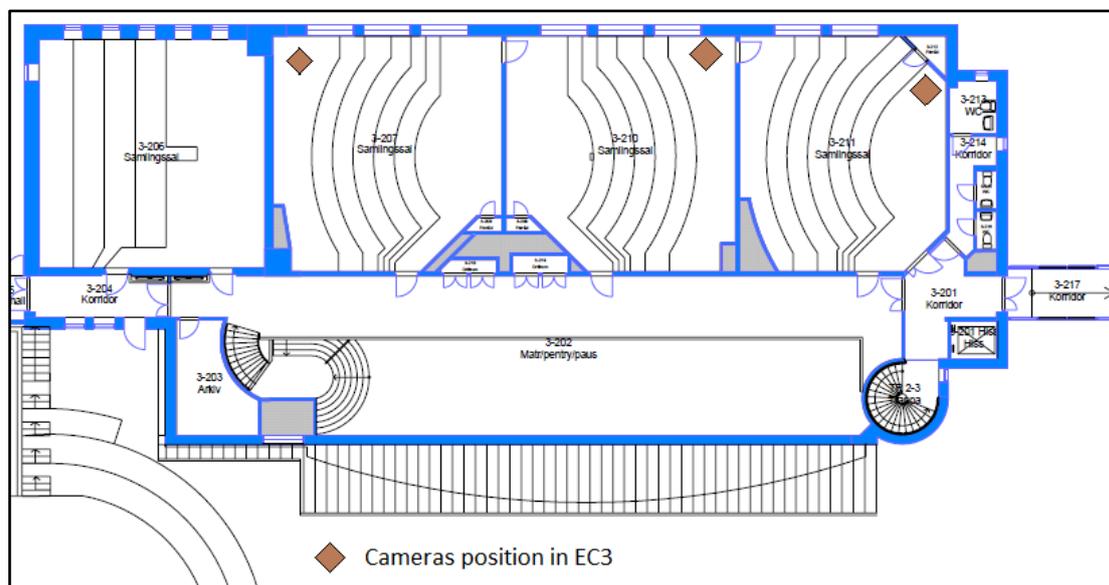


Figure 6. Position of the cameras in EC3 during UED (Norén, 2012)- reprinted by permission

2.2.6 Interview

In addition, a three interviews were conducted with faculty staff members, some of whom were attending this year training and participating in the UED. There was one person who

was a guest lecturer for the course and did not have training from the faculty. Performing an interview with a person from a different background gave an enormous insight on the training that was designed and how the improvements can be made. Questions were open and mostly containing the elements of the educational training and UED to see if interviewee changed the process of thinking (see Appendix G).

2.2.7 UED staff preparation and plan

Performing UED without extra help would not be possible and distribution or collection of the data would be impossible. In brief, description of evacuation staff (ES) and organizational staff (OS) tasks for year 2012 in EC are made in following sections.

Assembly of the organisation team and evacuation staff was at 14:00 h where everybody received the instructions: 1) provisional timeline of the events (see Figure 7) of the experiment, 2) a job description (Appendix E & F) with 3) general floor plan with position of all ES (see Figure 8) were handed out to them. ES was divided in three groups:

- ES outside the building (see Appendix F)
- ES inside the building (see Appendix E)
- observers inside the classroom (see Appendix D)

Unannounced Evacuation Drill Experiment Timeline, 14 th of March 2012			
Time	Event	Location	Organizing staff
Before			
14:00	Meeting with evacuation staff and collection of all the material	EC2:063	
14:30	Leaving for the positions of the locations where evacuation staff was assigned for	Assembly point 1 Assembly point 2	
Middle			
14:45	Trigger of first alarm bell	in EC3	
14:50	Trigger of second alarm bell	in EC2	
	Trigger of third alarm bell		
	Checking of the EC3 building and reporting to the Jorgen and Daniel	in EC1	
14:55	Checking of the EC2 building and reporting to the Jorgen and Daniel	Assembly point 1 & 2	
	Checking of the EC1 building and reporting to the Jorgen and Daniel		
	Collection of the surveys		
After			
15:15	Announcement that evacuation experiment is finished	Assembly point 1 & 2	
15:35	Gathering of all evacuation staff	EC2:063	
	Questions about the evacuation and some feed back		
16:00	End of the experiment		

Organizing staff (OS)
Evacuation staff (ES)
Faculty staff_ Teachers, administrator staff, security

Figure 7. Timeline of the UED in EC that was handout to the ES

There was time for questions and explanation because most of the students who were ES in the UED were there for the first time. The faculty was an unfamiliar environment to them and some time was needed to adjust. After half an hour ES left the meeting room for their intended positions for the start of the UED.

The students who were checking the faculty were taken to the "club room" on the top floor in EC3 and after 5 minutes from the start of the first alarm their job was to slowly propagate downwards through the building. All the doors should be unlocked but, just in case, access was provided to their student identity card and they could enter every room. Their role required to inform person standing on the assembly points, that the building is clear and the UED can be terminated. Instructions were prepared in advance (see Appendix E).

The ES outside the building were students who were posted outside in different positions around the faculty. Their work description was in first hand to direct the evacuees to the assembly point and distribute the questionnaires that were prepared in Swedish and English language (see Appendix B). The ES who were posted outside also received instructions (see Appendix F). From the information that they received before, it was clearly pointed out that they had to act like ordinary students which were just talking to each other before the fire alarm went off. On the notification of the first fire alarm a role of helping ES was assumed and not the supervising authority.

In the process of designing the experiment, a recognition of better prepared personnel was assessed, because no meeting was scheduled for them beforehand. Therefore, the key to a successful evacuation is to inform all the ES who are in charge on where or what they have to do in case of emergency (special circumstances). When the evacuation drill was terminated the ES gathered again in the meeting room for debriefing and future improvements of the evacuation safety.

2.3 Feedback to the evacuees in EC by management

Design of fire safety training is a competitive improvement for staff and for institution because with the knowledge of human behaviour, a transfer to the other areas of teaching

can be done, e.g. role-rule model or if a person invested a lot of time in writing a report, it is not so easy to leave from the building.

This training provided in depth knowledge on human behaviour with valuable insights how human respond in emergency situation. Information were lift up from giving simple instructions to explaining peoples response and what a staff members supposed to do and not wait for the others. Reacting as soon as possible is the right way to do on any kind of fire alarm bell.

Giving feedback on what happened inside EC with a simple email to the participant, staff and students, was assessed as a good step forward in communication. See following example:

Information on evacuation exercise of EC1, EC2 and EC3:

"Wednesday's evacuation exercise of EC-houses (1, 2 & 3) has gone well. Initial reports give the impression that all buildings have been completely emptied. Although the outcome was expected, it is pleasing that this has happened. Our evacuation exercises were carried out in cooperation with the Department of fire protection at LTH. Their students are listed as observers and officials. Along with the survey, you've completed, and their reports the school's security work continue and may become better.

Thank you all for your participation and that you helped all of our students to do well."

Norén J., 2012

2.4 Changes in the EC during the years

The building has been changed throughout the years which might affect staff response.

Following changes were made:

- The walk-through (passage) building between EC1 and EC3 did not exist before 1998, the year EC3 was built. But it was only "in door" for second and third floor.
- For the basement it became "built in" after the summer 2009. Normally students do not have access to the walk-through (passage) from second and third floor. But now they do from the basement.

- Between 2011 and 2012 “information announcement” (voice message) for adjacent buildings was introduced. Before that nothing was heard in any adjacent buildings if the fire alarm was off in one of them.

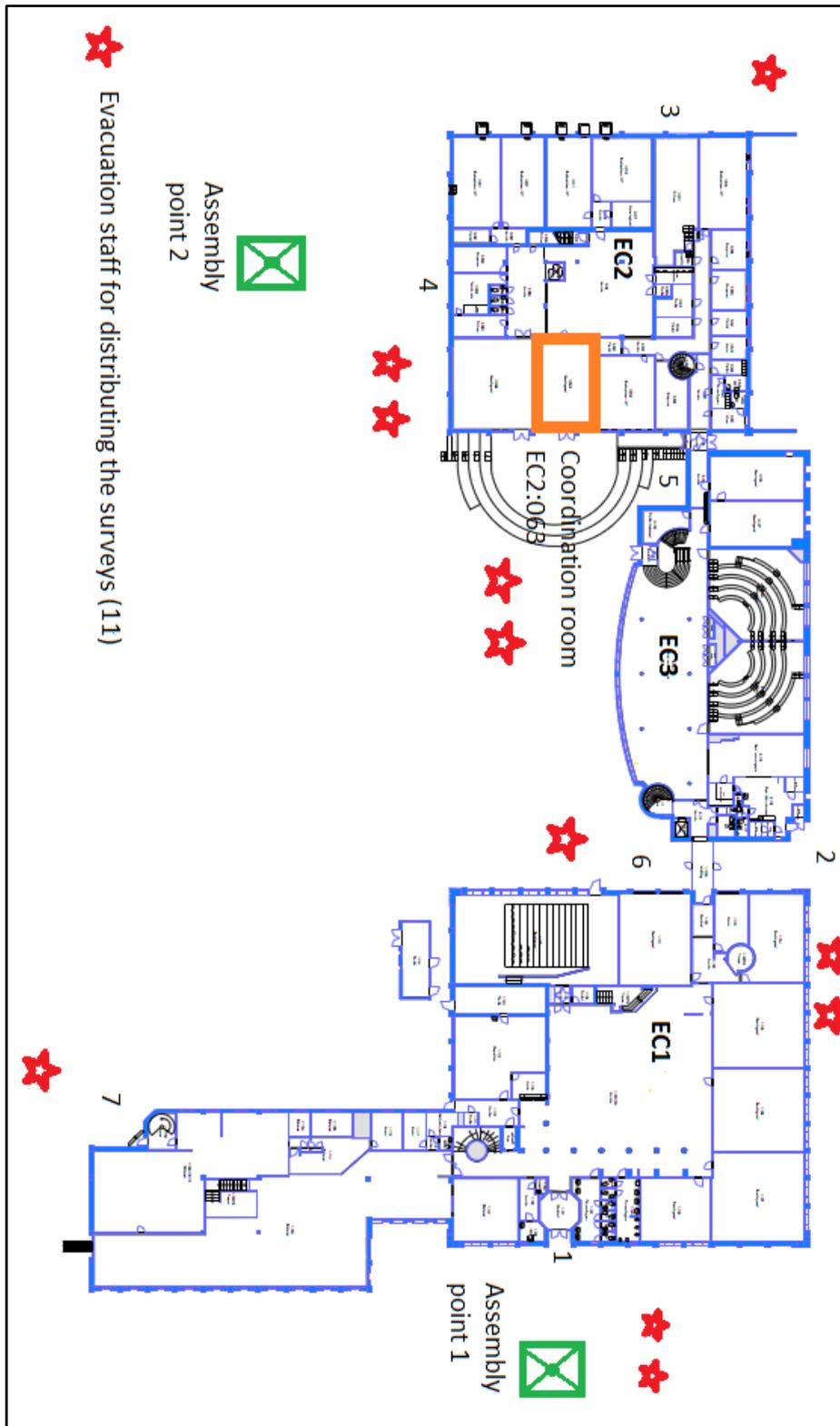


Figure 8. General floor plan for ES with all the positions of the personal (Norén, 2012) - reprinted by permission

3. Results

The research is comprised of many methods and techniques which are not connected to each other, but some conclusions can be drawn, based on the same environment and organization where study case was performed. The analysis will comprise of Questionnaire A results from UED, observers reports and video records inside the classrooms that were installed for the purpose of the UED. At the end, Questionnaire B results will be analysed. The most important data are presented in this part.

The staff was trained in fire safety lecture starting in 2009 when 7.67 % of staff was educated. 14.54 % and 16.93 % was educated in 2010 and 2012, respectively. There are more than 60 % of staff members that were contacted but did not attend the educational fire safety training during the period of four years (see Figure 9).

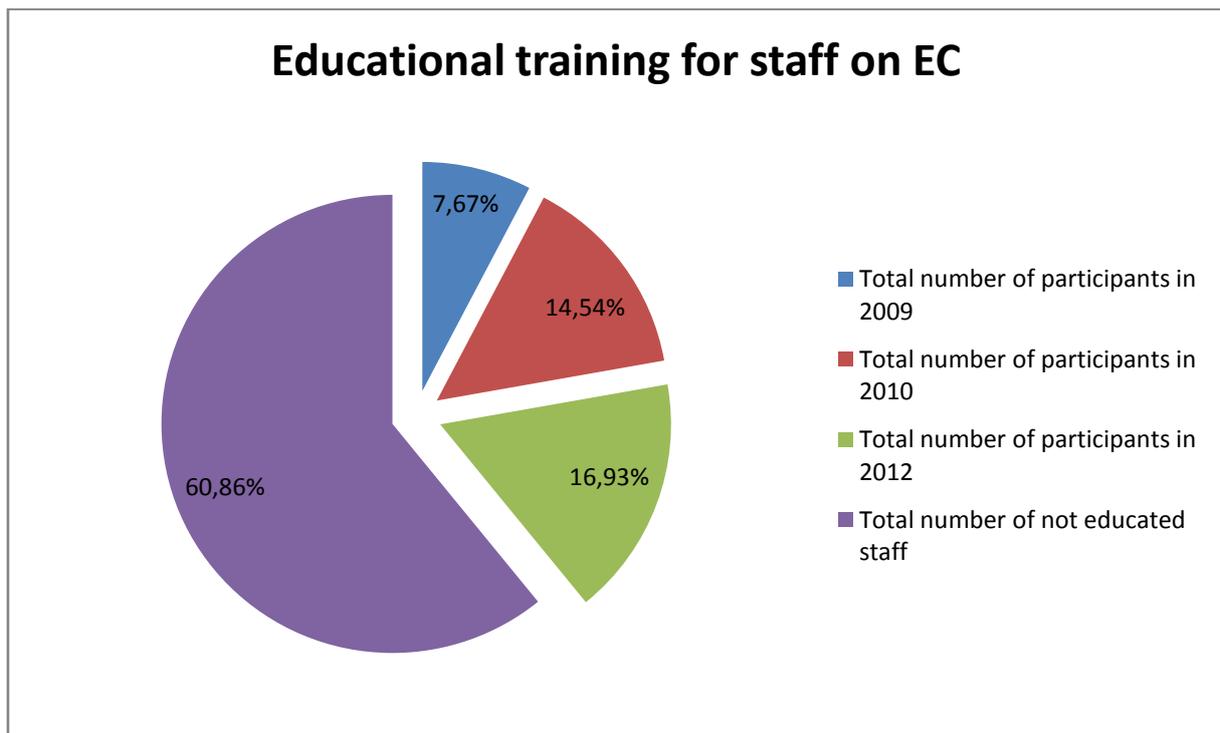


Figure 9. Educational training for staff member in EC in different years

A preliminary UED was done in 2008 and afterwards, until this year, 245 staff members were educated in the same manner. The total number of people that was invited to the educational training in past years was 626, which shows that 39.14 % of all the staff members were educated.

3.1 Based on Questionnaire A

Questionnaire was distributed in years 2008, 2010 and in 2012 to obtain a following information from evacuees UED which some of them were a staff personnel. In 2012 one more question was added to the Questionnaire A.

3.1.1 Demographic data

Starting in April 2008, an UED was performed in EC. The EC complex is big and in rush hours a several hundred people can stay inside the buildings.

	Year 2008	Year 2010	Year 2012
Men	85	60	153
Women	90	91	124
Disregarded			8
Info not provided			1
Total number of people	175	151	286

Table 2. Number of evacuees who participated in filling in the questionnaires

Table 2 shows that a total number of people in 2008, 2010 and 2012 was 175, 151 and 286, respectively. Each year a similar number of men and women was filling in the questionnaire, 85 men and 90 women in 2008, 60 men and 91 women in 2010, and 153 men and 124 women in year 2012 were participating. 8 questionnaires have been disregarded in 2012, due to clear signs of untruthfulness and insincerity in answering the questionnaire, e.g. putting all the answers in one row, filling in both sides of the questionnaire differently or putting double answers. There was one questionnaire where the person did not provide general information about him/herself but filled out the part of where questions about attitude and seriousness were given (see Figure 10).

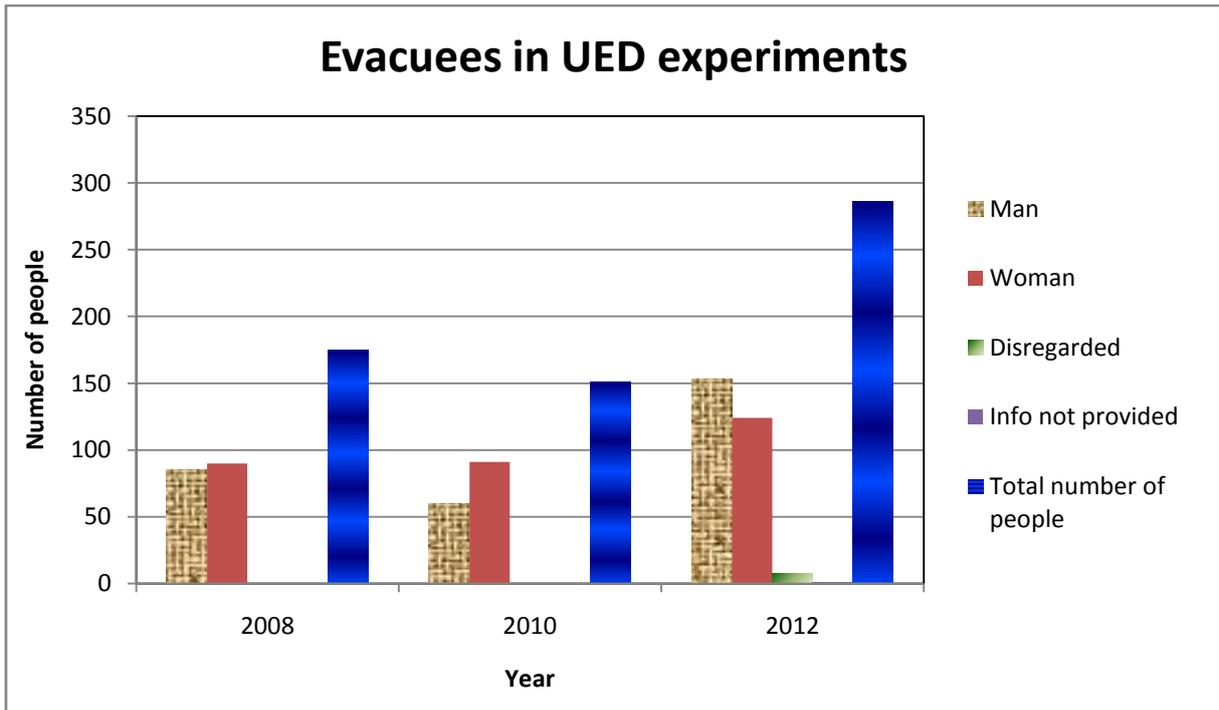


Figure 10. Number of evacuees in UED in 2008, 2010 and 2012

The objective of this thesis is to compare the results between the faculty staff and the students, and to see if there are any differences. The following graph (see Figure 11) presents the sample population that was participating in the UED experiments.

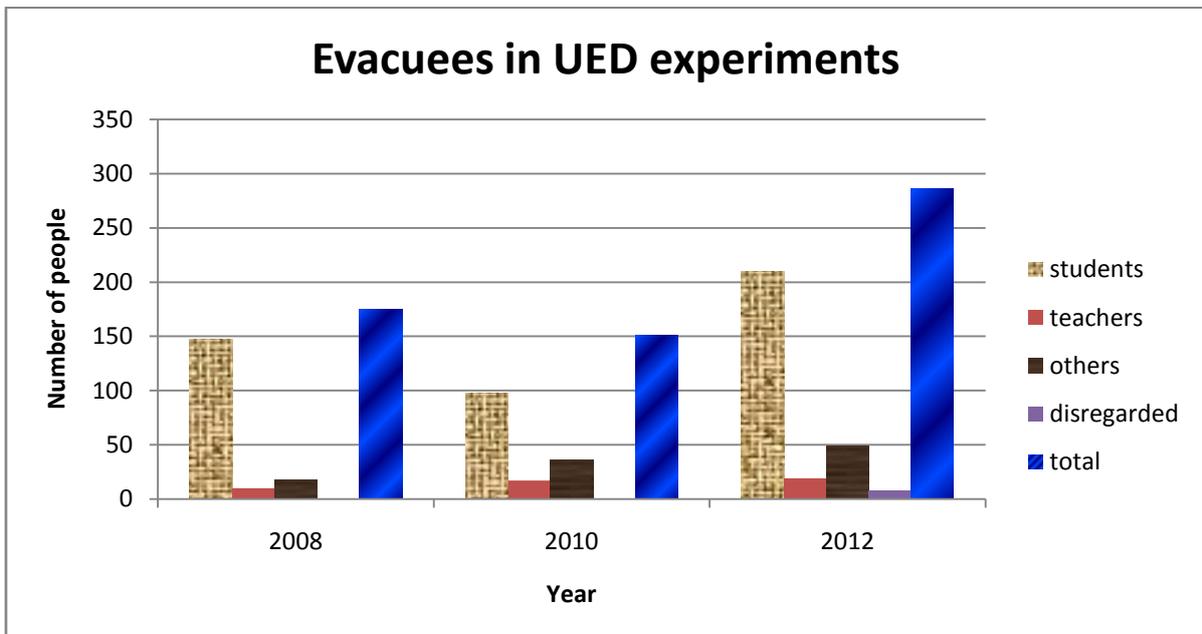


Figure 11. Number of students, teachers and other staff members in UED experiments

Year 2012 had the highest value of the response. The questionnaire was filled in by 147 students in 2008, 98 students in 2010 and 210 in 2012. On the other hand, questionnaire was filled in by 28 teachers and other faculty staff in 2008, 53 in 2010 and 68 in 2012 (see Table 3).

	2008	2010	2012
students	147	98	210
teachers	10	17	19
others	18	36	49
disregarded			8
total	175	151	286

Table 3. Number of students, teachers and other staff members in UED experiments.

For all the experiments, an average age and standard deviation was calculated to observe the sample characteristics and compare the years between each other. From Table 4, it is observed that the average age of participants is almost the same. In 2008, 2010 and 2012 the average age was 27.53, 29.00 and 28.04, respectively. Standard deviation for age in 2008 was 11.55 and in 2012 it was 9.64 (see Table 4).

	2008	2010	2012
average age	27.53	29.00	28.04
age (stdev)	11.55		9.64

Table 4. Average age and standard deviation for participants in 2008, 2010 and 2012.

3.1.2 Attitude towards fire safety through years

Attitude towards fire safety training was measured by the Questionnaire A that was the same in all three years. From Table 5 a change in attitude towards fire safety is observed. The scale range can be from -6 to +6. Lower that the score of one participant is, the more positive the attitude towards fire safety training is. In 2008 total average for participants in UED was 2.39. The results showed that in 2012 the attitude improved to 0.59 point on the

scale. An improved result is obtained if we analyse just faculty staff members from 2008 to 2012, that is 1.91 and 0.52, respectively.

An interesting observation between the first year and the last year when the theoretical training for faculty staff members was performed is that by increasing the percentage of faculty staff with fire safety training education the attitude of students towards fire safety will increase (positive attitude). Year 2010 is badly documented and that is why the results cannot be incorporated into the report.

Results for attitude		
	2008	2012
total average	2,39	0,59
average for faculty staff	1,91	0,52
average for students	2,47	0,61

Table 5. Attitude response towards fire safety in UED after theoretical training

Table 5 shows the average for the total, students and staff sample where a lower number, number that is closer to the value of -6, means better attitude towards fire safety. An initial hypothesis was that by performing a significant test for total sample with a "Two samples for means Z-Test" (Jackson, 2011), gave the average data are not the same with a confidential level of 99 % (alpha value is 0.01). From results, the attitude improved.

Table 5 shows that attitude towards fire safety changed throughout the years giving following results:

- total average of evacuees for attitude was 2.39 in 2008 and 0.59 in 2012, and this means that the attitude increased, it became positive
- faculty staff in 2008 had lower attitude towards fire safety, only 1.91, than in 2012 when the average for faculty staff was 0.52 (more faculty staff was educated)
- all students average was always very close to the total average of evacuees, although, in 2008 it was a bit higher and in 2012 it was a bit lower than total average
- students had lower attitude towards fire safety training in 2012 than the staff

- the difference between the students and the staff in 2008 was bigger than in 2012, there might be a connection between training of the staff and the students attitude towards fire safety

3.1.3 Seriousness about alarm and evacuation drill

Seriousness towards fire drills was measured in each year to see how evacuees perceive the fire safety scenario.

Results for seriousness		
	2008	2012
total average	-2,14	-2,31
average for faculty staff	-3,57	-3,50
average for students	-1,88	-1,90

Table 6. Seriousness towards fire safety drills

Results from Table 6 show that evacuees did take the UED seriously. If there would be a perception that this is a real fire alarm they would evacuate sooner and take the evacuation seriously. Lower the result from the participants is, better is the seriousness towards fire drills. From the Table 6, total average of the evacuees changed a little from -2.14 to -2.31 in 2008 and 2012, respectively. Faculty staff seriousness in 2008 and 2012 did not change much. A slight change in staff seriousness towards better from 2008 to 2012 can be observed. Training might help with improving the way how staff responds. An initial hypothesis was that the seriousness will stay the same and by performing a significant test for total sample with a "Two samples for means Z-Test" (Jackson, 2011), gave the average data are not the same with a confidential level of 99 % (alpha value is 0.01). From results, the seriousness stayed the same.

3.2 Observers reports

Results from Questionnaire A can be confirmed by the observers' reports. Observers had to write down, the way how teachers and students responded on fire alarm cue. In 2008 the teachers performed poorly. They did not know what to do, were looking for more

information and leaving the room and the students unattended and without assistance (see Appendix J). Following phrases were indicating a very poor attitude towards fire safety and wrong reaction to the fire alarm:

"What is that", or "See you again tomorrow" to observers explanation that teacher was passive during the whole evacuation (Observers, 2008).

and then he/she left from the room and did not direct the students towards the assembly points. Some of the teachers were passive and they did not assume any leadership position, like telling students to get up, leave the room through emergency doors and assemble again outside. In year 2008, four teachers were observed and only 25 % did respond correctly.

In 2010 big changes were observed. Attitude towards fire safety improved. Confirming this assumption is the response of the majority of the observed staff members. One example is the statement of the observer in room 109:

Teacher stopped to say something, meanwhile scratch the beard, and after that putting on the coat and started to move towards entrance. Meanwhile lots of students already started to pack their things. No instructions were issued during the process of evacuation (Observers, 2010).

The other report showed a variation from the person inside another room that might have been trained in 2010 or 2008, but there was still a lot of indecisiveness in teachers' reactions, for example in room 210:

"What is that"! When the spoken message was broadcast: It's a fire alarm", everybody starts to move. Some start to leave through the ordinary entrance. The teacher and some of the students are insecure if they could use the exit where it is written "Evacuation exit". They run a little bit back and forward and in the end everybody decided to leave through ordinary exit (Observers, 2010).

Despite the fact that more faculty staff members had training, there were some which responded incorrectly or they did not know what to do (see Appendix K). In year 2010 four teachers was observed and 75 % responded correctly.

The results from the 2012 UED differ from previous years. Observers inside of the rooms have reported that the teachers were assuming leadership role and were telling the students what they should do. All of the teachers responded correctly. Attitude towards fire safety has clearly improved and observer's report in room 207 shows that:

The teacher stands up and raises arms to get attentions and says: "Listen up, we go out all together and gather outside". After directing them towards the "normal entrance", teacher stands by the door until everyone has gone out and then follows the group (Observers, 2012).

From leaving the room and meeting again outside on the assembly points, o the teachers who were explaining what the sound that is coming from the speakers means (see Appendix L).

For general layout of the observers' questionnaire see Appendix D. The same questionnaire was used each year.

3.3 Video recordings for UED

Video recordings in 2012 show that the teachers responded very quickly, they gave instructions to the students and they made sure that no one was left in the classroom.

Taking initiative, showing towards the doors to exit, were one of many initiatives observed. The teachers also checked the classroom before they left from it. By addressing the students, their role became clearer in becoming a leader in the procedure of evacuation.

First response of students is from 8 to 11 seconds and teacher's response was also between 7 to 24 seconds. In room 207 everybody evacuated in 87 seconds and in room 210 in 120

seconds. When students were evacuating outside, they were calm and even talking to each other when moving towards the exit. Students were waiting patiently in a queue and no "panic" was identified.

From video records it is clearly seen that evacuees chose to leave throughout the same exit where they enter.

The very good side of having these video records is that detailed time of the events can be noted. In Appendix M and N a whole report of the video record in room 207 and 210, respectively, is presented. Video from room 211 was damaged and the timeline of the events could not be obtained.

3.4 Based on Questionnaire B

In this questionnaire 53 participants have answered the questions. Some very interesting findings can be deducted from it, based on individual, organizational and environmental level. In the following section the most important findings are presented.

3.4.1 First part - individual level

Individual section in Questionnaire B will show the individual's knowledge about fire safety and see what is the current situation of the staff members who took the educational training in year 2012.



Figure 12. Knowledge in fire safety procedures

Almost 50 % of recently trained faculty staff believe that they do not have sufficient knowledge in fire safety procedure (see Figure 12). This could be connected to the next question where staff noted if they had any kind of training before year 2012.

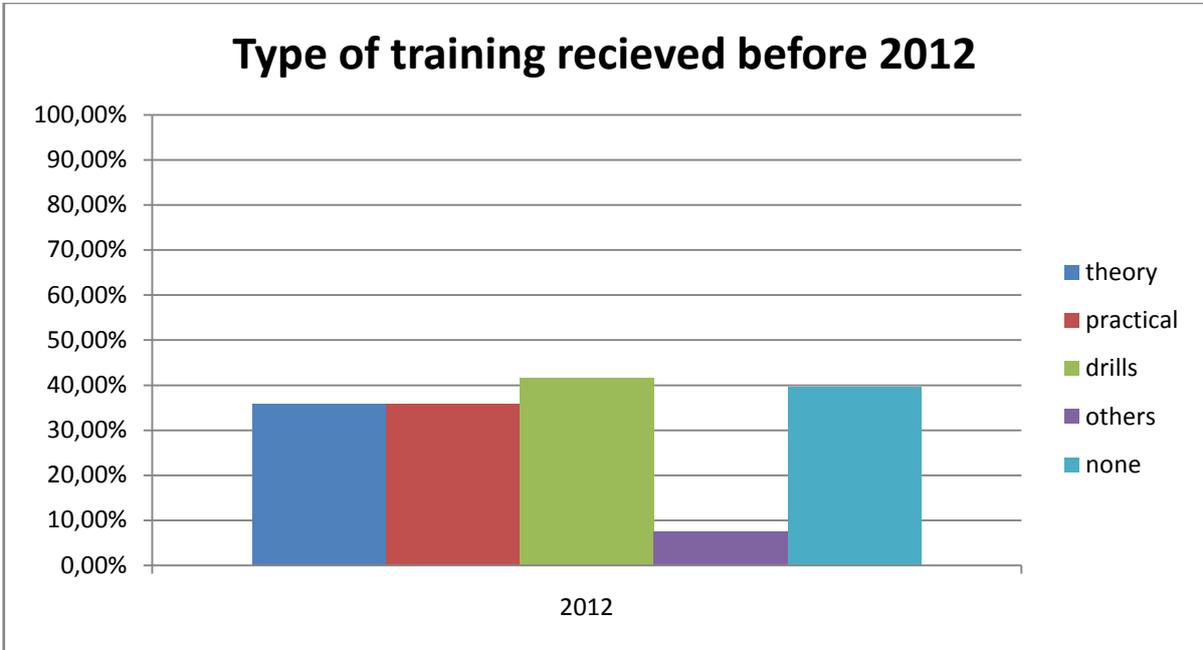


Figure 13. Type of training received before training for staff on EC

Figure 13 shows that almost 40 % of all the faculty staff members had no training at all for fire safety emergencies. Around 40 % had an experience with fire drills and around 35 % of the staff had theoretical and practical training.

3.4.2 First part - organizational

Organizational section in Questionnaire B will show the individual's knowledge about institutional procedures and if there was any kind of message communicated to them in any way before 2012 year in fire safety issues.

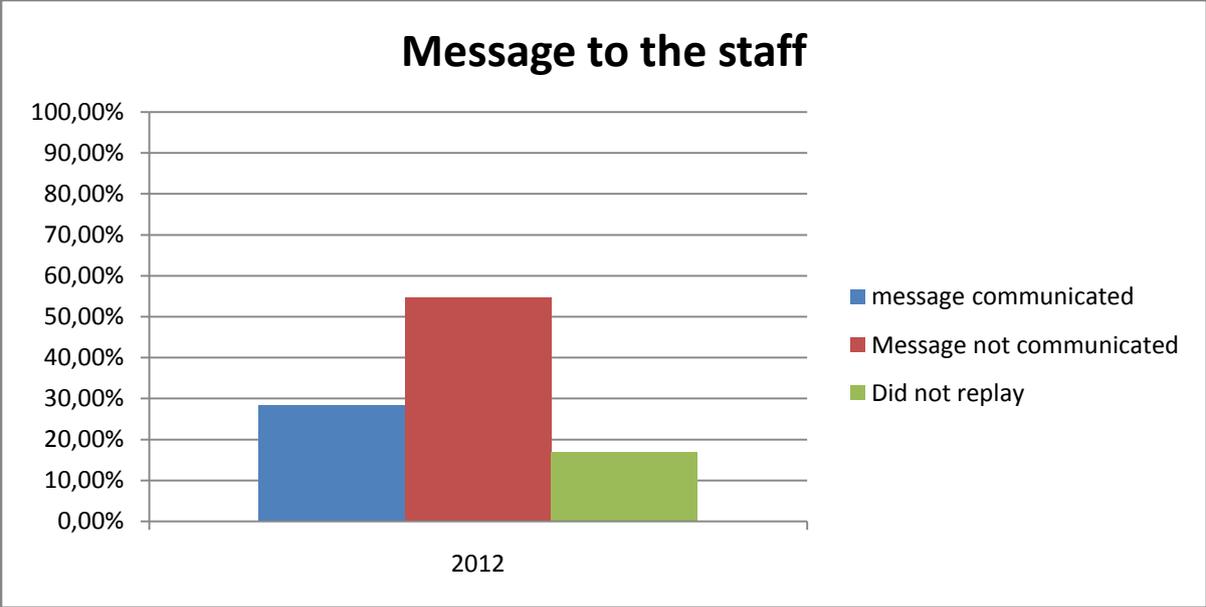


Figure 14. Message communicated to the staff from someone else about fire cues

54.72 % did not receive any message from other staff members in other evacuation emergencies, which implies that the communication among the management staff and ordinary faculty staff did not happen regularly. Almost 30 % explains that they received an explanation for the alarm that just happened from other staff members (see Figure 14).

3.4.3 First part - environmental

Environmental section of Questionnaire B was addressing issues with the building layout and evacuation route design.

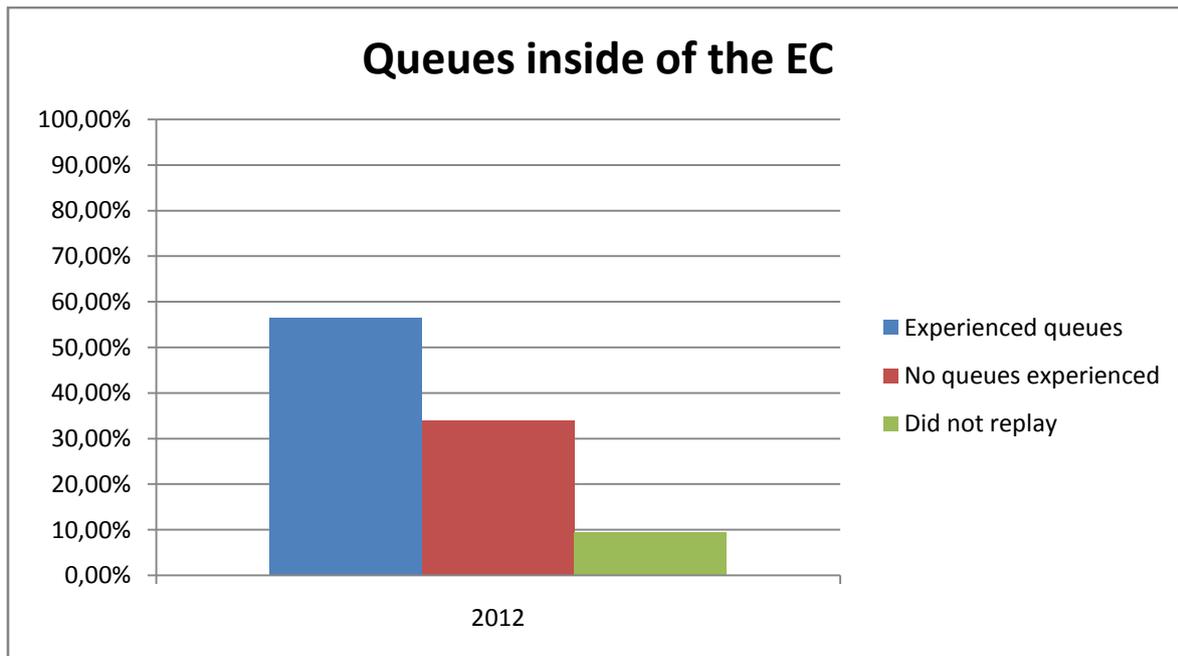


Figure 15. Queues inside of the EC

In the questionnaire, 56.60 % of the staff experienced queuing inside of EC and almost 34 % replied that did not experience queuing inside the building (see Figure 15).

3.4.4 Second part

The second part of Questionnaire B was analysed, obtaining attitude towards different level of the training. These results should be compared with the next year's data from staff that will be trained.

	Individual	Organizational	Environmental
total average from staff training	28,44	12,83	19,67

Table 7. Perception of fire safety in 2012 of trained staff

Individual, organizational and environmental training levels were examined and from Table 7 a strong agreement with the individual level of training can be seen, obtaining score 28,44 what is very close to the maximum score which is 30 points. Staff members are not so sure about environmental level of the building, obtaining score of 19,67 out of 25 maximum possible points. The organizational training is even lower, more unclear and staff assigned a score of 12,83 which is low in comparison to the maximum score of 20 points for this part.

The attitude towards organizational training level is the lowest. These three separations of the training goals cannot be compared because they have different numbers of questions. This data were collected too make improvements to the current educational training.

3.5 Interview results

Interview A and B shows a significant attitude towards behaviour of the staff personnel who had educational training and the one who did not have it (see Appendix H & I). The difference in decision making process is clear from both interviews, when alarm went off.

3.5.1 Interview A

Interview A was performed with a faculty staff members which was educated in year 2012 and was on the UED, because the lectures in room 207. The interviewee was part of fire drills before but never knew what kind of actions has to be take. From the interview it is clearly stated that the teacher would not act as it is if the training would not be provided to the teacher. The clarity on what to do is important in this kind of emergency situation.

When the alarm started, the students were told to leave the room quickly. What was a surprise is that the teacher was thinking afterwards that the outside conditions should be checked, e.g. observation of the smoke, etc., otherwise a re-direction of the students could be made to the other exit. Instructions that they should meet outside were given too. Educational training gave knowledge about how fast fire develops and the teacher was unaware of that, this event goes extremely fast.

The teacher also made sure that the classroom was empty before going to the assembly point. Evacuees were calm and secure, no "panic" behaviour was observed and that could be a contribution of that everybody was certain that this was a fire drill. No smoke or fire was seen in the process of evacuation or outside.

Educational training helped the teacher to revise the action after the UED and see if some mistakes were made. The main conclusion was how the improvements in teachers' actions can be made and how to handle the responsibilities better.

3.5.2 Interview B

Interview B was performed with a teacher who was a guest lecturer at the day of UED. The teacher did not have and training before or from the EC.

When alarm went off, the teacher did not take the leadership role, only followed the instructions from the speakers and did not address the students to leave quickly to the assembly point. No one was in the rush when they packed their belongings. Everybody were calm and no "panic" was observed.

First voice message asked them to stay in their places and wait for further instructions because the alarm was triggered in EC3 first and they were in EC2, but after a while the teacher decided to evacuated, even thought that this was not requested by the voice message. The message is part of phase evacuation from complex buildings. This procedure confused the interviewee.

The teacher also suggested that more information should be provided throughout spoken message.

A conclusions for the interviews are, that a participant of the educational training changes the attitude and response is going to be different, than if no training was provided to the personnel. Interviewees explained other side perspective in the process of training cycle.

4. Discussion

This evacuation experiment was designed to evaluate the effect of education that was communicated to staff members at The School of Economics and Management at Lund University, Sweden. Staff received all the knowledge in two lecture hours, possibly with a break, containing fire development and human behaviour theories in fires. First method to study the changes in attitude and seriousness towards fire was given to the evacuees in 2008, 2010 and 2012. Secondly, the observers were put inside of the rooms to write down the faculty staff response in 2008, 2010 and 2012. In addition, in year 2012 cameras were installed inside the classrooms, questionnaire B was developed to see previous knowledge and attitude of the participants to fire safety training and interviews were performed with three staff members.

In the beginning of the report it was hypothesised, that people who have more knowledge about fire safety have a more positive attitude towards the fire safety. This hypothesis was confirmed with clear indication of change for the better of the evacuees attitude towards fire safety issues. A higher percentage of staff that is trained with fire safety education could be linked to better attitude towards fire safety.

The second hypothesis that the faculty staff response time will be shorter is not clear. From the observers' report the teachers showed clear signs of taking leadership and instructing the students towards assembly points. What happened in 2008, when teachers left before everybody else, did not occur again. The teachers were the last ones who left the classroom and they were seen on the assembly points latter. The assumption that people will evacuate faster from the building is rejected because there are other components which slow down and control the flow of evacuees, e. g. doors, stairways, etc. and cannot be influenced by the training of staff members.

Hypothesis three is confirmed because from an observers report and video footage a response of the teachers was precise and there was no doubt like in the first year of the case study how the classroom should be evacuated and what should be done when the alarm

sounds. In addition, interview A confirms the hypothesis by showing that the interviewee know how he/she should react and why.

It is recommended that School of Economics and Management assign this task to one enthusiastic faculty staff member who will carry on with the delivery of training to newcomers when big lessons are not organised. Another fire safety consultant should be hired to conduct the training in the future if needed. Overall, the training and the evacuation drill was a success and a lot of changes have been done during the years to improve the response to fire scenario.

A limitation of the case study is that the results from the year 2008 could be completely different than the results from the year 2012. Different personal could be attending the lectures in fire safety education and another personal would be present on UED. This can not be checked for years 2008 and 2010. Besides, a number of other factors could influence the results like a serious accident which would make people believe that training for evacuation is important or personal experience in fire event. This was not the scope of this case study. Educational training could be the likely cause of change in human behaviour and attitude towards fire safety but this can not be proven.

Another limitation of this study was that as a non-native Swedish speaking person I had difficulties when explaining ideas to the staff members. When you do this type of research in another country, you start to realise how important the communication and cultural aspects are when working with people.

A big disadvantage of this study was that the data collection in year 2010 was not done properly and that is why the analysis was performed in smaller scale. It is important to keep all the material, in electronic, hard copy or any other data storage for the whole duration of the case study.

5. Conclusions

Results indicate that the faculty staff changes the attitude and the behaviour in the fire situation by assuming leadership role and instructing students to evacuate. Training was performed, giving theoretical lessons on fire development and human behaviour in fire. Staff who never had any training will likely to be socially influenced by the students and evacuate together with the rest of the crowd or leaving before everybody else leaves the classroom. Recommendation for on-site training with explaining how people react in emergencies is a very good way how to educate staff members. Hand gestures, instructions, checking if everybody left the building, etc. were identified from staff response after the education was given.

6. Future research

Educational training which would provide knowledge for employees, not only School of Economics and Management, but also all other big assembly area should be continued.

It might be possible to extend this research to design a tool for an evacuation simulation computer programs like Simulex, STEPS, Nomad, etc. A simple scale could be incorporated into the program where you could choose the staff's level of training. This would provide a level of certain response on fire cues. Staff would be more likely to respond and direct non-staff members towards the exits where place of safety can be reached. Making the sub-program and validate it, against the real case scenario.

Another study could be done after this training program is concluded in 2013(majority of staff had been trained) to assess the long term transfer of Fire Safety Training. Conducting UED, for example after five or six years in the same environment and partially with the same staff, would show if personnel shows the same characteristics as in 2013.

What would happen if the staff members and the students would be trained together? In this case study only faculty staff members were educated with a specific fire safety training. Students could influence the decision making process by obtaining the same knowledge as the staff members did. Future five to six year study case could investigate this aspect too.

After finishing this case study a similar research could be performed in another institution with different population sample. Results from that study would be interesting to compare to the present case study in EC, e.g. shopping malls or concert halls.

This environment was familiar and this was beneficial to the UED. Knowing where the exits are makes it easier to evacuate. What would happen if the environment would be changed or if the evacuation would be performed in the night time? Would staff still act the same?

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Appendix

Appendix A: Theoretical lessons for fire safety training

Appendix B: Questionnaire A_ for participants in unannounced evacuation drill

Appendix C: Questionnaire B_ for Faculty Staff on theoretical lessons

Appendix D: Questions for observers in 2008, 2010 and 2012

Appendix E: Instructions for ES inside the building

Appendix F: Instructions for ES outside the building

Appendix G: Interview Questions

Appendix H: Interview A

Appendix I: Interview B

Appendix J: Observer's report from 2008, room 207

Appendix K: Observer's report from 2010, room 207

Appendix L: Observer's report from 2012, room 207

Appendix M: Report from camera in room 207, year 2012

Appendix N: Report from camera in room 210, year 2012

Appendix A

Appendix A shows the general content of the educational training that was provided to the staff members in years 2009, 2010 and 2012. A lot of videos and examples were left out but for successful training case study examples are crucial.

Educational training content

Research in Human Behaviour in Fires started in late 50's with work done by John Bryan. Overview of past and current knowledge (Shields & Proulx, 2000; Fridolf, 2010)) is important to understand the development of the field. Canter's publication, "Fires and Human Behaviour" in 1980, which broke stereotypes how people react in fires, e.g. people are not scared of a fire like an initial thought was. Concept of "panic" was looked closely by several researchers (Croker, 1917 & Sime, 1980), but latest findings explained that "panic" is a rear event that almost never happens (Fahy, 2009).

Understand fire to explain human behaviour

Fire a necessary commodity which people are taught how to use it in a control manner. A major assumption in human behaviour n fires is that people would evacuate immediately when exposed to fire situations. In many cases or reports from fire accidents of real fire, e.g. video records Bradford City Disaster, people did not leave without delaying and looking for more cues what is going on before they evacuate.

"When building is safe" is a question that everybody should ask themselves. When is the time to evacuate outside? The building is safe until it reaches a stage of untenable condition. With engineering calculations, a more or less accurate prediction of sequence of fire development can be predicted (Proulx, 2002). Generally, compartment fire generates heat, rise of hot gases with a plume. A cold air enters in the compartment through the openings and the plume, which conducts mixing. When gases hit the ceiling, a radial movement is observed. If the gas layer decays lower than it is peoples high, a few breaths will make them dizzy and disoriented (Karlsson & Quintiere, 2000). It is advised to kneel when moving out thus having smoke layer above. Hot layer consists of (Karlsson & Quintiere, 2000):

- increased temperature, between 80 to 200 °C
- radiation, that is mostly from hot layer gases but it can be from a fire source too

- smoke, product of incomplete combustion
- toxic gases: - carbon monoxide (CO)
 - carbon dioxide (CO₂)
 - etc.

This two gases have the most toxic, opposite effect on our organism because our blood cells can receive CO easier than air and CO₂ makes our body hyperventilate, to breathe deeply or abnormally fast.

Theories on Human Behaviour in Fires

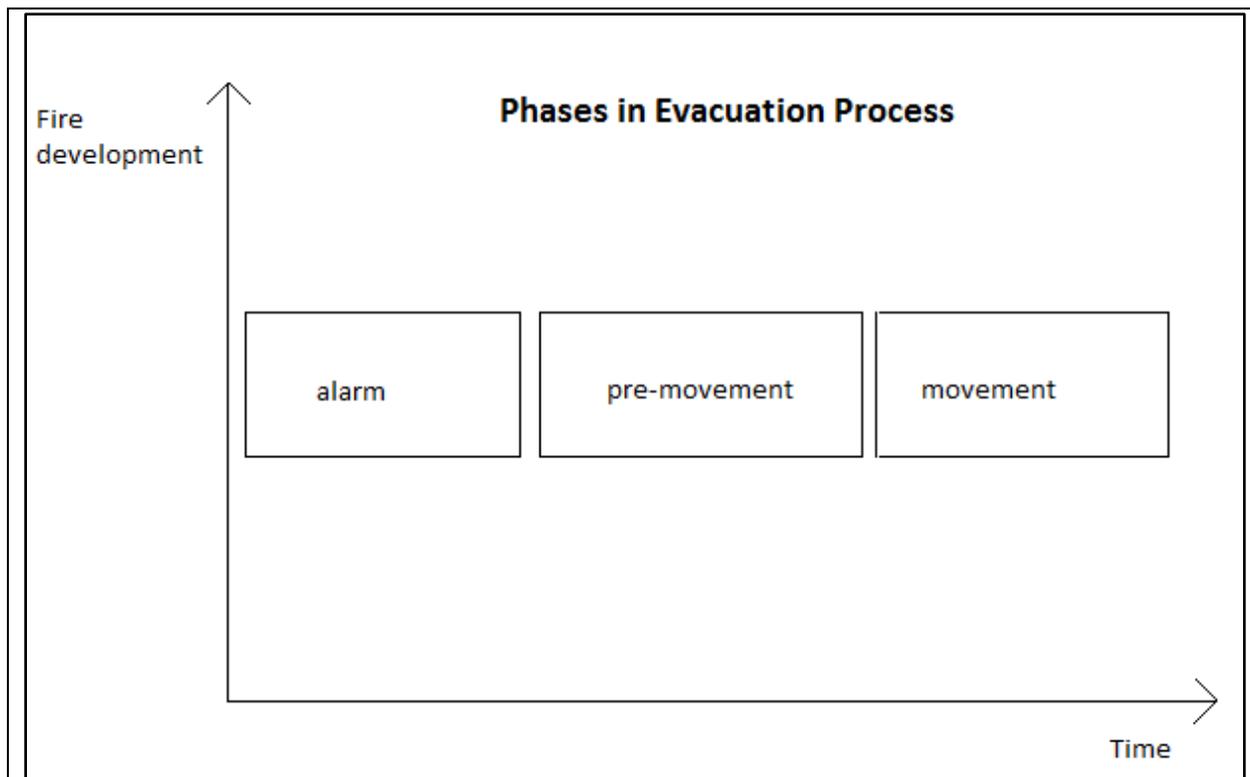
Understanding of fire is not enough that is why a lot of research was done to predict how people will respond in fire situations (Sime, 1985; Canter, 1980; Purser, 2008; etc.). Now, technological advances makes possible to simulate people's evacuation from the building with significant accuracy (Evacmod, 2012). Still, many detailed aspect of human behaviour needs to be investigated and incorporated into the simulation tools, like training of staff members.

The most important behaviour of people exposed to fire can be divided in several groups:

1. simple model
2. behaviour sequences
3. social influences
4. affiliation theory- exit choice

Simple model

Simple model illustrates a time response from alarm bell to the time when people are evacuated to the place of safety. Recognition time is the first one, pre-movement time is the next and the last period is movement (Purser, 2008). These three periods can differ from the type of occupancy, layout, familiarity, and many other factors. The most difficult part to determine is pre-movement time.



Simple model of phases in evacuation process, (Purser, 2008)

A more detailed description of Required Safe Escape Time (RSET) is described by following model (Purser, 2008). The total evacuation time is a sum up of time of detection of the fire, reaction time of the people on the alarm, pre-movement time and travel time (queuing, moving on the stairs, etc.):

$$t_{esc} = t_{det} + t_a + t_{pre} + t_{trav}$$

It is analytical time available between ignition of a fire and the time at which and the time at which occupants in a specified space in a building are able to reach a place of safety. A temporary place of safety may be represented by a protected escape route or other form of protected compartment. An ultimate place of safety would be outside the building at a safe distance from it (Purser, 2008). In our case place of safety would be when person is outside on the street. t_{det} is a function of fire growth and we do not consider it in this case.

On the other side, a simple hand calculation can be done with SFPE handbook (Proulx, 2002) to determine RSET. Recent collection of the data (Korhonen, Rinne & Grönberg, 2011), of

real evacuation scenarios show differences between in times for RSET and in people's behaviour. The second case was analysed on A comprehensive school where pupils had from very short (0 - 20 s) pre-movement time to a very long one for those who waited for the people who they wanted to evacuate with. One man finished his work before leaving the building (Korhonen, Rinne & Grönberg, 2011).

To investigate the response time a research was done in Swedish cinema halls (Bayer & Rejnö, 1999), where people respond differently, depending on type of the alarm that was played.

Behaviour sequences

Detailed examination of the fire incidents and close of some psychological experiments give us knowledge and understanding why people react in certain ways and who can influence the response.

Major research was done by behaviour sequences and risk perception (Canter, Breaux and Sime, 1980) where final result was a published book in Human Behaviour and Fires (Canter, 1980). Articles are describing people's reaction in fire emergencies, a study of survivors can be a vital source of information. A comparison was done for man and woman and some other theories were concluded (Canter, Breaux & Sime, 1980):

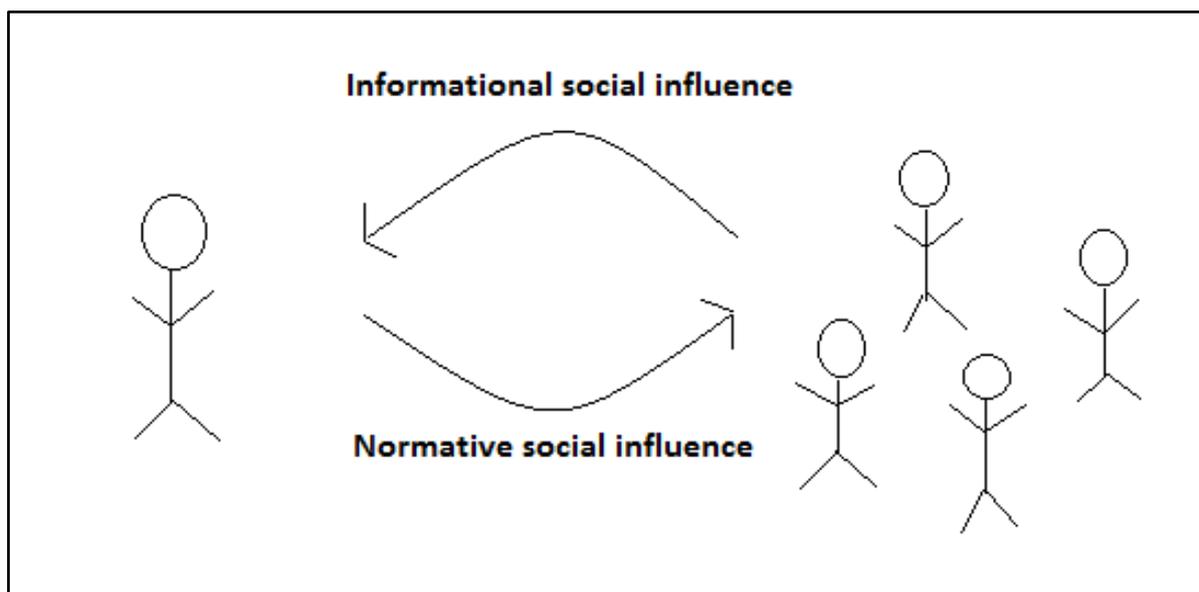
- initial insecurity can be seen in all people
- likely to ignore the cues (first the cues are ambiguous, doubtful and a second more clear cue has to be given. Also if you invested a lot of time in doing something like a report or an assignment, you are not prepared to leave from the place immediately. Other cases like IKEA shopping mall, people who just got their meal in a restaurant and Nuclear power plant regular maintenance operation where workers did not want to abandoned their post just because it was too hard to put the protective clothes off and on again).
- man are more prone to extinguish the fire
- woman will go and worn others
- man would misinterpret fire cues more often than woman

- no "panic", people are calm and helpful, no scuffles or rushing without thinking (Fahy, 2009), presenting a video how people calmly waiting in a queue to get outside profess that there was no sign of panic.
- role-rule model was observed in some fires to have significant influence on how people evacuate (Tong & Canter, 1985). Everyday a person is playing several roles and in a classroom a role of a teacher and a student is clearly seen. That is why in is vitally important that the teacher takes initiative and lead the students out. Waiting for more cues or response from the other people will prolong the evacuation and maximize a potential that something goes wrong. Another example of staff role is Chicago school fire (see part 1.1.1).

Social influence

An experiment was designed to test how much time people need to respond on cues if they are influenced by the others. The test subjects were students where normative and informational social influence was tested (Deutsch & Gerard, 1954).

From above example is that, as individual are always looking information from the group how to react (informational social influence) and on the other hand, group will feel uncomfortable if an individual starts to observe them. If you go in front of the people and start staring at them that is unacceptable (normative social influence). See following Figure



Social influence scheme (Deutsch & Gerard, 1954)

Excellent example can be shown by the research in Swedish cinema halls (Bayer & Rejnö, 1999), where people respond differently. In one case, a young guy in front row stood up but his college said that he is a fool and that he should sit down. The guy set down and in that theatre now one evacuate outside- example of negative influence, (Nilsson & Johansson, 2009).

Exit choice

People move towards familiar places, in our case towards familiar exits which, in many cases, are main entry doors- affiliation theory (Sime, 1985). From evacuation experiments was observed that many emergency evacuation doors are not used. People tend to evacuate in groups together with the people that they know and they will even wait for them.

Educational lecture gave a lot of examples from the environment where staff is working and videos from experiments about human behaviour/simulations of fire development were shown to illustrate presented theories.

Appendix B

Questionnaire A was developed in 2008 and it was kept the same for all years of UED except for 2012 year when specific question was added to test separate hypothesis. Questionnaire consists of demographic data, attitude and seriousness scale part and open question ending.

Evacuation of buildings EC – 14 of March 2012							
Please answer the following questions and hand the questionnaire to an evacuation staff. Var god vänd för en svensk version →							
1. Gender							
<input type="checkbox"/>	man	<input type="checkbox"/>	woman				
2. Occupation							
<input type="checkbox"/>	student	<input type="checkbox"/>	teacher	<input type="checkbox"/>	other, please specify _____		
3. How old are you?							
_____ years							
4. When were you when the alarm started?							
<input type="checkbox"/>	room EC3: 106/107	<input type="checkbox"/>	room EC3: 108	<input type="checkbox"/>	room EC3: 109	<input type="checkbox"/>	the café
<input type="checkbox"/>	room EC3: 206	<input type="checkbox"/>	room EC3: 207	<input type="checkbox"/>	room EC3: 210	<input type="checkbox"/>	room EC3: 211
<input type="checkbox"/>	room EC1: 134	<input type="checkbox"/>	room EC2: 169	<input type="checkbox"/>	EC1 atrium	<input type="checkbox"/>	EC2 atrium
<input type="checkbox"/>	other, please specify _____						
5. State to what extent you agree or disagree with the following statements?							
		Strongly agree	Agree	Disagree	Strongly disagree	Do not know	
	I thought there was a fire when I heard the alarm	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
	Evacuation drills are unnecessary	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
	I thought it was a drill when I heard the alarm	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
	Evacuation drills take too long	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
	I thought that it was a false alarm when I heard the alarm	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
	Evacuation drills are necessary	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
	I thought that something serious happened when I heard the alarm	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
	An evacuation drill is a good way to practice	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
	When I heard a voice from loudspeaker I felt calm	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
6. Do you know where assembly point is?							
<input type="checkbox"/>	no	<input type="checkbox"/>	yes, please specify _____				
7. Did you experience any difficulties during the evacuation drill (please describe)?							

Utrymning av byggnad EC – 14 mars 2012

Var vänlig att svar på frågorna och lämna dem till en funktionär.
Please see the other side for English version →

1. Jag är

man kvinna

2. Ockupation

student lärare annat, nämligen _____

3. Hur gammal är du?

_____ år

4. Var befann du dig när larmet startade?

room EC3: 106/107 room EC3: 108 room EC3: 109 the café
 room EC3: 206 room EC3: 207 room EC3: 210 room EC3: 211
 room EC1: 134 room EC2: 169 EC1 atrium EC2 atrium
 annat, nämligen _____

5. Ange i vilken utsträckning du instämmer med följande påståenden.

	Instämmer helt	Instämmer delvis	Tar delvis avstånd	Tar helt avstånd	Vet inte
Jag trodde att det brann när jag hörde larmet	<input type="checkbox"/>				
Utrymningsövningar är onödiga	<input type="checkbox"/>				
Jag trodde att det var en övning när jag hörde larmet	<input type="checkbox"/>				
Utrymningsövningar tar för lång tid	<input type="checkbox"/>				
Jag trodde att det var ett falskt Larm när jag hörde larmet.	<input type="checkbox"/>				
Utrymningsövningar är nödvändiga.	<input type="checkbox"/>				
Jag trodde att något allvarligt hade hänt när jag hörde larmet.	<input type="checkbox"/>				
Utrymningsövningar är ett bra sätt att öva	<input type="checkbox"/>				
När jag hörde en röst från högtalaren kände jag mig lugn	<input type="checkbox"/>				

6. Vet du var din återsamlingsplats är?

nej ja, nämligen _____

7. Upplevde du något problem under utrymningen (beskriv nedan)?

Appendix C

Questionnaire was developed in 2012 to obtain more knowledge and asses the attitude towards fire safety training so the improvements for the educational training can be made in the future.

Questionnaire for employees, 2012		
Individual (personal)	Organizational	Environment (structural)
<p>1. Would you say that you have a sufficient knowledge in fire safety emergency procedures? yes no</p> <p>2. Mark the boxes indicating what kind of education did you receive before: ___theoreticallectures ___practical training ___evacuation drills ___others () ___none</p> <p>3. Do you know how to report a fire? yes no Give two examples! _____</p> <p>4. What does the green sign on the top of the doors mean? _____</p> <p>5. If necessary, role of a leader needs to be taken? yes no</p>	<p>1. Do you think that staff is sufficiently prepared for fire emergency response? yes no</p> <p>2. Why do you think that School of Management and Economics has to perform evacuation training? _____</p> <p>3. Did you see, in other evacuation drills, if other staff members took any actions? yes no What kind? _____</p> <p>4. Was there any message communicated to you? yes no What kind? _____</p>	<p>1. Did you have any problems to get around in the building when you start working here? yes no</p> <p>2. Would you say it is a complex building (a lot of corridors, stairs, level differences, ect.)? yes no</p> <p>3. Are the evacuation routes clearly visible? yes no</p> <p>4. Can you describe how the emergency doors look like, the difference to the normal doors? _____</p> <p>5. Did you experience any queues inside of the building? yes no</p>

Questionnaire for employees, 2012

Individual (personal)	Organizational	Environment (structural)
<p>1. What do you feel towards Fire Safety Training? 0 1 2 3 4</p> <p>2. Is Fire Safety Training necessary? 0 1 2 3 4</p> <p>3. Obtained knowledge will help me to perform better when needed? 0 1 2 3 4</p> <p>4. When general alarm sounds, the training will help me how to react? 0 1 2 3 4</p> <p>5. Taking leadership will be beneficial for me and for the students? 0 1 2 3 4</p> <p>6. Students should be directed towards exits (ordinary and emergency ones)? 0 1 2 3 4</p>	<p>1. Management of the building should perform Fire Safety Training more often? 0 1 2 3 4</p> <p>2. Staff has a sufficient knowledge about fire in building? 0 1 2 3 4</p> <p>3. Staff has a sufficient knowledge about people's behaviour? 0 1 2 3 4</p> <p>4. Information about what is happening was communicated sufficiently? 0 1 2 3 4</p>	<p>1. Do you think that building is complex? 0 1 2 3 4</p> <p>2. Knowing the whole building will help in emergencies? 0 1 2 3 4</p> <p>3. Building emergency exits are well marked? 0 1 2 3 4</p> <p>4. Leaving through emergency exit will commence faster evacuation? 0 1 2 3 4</p> <p>5. The direction towards the assembly point is clear? 0 1 2 3 4</p>

0 - strongly disagree, 1 - disagree, 2 - neither agree or disagree, 3 - agree, 4 - strongly agree (Likert technique, Albert, 2005)

Appendix D

Observers in years 2008, 2010 and 2012 were answering on specific types of questions to observe reactions of the faculty staff and students when alarm bell goes off.

General layout for observers, 2012

1. Observation in room

room 108 room 109 room 207 room 210 room 211 other

2. Number of persons in the classroom

_____ students
_____ professors

3. Professors gender

male female

4. Time of the following events (hh:mm:ss)?

activation of the alarm _____

first person leaving the room _____

last person leaving the room _____

5. Which exit was used by the professor?

ordinary exit (towards the cafe)

alternative exit (describe which)

6. Describe with your own words evacuation procedure in the room. Focus on professors behaviour, way of acting (write your own reflections, observations and try to answer the questions on the back side. Fill in the question 6 directly after the exercise, for example when you are standing outside).

Appendix E

Instructions provided to the evacuation staff who was helping on UED in 2012.

Instructions for staff inside the building

Work description

Going from room to room and checking if there are still some people inside.

Before the experiment

1. The alarm will be sound at 14:45 (EC3), 14:50 (EC2 and EC1) and all the evacuation staff should be in the position at least 15 minutes (min) before the general alarm goes off.
2. Every member of staff should check the building layout before the official experiment. Make sure about the position where you are standing and start from the top to the bottom .
3. Gather all the materials (instruction notes, yellow jacket, etc.)

Middle the experiment

1. After 10min of the general alarm had been sound, the check of the assigned part (EC3 building for example) commands.
2. Check the room and give instructions to the people who are still inside the building.
3. Manage people who stayed inside the building (deal with insubordinates) by giving them clear and direct instructions to leave the building.
4. Note any unusual events (for example if there was any long queuing, complaints from faculty staff members, etc.)

After the experiment

1. When the check of assigned area is finished, notify the organisation team in both assembly points
2. Pass any special thought to organisation team on final meeting

Special information

Name of the building: Holger Crafoords Ekonomisentrum (EC1, EC2, EC3)
Tycho Brahes väg 1
220 07 Lund
Reception: 0046-222 02 70
Local fire station: 112
Organisation team member:

Appendix F

Instructions provided to the evacuation staff who was helping on UED in 2012

Instructions for staff outside the building

Work description

Distributing the surveys and directing evacuees towards assembly points (evacuation staff takes opportunity to teach and advise the students where they should assemble).

Before the experiment

1. The first alarm will be sound at 14:45 at EC3 building and all the evacuation staff should be in the position at least 15 minutes (min) before the evacuation alarm goes off.
2. Every member of staff should check the building layout before the official experiment. Make sure the position where you are standing.
3. Gather all the materials (surveys, pencils, yellow jacket, stop watch, etc.) and mark the position where you are standing (see general layout)

Middle the experiment

1. First, put the yellow jacket on
2. Distribute the surveys and pencils to the evacuees
3. Direct them to the closest assembly point
4. Remain in your position at least 15 min after all people left the building, or till you were told that evacuation drill is over
5. Note any unusual events (for example if people helped each other, were they happy or were complaining, etc).

After the experiment

1. Help to collect all the distributed surveys and leave it the boxes or in the Coordination room
2. Pass any special thought to organisation team on the meeting

Special information

Name of the building: Holger Crafoords Ekonomisentrum (EC1, EC2, EC3)
Tycho Brahes väg 1
220 07 Lund

Reception: 0046-222 02 70

Local fire station: 112

Organisation team member:

Appendix G

Interview questions for staff members of EC in 2012

Interview questions, 2012

Before the training

1. What is your background, where are you from, what is your profession, age, are you from Sweden or how long you are living in the Sweden?
2. Where were you studying and had they ever had fire safety training?
3. Did you know how to act before the training in a fire situation?
4. In the environment where you worked or study before, did anyone talk about fire and human behaviour in fire?
5. Did you have any experiences with real fire?

During the training

1. What did you find it interesting? What was the message?
2. Was the teacher clear about the theories? Can you give an example?
3. First part was about the fire! Can you tell me, what makes fire so dangerous to the people?
4. The second part was about human behaviour in fire! Did you find that interesting? Most of the movies showed extreme behaviour of human response on fire alarm and real fire scenario! Do you think that people act the same during the evacuation?

After the training

1. On the day of Unannounced evacuation drill, where were you?
2. What did you think first when you heard fire alarm?
3. Was it difficult to evacuate? How did you do it?
4. Did you observe any strange behaviour during the evacuation, e. g. people were buying drinks on the machines, etc.
5. Why this training was helpful for you?
6. Describe our project and give final remarks! Ask for the opinion.

Appendix H

Interview conducted with a member of a staff who had educational training in 2012 and was also attending the UED in EC in March 2012.

Interview A

The teacher is working in School of Economics and Management (EC) at Lund University and she gave permission to record the conversation. She was having a educational training from EC this year and she was at the time of unannounced evacuation drill (UED) inside of EC in classroom EC3: 207 where she had a class from 14:00 to 16:00 (see Figure bellow). From that room an observer's report was assessed and could be compared to this interview.

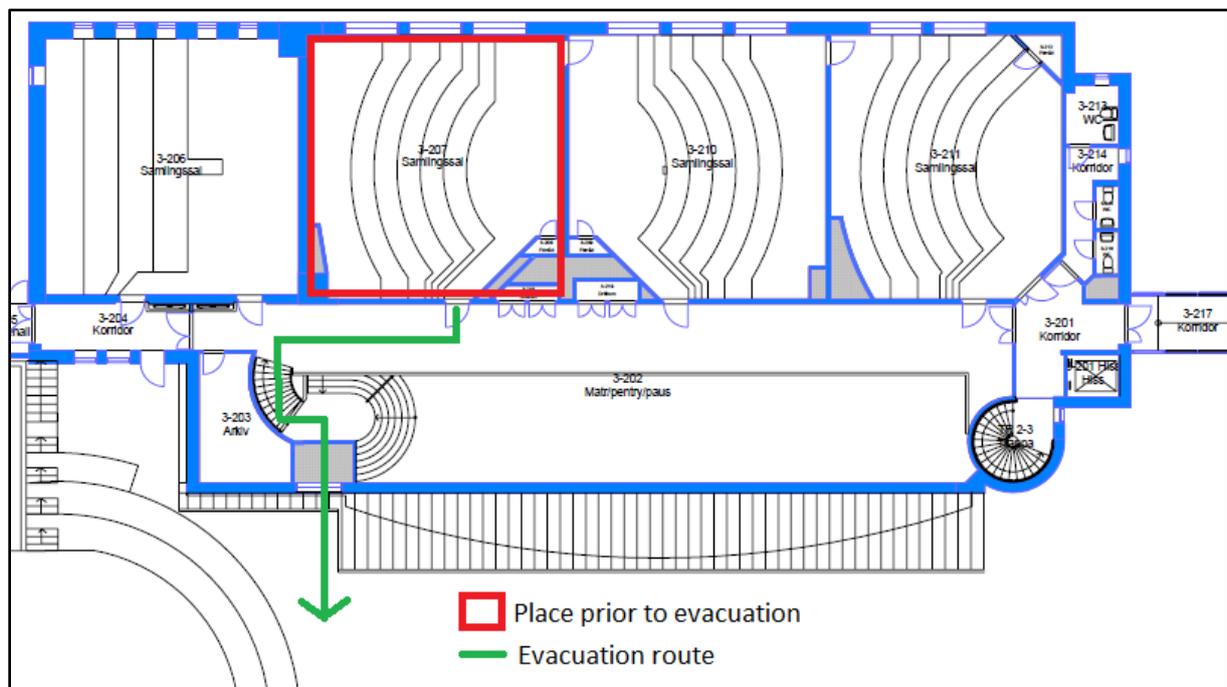


Figure. Evacuation route from classroom 207 in EC (Norén, 2012)- reprinted by permission

Can you tell me something about yourself, your background?

I am a teacher in EC and a researcher in a department for three years now. I am from Sweden, originally outside of Lund area but my study was here, I did a PhD and now I teach here.

So, you know the facilities and the environment very well?

Yes, I do.

Do you like what you are doing?

I studied the same field. I like teaching and I like the University.

Now that we are talking about your study, do you remember if you had any fire safety training in the period when were you a student here? Maybe evacuation drill?

No, there was none. Not during my studies when I had classes.

Educational training part

Did you know how to act in fire situations before you had the educational training in EC this year?

I think, I had an idea! I taught about a couple of times when we had drills here as a staff member. Also, when I was studying, I worked in a nursing home for elderly people and as you can understand, fire safety was crucial there, but I did not do any training there too. It was more of a question how to move everyone outside because they could not move by themselves, so I knew about the fire safety things before but with the training you can get aware about the things that you know, are logical but you never think about it. I became aware about the thing that I thought about before.

So, you translated the experience on what you had on the training?

Yes, basically. It is not so much how to act when something happens. After all this theoretical instructions for the facility here, e. g. where the exits are, I actually did not think about it before, like the doors are also in the back of the room. I was here as a student and now I am teaching here, but before the formal training, I never realised about them being there.

What did you find it interesting about the educational training? Was it different and was it the first time for you to have this kind of training?

This was the first time for me and I guess, I did not think about before how fast it goes. How fast fire spreads, smoke and everything. How quickly I should react. Did not think that it was such a short time.

Did the movies on the presentation persuade you because one of them was how fast the smoke will spread?

Yes, I knew that was really, the simulation and the videos, dangerous. I did not think that I have only few minutes to act.

What is the most dangerous part of the fire?

The smoke and how fast it moves, even how soon you stop breathing. How fast you lose your consciousness because of the poisons in the air.

Was the lecturer clear in the presentation and design of it?

The teacher was very clear. I remember when the teacher showed the simulation and then movie of the behaviour, how the people are scared of anything. If no one else acts, you will not act either and you are pretending that nothing is coming. These really stuck in my mind and I think that this was the message. Lecture was very easy to follow.

Then, can you tell me the main goal of this educational training?

I think that the main goal must have been, to make us very aware of how fast we have to react and small things are important. It is not enough time to hesitate, you have to react immediately.

UED

Do you remember where were you on the day of UED and what were you doing?

I remember me being in EC3 on the 2nd floor with my students. We had presentation of the student's projects. I was sitting in front, listening and giving feedback.

What did you do when you heard the fire alarm?

I told the students that we have to leave the room and they have to go out quickly. What I did not think about, is to check which way to go. So, the students which were the nearest to the doors, they went out first. I was also sort of telling them where we should meet outside, to make sure I had everyone with me and I left the room after everyone left. But afterwards I have thought, I should check if there is any smoke and if there was a smoke in the main entrance, where we enter, we should take the back. Another thing that I remember is, that all the other classes were also evacuating and when we came to the balcony, a queue was there. It was hard to go down the stairs.

Did you take the closes route in EC3 to evacuate?

Yes, exactly. It was the normal exit where people started to walk towards and I taught, if it really was a fire, we would not have time, it would be a "panic" because it was crowded in the stairs down. I guessed that there was no smoke otherwise the students would notice it and turn around, take another door. I was not careful in my instructions towards the students, where they should go. Just said, you have to leave, we have to evacuate and I want everybody outside in that area. I make sure that everybody left the classroom before I left.

Is the amphitheatre in front of EC3, some sort of assembly point?

Yes, I think it is. I was not sure, when I was in the classroom, where the assembly point for EC3 is, because I had fire drill only in Alfa building where I work but not in EC. Fortunately I taught that there was an assembly point, but my reason for doing it, it was to make sure that when I am outside, I could see all the students and have them all in one place. I didn't think that assembly points are that important, the most important thing for me, afterwards, if there was really a fire, is to see everyone in one place.

You wanted to have control?

Yes. I did not remember where the assembly points are, so the most important thing is, for me, to meet in the place where I can count students, to see if I miss someone.

Did they come back into the room together with you?

Yes, they did and everyone were really obedient. They followed instructions.

The only thing then, during the evacuation, was this queuing or was there something else?

No, it was the queuing. There was a lot of people going out the same way. That was the main problem and maybe that I did not remember where the assembly points were. For me the most important thing was to gather in the same place so I can see if I miss some one, but that is my point of view. Also, I should check before we left the classroom, which is the safest place to go. If there was fire outside and a lot of people, we should take another way. If there would really be an emergency it would be better to take another way. There would be smoke and crowded, so the other way would have been better. They exit the way they entered.

It is one of the theories that we like to move towards places that we know, are familiar to us. Did you maybe observe any strange behaviour during the evacuation?

No, I did not. I think that people are so certain that it was a fire drill. As long they do not see smoke or fire, they are securely knowing that is the drill. So it was very calm, even though it was a lot of people. I guess it would have been different if there would be smoke or fire.

Did you receive any instructions from people in yellow jackets (evacuation staff members)?

Yes, I did and they give me questionnaire to fill in also.

In the teaching process you are used to one routine and when you need to change into a role that you were taught once in the training, is it difficult to do that?

When are you in classes, doing teaching, it happens that you do not have time to think so much, you have to react. Sometimes you forget certain things, like going the other way, etc. I remember afterwards, I taught about it that maybe we should take it another way but everyone went out the same way. I guess in the real situation people would go the same way also. They would stop and wait. What I cannot do is to control the whole classroom, I can just hope that everyone will meet outside where we decided. To leave the classroom is the most important part and check if everybody left, I think. This can be done if you have small groups, a hundred students is already too much, it is impossible to see all. At that time I had in the classroom around 25 students and I could easily see all of them outside.

In general, was the educational training helpful for you? In what way?

Yes, really. It was because, although that I did not do everything right, when we had a drill, I thought differently about it. I would react differently if I would not have the training, probably just letting them to go outside. I would not have ask them to meet me outside or been that organised as I was and knowing how to handle my responsibilities better after the training. I guess I learned how to do it next time. Now, I have a different idea about it and I become aware of it. It is logical and common sense that sometimes someone needs to tell you what to do and you should reflect on it. I did this wrong, this could be done better based on the training that I got. Otherwise, I could not do it.

Do you think that we should have more educational training and UED?

Yes, evacuation drills are good and I guess we should had more of them, so all the teachers could be in the situation, although that you are teaching for some years, you do not do it so often and you need to have this formal training for someone tell you what is important. This educational training was very good, but is was theoretical and it is good to practice too. Combination is the best, I think and you improve after a while.

These were all the questions from my side.

Thank you

Sometimes, quite often, I do lectures at Lund University in presentation techniques and rhetoric. On the day of unannounced evacuation drill (14th of March, 2012), I was giving a lecture in presentation techniques in EC.

Economical Centrum organised educational training for fire safety emergencies, were you part of it?

No, I haven't had any training where I would be listening a teacher talking about fire safety and the way how evacuation should commence. No any other training was given to me before about the fire safety.

Did you have a previous experience with fire situation or any other evacuation drill in other places?

No, I have not.

Moving to the evacuation drill, can you give me some examples how it was performed, what did you do?

Well, when alarm started, everybody looked to each other and thought, is this a training or is this a true call and then suddenly someone was speaking from the speakers: "Please stay, don't get worried, stay at your seats." When this was said, everybody understood this is just training. I think, most of us understood that.

Then, what did you do when you heard the message?

I started to pack my things, we started to pack out things because we thought we better leave but it was in a very slow tempo.

So, no one rushed anywhere?

No, no one rushed.

Do you remember, if you gave some instructions to the students?

No, I had no instructions to give them. I was following instructions that was given from the speakers, I didn't know about this. So, I didn't know what to give them. What instructions to give them?

What to do was a syllabus of the educational training that we had. That is why, this interview is important for us to understand your reaction and to even make better training for the staff in the future.

Yes, I understand. I did not know about this. No one had told me.

Did you maybe give some directions where students should assemble outside, or how to proceed further?

I didn't know anything. I knew as much as them. I told them, we better do as they are saying, in the loud speakers, but then I said no, we better leave. So we left.

Was it difficult to evacuate from the place where you were?

No, no, we were just near the entrance. I don't remember exact room number but we were on the 2nd floor, it was a bottom floor, very near to the entrance.

Economical Centrum is very well known to you, do you know the building? Is it confusing to walk around?

A little bit. No its not confusing for me because I had been around quite much and I know a bit of it.

Did you observe any strange behaviour during the evacuation?

No, nothing. Everybody were quite calm and they took their bags and their coats and went out and set in the sun. I think everybody understood that was no real alarm because we didn't see any smoke nor sense it, nothing. Everybody seems very calm so I think that everybody thought it was just an exercise.

The calmness that you are describing and everybody thought it was just an exercise, was this because of the fire alarm, the message that was broadcast or was from, etc.?

Yes, it was from the message and that everybody outside was calm. We couldn't see any signs of a fire either, e. g. smoke or smell.

Did you receive some instruction from staff outside who was distributing the questionnaires and directing the people? Did you ask for it, did you ask what is going on?

No, I did not receive any instructions but I do remember that I ask someone about it and they told me that they cannot tell. We are not allowed to say it.

Can you remember anything else from the day of the evacuation?

It was nothing special, it was quite calm. What I think it was remarkable, was the person talking in the loud speakers saying, please stay and stay calm. Stay at your places, and I found that quite funny because if there had been an alarm, we shouldn't been told to stay.

Do you think that more information should be provided? For example what?

Yes, for example, take your staff and go calmly outside. Bring your things, walk outside and stay outside until further instructions. There were some double messages here. The alarm rings and then someone says, we should stay at our places. I couldn't believe that.

Thank you for the interview, this was all from my side.

I hope, I was being helpful.

Appendix J

Observer's report from room 207 in year 2008.

Observer's report in room 207/2008

In the room was 40 students and a male teacher. Timeline of the events was as follows:

00:00 activation of the alarm (09:45:53)
00:09 first person goes through the door (09:46:02)
02:07 last person leaves the room (09:48:00)

The exit that teacher used was an ordinary one (towards the caféet).

The voice which urged them was very authoritative and the teacher role disappeared. The students stood up immediately after they heard the message and they started to get ready during the spoken message. The teacher's only comment was: "See you again tomorrow" and then he was out before everybody. I did not see him giving any directions outside and he did not have any need because there was no signs of fire and the way to evacuation exit was clear (students clearly know where to go).

No one ignored the alarm but some of them took pretty long time to get dressed. Teacher did not give any instructions or say anything about the alarm. Observer felt like the initiative was taken by the spoken message and the voice was the leader. There was some queue but everything flowed well and no one was in a hurry, A small queue was formed outside but even that was fine, everyone moved towards the main entrance and down stairs.

Appendix K

Observer's report from room 207 in year 2010.

Observer's report in room 207/2010

In the room was 38 students and a male teacher. Timeline of the events was as follows:

00:00 activation of the alarm (09:46:00)

00:30 first person goes through the door (09:46:30)

02:00 last person leaves the room (09:48:00)

The exit that teacher used was an ordinary one (towards the caféet).

The teacher turned off the projector and turned around. He looked a little bit disturbed and did not give any instructions. The students stand up, mumbling, collect their clothes and go outside. The teacher was the last one to leave the room and outside the classroom he tried to direct the last students towards the exit.

There was no reflection of any alternative exit. A queue was made next to the exit but generally students were slow to pack their things, so they took their time to move towards the exit.

Appendix L

Observer's report from room 207 in year 2012.

Observer's report in room 207/2012

In the room was 24 students and one teacher, which was female.

4.35 seconds after the alarm went off the first person left the room,
The last person leaving the room was missed.

Directly, in the beginning, I got the question from one of the student if I really was reading the course. I told them that I was just going to sit there during the lecture to listening. They didn't ask anything further.

They were having students' presentations of group work in front of the class so they sat in their groups in the lecture theatre.

The second group has just started to present when the alarm went off. One in the group say "No not now", and some were laughing a bit, they were talking to each other. One girl in the lecture theatre stands up and starts to get ready to get out the other follows. The professor stands up and raises her arms to get attentions and said "listen up, we go out all together and gather outside" she direct them towards the "normal entrance", she stands by the door until everyone have gone out and then follows the group. It is crowded on the balcony in front of the stairs.

Additional questions:

1. The teacher and the students did not ignore alarm in the beginning.
2. Instruction that teacher gave to students are written in previous paragraphs
3. The students were listening what the teacher was saying
4. They said "Nooo" about fire alarm and they were not happy over being disturbed.
5. It was first a girl how stood up and took the initiative and then the teacher took the lead and told them what to do.
6. The professor took the leadership.
7. Yes, there was a queue and all left the room through the "normal entrance".
8. No one change direction or a way during the evacuation.

Appendix M

Detailed description of the events from camera in classroom 207 in year 2012.

Camera in EC experiment, classroom 207 (14th of March, 2012)

Group presentation was scheduled in the classroom where students were sitting together with a group members. The classroom is in a shape of amphitheatre and group was presenting in front of the classroom. Four members of one group were giving their findings when alarm went off. In the brackets the time of a video recording is shown in hh:mm:ss

00:00 alarm goes off (00:48:14)

00:06 first voices are heard from the students but they are still standing in the same place like before the alarm

00:08 first student stands up

00:12 first message in Swedish was broadcast, everybody were listening carefully

00:18 two students stand up and start putting their clothes on during the message broadcast and at this time also the student who were presenting in front of the classroom left to their seats to collect their belongings

00:24 a specific female voice is telling students what to do but from the video it is not clear where is it coming from

00:27 second message in English is broadcast and at this time only three students are seating in their seats and the rest are dressing up

00:34 first student leaves the classroom, the other followed

00:38 all the students are up and at this time the teacher appears for the first time in front of the classroom because she was seating before in the first rows and listening to the students, the teacher was carrying her bag and coat with her, she moved towards the main entrance of the classroom and waited there to monitor the evacuation, there is also a small queue in front of where you can hang on your jacket and the students who had the clothes their took it with them before they left the classroom

01:00 at this time a students from next classroom which are joining the evacuation could be seen through open doors

01:13 only one student and the teacher are inside of the classroom at this time, the student is putting his bag on, collecting his material from the desk and closing it afterwards, then the student moved one row to the back where he had his jacket and put it on his arms, then he left, moving to the front and turning right to take the shortest way out from the classroom

01:17 the teacher opens the doors again and moves outside from the classroom into the balcony but she keeps the door open to observe the last student's movement

01:27 everybody is out of the classroom

07:48 the door opens and the staff member in yellow jacket comes inside to check if room is empty, the other member of the team is standing outside and holding the door open

07:57 staff leaves from the classroom and the door closes

01:31 the door from the classroom are closed

22:21 door opens and the first student comes back inside from the evacuation drill, the others follows

24:20 the teacher comes back inside of the classroom and seats down in the front row on the left side of the classroom

24:33 fire alarm stops

Appendix N

Detailed description of the events from camera in classroom 210 in year 2012.

Camera in EC experiment, classroom 210 (14th of March, 2012)

Lecturer was teaching students by standing in front of the cathedra and giving power point presentation. Moving around the same spot was his way of giving presentation on the topic. In the brackets a video time is given for the reference. The classroom is in the shape of amphitheatre and from observers report around 47 students was inside of the room at the time of unannounced evacuation drill.

Timeline

00:00 start of the sound alarm, computer went blank (01:19:02)

00:02 teacher looks away from the students towards the door, like he is searching for some explanation what is happening

00:07 teacher goes behind the cathedra and address the students. Before saying something he looks into his arm watch like he is checking the time

00:11 first student stands up and the other students are impatient, they are rolling up their sleeves

00:12 first spoken message in Swedish is broadcast, during the voice message students started to put their course material together

00:22 three students are already up and they are dressing their jackets, teacher is still standing in front of cathedra

00:26 second spoken message is broadcast in English and the teacher is quite at that time but immediately after the English broadcast teacher continue with telling something to the students and showing towards the direction of the doors with his hand

00:40 teacher shows again with his hand a little bit different direction, similar towards to the assembly point area, during this time students are collecting all their belongings and putting their clothes on

00:43 second sound alarm is broadcast and at this time the teacher is still saying something by standing in front of the whole classroom

00:45 classroom door open and the first student leaves the room and the other follows, it is noticed that all the students turn right when they exit the classroom, teacher stops giving instructions and moves behind the cathedra to collect his material for the lecture.

00:47 all the students are now up from their seats and they are dressing up

00:50 teacher puts some kind of pan into his jacket and the hi starts collecting his papers that he used during presentation, at this time students are slowly and calmly leaving the classroom, they are not in a hurry

00:53 a small queue is formed in front of the exit and students have to wait in line for them to exit, this queue is formed because some of the students are coming from the back side and the other from the front side of the classroom, some students go behind the teachers back to get to the door quicker, right side of the classroom decided to turn right and go in front of the classroom and behind teachers back towards the exit

01:00 teacher is still collecting his papers and it looks that he is sorting them out, a queue of students in front of the exit is still there

01:24 teacher takes the map with all the documents beneath his arm and puts something into his pocket, at that time he starts a small conversation with one of the students, a gesture with his hand implies that student ask him something connected with the evacuation drill

01:30 teacher was already in a queue to leave the classroom but at this moment he turns around and starts walking towards the cathedra and at the same time scratching his face, he noticed that some students are still seating in the back of the classroom

01:55 last student leaves the classroom and the teacher is walking towards the door

01:58 teacher opens the door of the classroom

02:00 teacher turns around and checks the room one more time

02:14 teacher closes the door because he was talking to someone outside, classroom is empty

07:38 door from the classroom opens and one member from evacuation staff in yellow jacket come inside, he checks the room quickly and leaves, on the video it is clear the other member of the team joined him in front of the door

07:44 door closes again after the evacuation staff checked the room

20:15 door opens and the first students comes inside the classroom after the evacuation drill was announced to be over, fire alarm is still on

24:28 fire alarm is turned off and more students comes inside the classroom

25:10 teacher comes inside of the room again, students are still arriving back to the classroom

26:54 teacher starts lecturing and no discussion is made about what just happened