Fire Safety Education and Training in Architecture: An exploratory study

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Abstract

Studies have shown that building designs contribute greatly to the magnitude of fire in building with severe consequences on safety of life and property. Hence, fire safety is an important consideration in building design which architects seek to fulfil at the early stage of design. Knowledge of fire safety amongst architects can aid the design of safer buildings in terms of fire protection. Fire safety designs are expected to meet the provisions in Approved document B of the UK Building Regulations which specifies basic fire safety requirements. The main objective of this paper is to explore the educational underpinning of architects with respect to designing fire safe buildings. This paper is based on literature review and interviews conducted among architects both in academia and in practice to ascertain the need for fire safety education in architecture, and as a working knowledge for practicing architects. Findings show that architects undergo fire safety education under different modules, but not as a distinct course. Fire safety education provides architects with basic understanding of fire safety principles, and to determine when to consult fire experts. Recommendations include creating a separate course on fire safety and if taught as part of other modules, more time/ depth should be allocated to its contents.

Keywords: Architects, Building design, Education, Fire safety.

1. Introduction

Fire according to Cote and Bugbee (1988) is a serious threat to people, and the principal cause of death in building, beside falls, which is also responsible for a large number of deaths in building related incidents. Among the momentous dynamic forces such as earthquake and windstorm, devastations from fire are about 20 times those from earthquake and wind disasters (Walls, 2007). Fire accounts for almost half of the insurance policies claims against fire and multiple perils (Cote and Bugbee, 1988; Association of British Insurers (ABI), 2014; Hogendoorn, 2016) and a leading source of property loss and its contents (ABI, 2009; Haynes, 2015). The ability of a building to either confine or fast-track the growth of fire depends on how it was designed. For instance interior finishes might facilitate or restrict the spread of fire. Likewise walls, duct systems, barriers and routes can either allow or compartmentalise fire. Occupants' routes might or might not be protected, lighted, signage, of sufficient size, as well as the provisions of fire detection and suppression facilities or otherwise (Cote and Bugbee, 1988).

Fire safety is one among several other considerations such as functionality, aesthetics, human comfort, structural stability, cost-effectiveness, constructability, maintainability, and sustainability, etc (Kodur, et al, 2012; Park, 2014), that building designers must fulfil at the early stages of building design process (Stollard, 1989; Fire Sector Federation, 2015). This is to ensure safety of the building users in the event of a fire incident, as well as the protection of the built property using active and passive measures. For a building design to be effective in terms of satisfying both architectural and technical objectives, fire safety must be integrated early on in the building design process (Lawson, 1990, Stollard, 1989, Lataille, 2002). Arguably, the duty of guaranteeing the fulfilment of fire safety objectives rests with the architect (Stollard, 1986; Abraham and Stollard, 1999; Stollard, 2014). Kodur (2012) highlighted that:

"Most of the passive fire protection design for structural framing remains within the project architect's responsibility, with little if any input from a fire protection or structural engineer"

(Kodur, et al 2012. Pp 826).

Although architects are not trained to be fire scientists, it is important for them to be aware of the fundamental principles of fire safety (Abraham and Stollard, 1999; Stollard, 2014) because of their roles as principal designers. Architects should also ensure they are acquainted with specific safety issues of a structure being planned, as well as obtaining necessary advice and information from fire specialist early in the design stage (Megri, 2009). The necessity for safety awareness especially for fire safety is due to the fact that the design and construction of a building contributes substantially to the severity of fire in building (Stollard, 1986; Stollard, 1989; Sagun et al, 2014). For example, in the inquiry into the Summerland disaster, it was reported that 20 out of 34 recommendations had to do with the building and the design process. The knowledge of designers with respect to the combustibility of the materials was faulted in the following areas (Rasbash et al., 2004):

- Oroglas acrylic sheeting or poly methyl methacrylate, is a form of plastic materials whose quality is of low fire resistance and can easily be degraded was used for constructing the wall and roof of the building (Rasbash et al., 2004; University of Birmingham, 2016);
- The rear part of the amusement arcade to the top of the building was adjoined on the oroglas with a wall of Galbestos cladding. The cladding was covered with resins which makes specimen prone to a radiation of $12kW/m^2$; and
- A 300 mm wide cavity with a length of 12 m, which contains fibreboard called Decalin was used between sheet steel outer wall and the amusement arcade. The decalin was of low rating in terms of spread of flame test in the BS 497 part 7.

In addition to the materials used in the building, delayed evacuation, locked exit, lack of escape stairs contributed to the fire deaths during the incident.

Another notable example is the fire that occurred at the Faculty of Architecture building, Delft University of Technology, Netherland, in 2008. The incident showed some effects that building design has on fire development. The fire as reported by Meacham et al. (2010) and Park (2014) started around 9:00am on the 6^{th} floor of the South tower, but quickly spread to the 11^{th} floor which leads to the failure of the North tower after approximately 8 hours. Even though the building was said to have satisfied Local Fire Regulations for existing buildings, other features contributed to the speedy development and vertical spread of the fire. These features include (Park et al, 2014):

- The large open space in the design studio area sustained oxygen which allowed the fire to grow fast at the beginning of the fire development;
- Combustible acoustic material at the bottom of the mezzanine floor which aided the fast heat release rate (HRR);
- The 30 minutes fire barrier could not confine the fire within the fire origin room. The fire developed more rapidly that it could not be controlled by the fire service;
- Horizontally continuous exterior windows served as means of horizontal fire propagation making the fire to spread around the fire barriers; and
- The 4.95 m tall exterior window height was high enough to facilitate large flame extension which could annul 2.05 m vertical separation in the international Building Code requirement. The extended flame height out of the opening reached was reported to be more than 7 m.

Figure 1 shows an extended flame over two-story high (left), and the right picture displays the rapidity of fire spread within 12 minutes from when the left image was captured (Park, 2014).

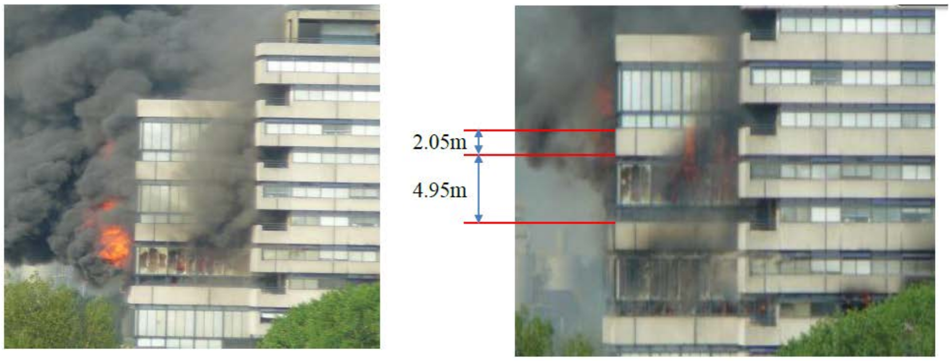

Figure 1: Faculty of Architecture Building, Delft University of Technology Netherland, 2008 (Park, 2014).

The two examples cited above provide insight into how some building design features and the material choices impact on the seriousness of fire in buildings.

This work seeks to find out among other things the level of importance accorded to fire safety in the design process as well as the extent of fire safety awareness that is currently available among architecture students, and practicing architects. This work further explores the training that building designers currently undergo to identify deficiencies and efficiencies that affect fire safety considerations in building design. The motivation for this research comes from the fact that the design and construction of building contributes substantially to the severity of fire in building (Stollard, 1986; Stollard, 1989). Stollard (1986) reviewed a number of major fire incidents including the Summerland of 1973, Fairfield of 1974, Coldharbour of 1972, Woolworths of 1979, and Bradford City Football ground of 1985 and established that the design of those facilities play a major role on the magnitude of fire after ignition and consequences for occupants.

2. Literature Review

2.1 Current Approaches to Building Design

Building design process is an uninterrupted series of actions by design team members such as architects, structural, mechanical, electrical and fire safety engineers, to achieve a comprehensive building design (Park et al, 2014). Laseau (1980) describe the process as a chain of transformation from ambiguity to information. The design process according to Balcomb and Curtner (2000) involves four stages which include: pre-design (PD), schematic design (SD), design development (DD) and construction documents (CD).

Design stages are realised using two patterns which can be either: conventional linear design or integrated design. In the linear design approach, architects primarily manage the design progress and request engineers and other consultants to take part when the design has advanced (Gane and Haymaker, 2009). This method is effective for a small and uncomplicated building projects, that are carried out by few stakeholders usually with little budget, and where it is not necessary to undertake major building performance analysis and evaluation (Park et al, 2014). Integrated design on the other hand is used for large size building project where, interested parties in the projects such as the client, the project manager, architects and other consultants come together early on in the design process to share project information. This process allows for identification of required building performance and reduces any possible clashes that may arise later in the design stages.

In the past few decades, enormous transformations had been observed in the design and construction of fire engineered buildings such as transport termini, airports and high-rise buildings. This is due to rising demand for efficient space, greater comfort level and safety (Megri, 2009; Wilkinson et al, 2013). Megri (2009) maintained that fire safety plays a major role in building operations and should be properly coordinated with other subsystems early in the design stage to provide efficiency, reliability and performance. He further stated that consideration for fire protection is carried out by the architects in conjunction with the structural engineers. While architects design the building layout-including the exterior and interior walls, structural engineers produced structural calculations that meet fire safety regulation. In addition, inclusion of an experienced fire engineer in project design team according to the National Institute of Building Sciences, (2015) is crucial at all stages of the design to occupation. This is to ensure the construction of a reliable and safe building for occupants' habitation.

2.2 Need for fire safety education and training

The need for education and training on fire safety arose from different reports in literature (National Commission on Fire Prevention and Control (NCFPC), 1973; Barham and Roberts, 1995; and Watt, 1998). This includes creating a common understanding among designers and consultants involved in building design to be adequately equipped with the currently available fire safety information and their applications. This common understanding could prevent any form of delay that could come up during the design process (The fire safety studies group, 1992). In addition, fire safety was reported to be lagging behind other consideration such as aesthetic and cost in building design (NCFPC, 1973; Watt, 1998; Lo and Yuen, 1999). Watt argues that the gap between building and fire safety design was due to fire safety analysis not meeting up with rapid innovation in building design, as well as inadequate attention being given to fire safety by architects and engineers. He opined that as a result of insufficiency of formal education in fire safety for architects and engineers, a lot of information necessary for effective fire safety application appeared to be unheeded. For instance in architectural curricula for most schools, students are not taught any course specifically on fire and life safety design (Watt, 1998).

2.2.1 Fire safety education

Fire safety education involved providing people with good knowledge of fire prevention and protection. The Mid and West Wales Fire and Rescue Services (2015) use the term fire safety education with respect to the following:

- creating awareness among young people on the need to be mindful of fire hazard in home;
- Give necessary information that can help people prevent, detect and escape from fire;
- Cautioning children to overcome the peer pressure of getting involved in crime such as arson and hoax calls.

Fire safety education can be an effective and empowering tool for intervention with fire setting behaviours among children if properly utilised (Kolko, 2002). For operators of business premises fire safety education deals with issues such as false alarm due to malfunctioning of fire detection system poor maintenance and insufficiently trained staff (Rielage, 2009). In some cases fire safety awareness is created through different means. For instance, the distributions of free fire alarms to communities that have high prevalent rate of fire incidents (Parmer et al, 2006).

Fire safety education is important in many ways. For example, the National Fire Protection Association (NFPA) runs education programmes that are focussed in educating individual representing different age groups about the practices of making responsible choices concerning health and safety (Gamache et al., 2011). Similarly, the Fire Service College runs training programmes to develop the capability and expertise within UK Fire and Rescue Service, emergency services and other categories of respondents (Fire Service College Limited, 2015). However, the example included here highlights the breadth of fire safety education encompassing a range of stakeholders representing specialist emergency services on the one hand to the general public on the other. Thus, the architectural practitioners may or may not be covered as a stakeholder group. This forms the focus of this research, to shed light on how exactly fire safety design training is imparted or conducted.

If people have good knowledge of fire, the number of fire related fatalities in buildings may be greatly reduced. For the aforementioned reason, it is a valuable project to train people on the various ways of preventing fire. Cote and Bugbee (1988) asserted that fire safety education have impacted positively in subsiding fire hazards. They also highlighted that the advantage of public fire education outweigh the cost that may be incurred in creating such awareness. The main purpose of public fire education is to enhance people's awareness, support and participation in fire prevention activities. Local fire department contribute to this process in the form of periodic inspection of building of various occupancy types, fire safety materials distribution, presentation of fire safety material to the public as well as presenting fire safety educational programmes in schools (Cote and Bugbee, 1988).

2.2.2 Fire safety training

Lawrence Webster Forrest (2015) defines Fire safety training as "the process of instruction and learning between trainer and trainee for the efficient application and management of evacuation procedures for a building". Training on fire safety is often provided to prevent injuries and deaths that could result from fire incidents. The general knowledge of fire safety among people helps in determining the level of training that could be provided. The effectiveness of fire safety training programmes such as 'fire Ed' (carried out by the Oklahoma City Fire Department) and 'kid safe' (conducted by the Melbourne Fire Brigade, Melbourne, Australia) led to the provision of fire safety information and skills for young people. It also contributes to reducing fire deaths and more use of fire alarms in homes and workplaces (Huseyin and Satyen, 2006). In order to achieve a fire safe design, Buxton (2011) suggested that a good working knowledge of the building regulations dealing with fire safety is required of architects, even when there may be opportunity for consulting fire experts. In her opinion, architects should not leave all activities regarding fire performance technology to fire engineers, as such seeking knowledge of building materials and how they affect designs becomes necessary.

3. Methodology

To carry out this task, a number of stakeholders who have roles to play in the education of architects (principal designers) as well as those governing the practice of architecture in the UK were identified. Under these categories falls the professional body – the Royal Institute of British Architects (RIBA), and the Schools of Architecture. A significant numbers of trained and qualified architects go into professional practice of architecture, designing buildings which are expected to comply with building and fire regulations such as ADB and BS 9999 etc. The architects in practice formed the third group of stakeholders who are considered in this work. Then the next two are those that enforce the provisions of the building regulation from the conception design stage through construction and operation of the building. They are the Building Control Officers, and the Fire Prevention Officers (Communities and Local Government, 2007). The Fire Prevention Officers are the Statutory Consultee for Regulation B5 (access for firefighting personnel to building) during the design and construction stages, their statutory functions of enforcing the regulatory reform fire safety order (2005) commence after a building have been completed and occupied. Further information on the interviews is given in the next section, the interview design. Table 1 shows the profile of research participants including their years of experience, post and their places of work.

Table 1: Profile of the Research Participants

S/No	Participants	Years of experience	Post	Organisation
1	AA1	8	Academic leader	Educational Institution 1
2	AA2	16	Lecturer	Educational Institution 2
3	AA3	20	Head of School	Educational Institution 3
4	AA4	12	Head of School	Educational Institution 4
5	PA1	20	Director	Architecture Practice 1
6	PA2	20	Partner	Architecture Practice 2
7	PA3	7	Project Architect	Architecture Practice 3
8	PA4	34	Director	Architecture Practice 4
9	PA5	28	Director	Architecture Practice 5
10	PA6	48	Director	Architecture Practice 6

Note: AA - Academic Architects; PA- Practicing Architects

Interview design

For this research, interviews were conducted to find out amongst other aspects the relevance of fire safety education, its coverage in the curriculum, specific topics where fire safety is considered, mode of delivery and intended learning outcomes. Information generated from the interviews is expected to provide insight on how the current approaches to fire safety in architectural education contribute to shaping the understanding of fire safety issues amongst the future practitioners, and assessing the adequacy of the approach to fire safety problem during the building design process.

Stakeholder samples were obtained using stratified random sampling. The suitability of this sampling method was due to the spread of population into distinctive groups, or strata (Fellow and Liu, 2008). The selection of each of the stakeholders was based on their various roles within the study area. Four members of academic staff from various schools of architecture identified as Educational Institution 1,2,3…n, comprising of two heads of school, and two academics were interviewed. Two of the interviews (AA1 and AA4) were conducted face to face, while the other two (AA2 and AA3) were carried out over telephone. Three of the interviewees consented to audio recording of the interview, but fourth respondent declined recording. Consequently, little information was obtained from the participant AA4 even from the note taken during the meeting, as not all questions were responded to, therefore analysis with regard to participant AA4 was be restricted to the area where information were provided. For the practicing architects (PA), 6 participants were interviewed, 1 was carried out by telephone while 5 were conducted face-to-face in the location preferred by the participants, mostly in the offices of the participants except one that volunteered to be interviewed outside the office. 3 Building Control Officers participated, 1 of which was conducted by telephone and the rest face to face. The last stakeholders interviewed are the fire prevention officers, all the interviews were conducted face to face in the various offices of the participants.

Similar questions were asked during the interviews for the various stakeholders, but sometimes additional questions do arise from answers given by respondents for clarification of responses and detailed understanding. This approach is categorised differently by in literature. While Valenzuela and Shrivastava (2008); McNamara (2009); and Tuner (2010) consider it as standardised open-ended interview, Davies and Beaumont (2010) and Open University (2015) on the other hand referred to it as semi-structured interview. This method enables a quicker interview that can be analysed and compared straightforwardly. It is in contrast to the closed, fixed response type of interview where interviewees select answers to questions from same set of options (Valenzuela and Shrivastava, 2008). The standardised open-ended interview according to Baker (2012) allows the interviewer to further probe unexpected responses to obtain more information.

4. Findings and Discussions

Under this section, findings from the analysis of data collected are discussed under the following sub-headings:

4.1 Relevance of fire safety education in architectural programme

This section highlights the importance of fire safety in architectural education in the UK. Views and opinions of architects both in academia and in practice were sought to gain insight on fire safety related courses are taught amongst the various Schools of Architecture. There are different views among architect concerning what they studied of fire safety while in the school of architecture. Some of the practice and academic architects confirm dealing with some aspects of fire safety to the level of awareness, and compliance with the building regulations (PA4), others were of the view that nothing of fire safety were done (PA5, AA4).

The relevance of fire safety education was expressed by the various participants in terms of creating awareness among students, and how other design criteria can be integrated in building design to ensure a fire safe building. Fire safety knowledge is mostly needed in practice where actual designs that will comply with building regulations are carried out. Designing out fire in buildings is key to reducing fire risk where possible. With fire safety awareness, architects highlight necessary steps and measures to be employed to mitigate fire risk, where it is not possible to design out fire (PA4). Some of the critical fire safety issues that are considered during the building design process include the provisions of adequate means of escape for safe evacuation of building occupants, as well as protecting the building to allow for people escape and intervention of fire and rescue services.

Understanding fire safety will enable students to know where to seek information on fire safety design, developing a proposal that is fire safe (AA2), as well as getting a good grasp of building regulations and its application in design (AA3). These include understanding the guidance document, the approved document B both for domestic and non-domestic buildings, and the Department of Communities and Local Government Guidance on fire risk assessment for various types of buildings. Some of these buildings comprise of Offices and shops; sleeping accommodation; educational premises; places of assembles – both large, medium and small; health premises; places of entertainment such as cinemas and theatres; and fire safety risk assessment covering means of escape for disable persons (University of Reading, 2008).

The significance of fire safety was emphasised as an aspect that examiners check for the understanding of architectural students. For instance in studio courses students are expected to prove how their designs comply with regulatory requirements including fire safety as explained in the Part B of the Building regulations for England and Wales. It is one of the determining factors for students' success in examination even as it may not be a stand-alone module.

"… fire safety is one of the key things that external examiners look at, as a sort of evidence that they understand the building regulations" (AA 1).

In addition, Fire safety awareness is necessary as part of architectural professional ethics to comply with the building regulations and standards (RIBA, 2005; RIBA, 2007; Architect Registration Board (ARB), 2009; and Sadri, 2010). The aspects of building design feature which need to conform to the regulation include accessibility and fire core. Equivalent solutions are negotiated for, if it is not possible to produce an efficient design using the guidance in the approved document B of the Building regulations 2010. As part of personal and professional responsibility, it was also stated that architects ensure the safety of users of the buildings designed by them (AA1).

4.2 Fire safety content in architectural programme

Essentially, architectural curriculum is grounded on the design studio that is concerned with learning by doing, a process that is achieved through lectures and critique sessions, through which students express their understanding based on discussions with teachers, friends and colleagues (Utaberta, et al., 2011).

The general opinions of the interviewees from educational institutions and from architectural practitioners are that there is very little content of fire safety related topic in architecture. The topics are not treated as an individual subject rather as part of other technical courses such as Building construction and studio works. In studio students learn by doing, and are expected to present their work before peers and teachers, in a form that can be built to conform to all existing standards and regulations that apply to the project type.

Participant PA2's view supported the opinions of academic architects' stakeholders concerning the content of fire safety in architecture and went further to state that fire does not really feature in the architectural education in the university. The participant's view also agrees with others such as AA2 and AA3 that advocated for on the job fire safety related trainings. When asked if a participant's interest in fire safety was inspired by education in the school of architecture, the response of PA2 was as quoted below:

"No I can honestly say that has nothing to do with it, absolutely nothing to do with it… I can still say there is still very little in terms of fire engineering in schools of architecture…fire doesn't from my understanding of what people are going through now, it doesn't really feature at all…I don't think it (fire safety) sits well in the architectural training, in terms of the formal training at the university. I basically believe it is far more successful on the job training, because you can see the relationship far better" (PA2).

The aforementioned statement does not rule out the necessity of having the basic knowledge of fire safety in the widest engineering terms. The fire safety taught elements of curriculum was stated to be within the range of 1.25% to 3% of the total course contents (AA1, AA2, AA3). It is covered within an estimated duration of 3 to 6 hours in a year. This issue might have prompted Gillie and Morvan (2006) and others in proposing course content that could improve the fire safety engineering knowledge among architects and engineers. Although it was stated that the duration could be more when one considers time spent by student for independent learning (AA3).

All the interviewees agreed that fire safety is not run as a distinct course. For example, participants AA2 was of the opinion that it should not be a stand-alone module stating that the purpose of architectural education is to improve critical abilities of an architect, rather than filling them with knowledge. Although the respondent is entitle to his opinion, the research argues that a separate fire safety module may enhance a better understanding of the basic principles of fire safety. The next section indicates the module where fire safety topics are taught in architecture schools.

4.3 Modules with fire safety topics in the architectural programme

This section seeks to find out where to locate fire safety related topic within the curricula of various Schools of Architecture. The collected data shows that the modules under which fire safety topics are taught include: technical lectures (AA2), tectonics modules, professional studies, and all studio modules for undergraduate degree (AA3). In the Masters of Architecture (MArch), it is usually taught as a lecture in the design studio (AA1). Some of the architects in practice interviewed could not recall precisely the module under which they studied fire safety (PA4, PA5, PA6). However, PA4 stated to have learned in the School of Architecture in the past three decades, how to provide adequate means of escape, the principles of travel distances, compartmentation, fire resistance of structures as well as fire doors and partitions, although not to the level of fully complying with the building regulations (PA4).

The participants AA1, AA2, and AA3 were all of the view that the modules with fire safety topic prepare majority of students with the understanding of basic principles. The available information in the module may not be enough to be used on real building in practice. According to PA2:

"*Fire does not from my understanding of what people are going through now; it doesn't really feature at all*".

The above quotation was supported by one of the academic architects (AA4) who opined that there is no fire safety education in architecture. According to the participant AA4, things like calculation of exit width, numbers of escape routes are not carried out by architects. He further stated that design education do not cover evacuation and collapse of building during fire. The participant however admitted that architect do consult fire engineer during preliminary design stage, and where necessary modify the design based the outcome of such consultation.

For some schools of architecture that fire safety related topics were admitted to be taught, the impact of such course(s) on architecture students include: knowing how fire safety problem in design is solved; and whose assistance that may be required to provide effective design solutions. Practical experience about understanding how these modules get applied to real buildings was suggested for students, whereas continuous professional development (CPD) was highlighted as a veritable means of acquiring fire safety education in practice (AA2, and AA3). This is in agreement with Cerda (1981) who supported that Continuing professional development serves as a mean of providing up-to-date information for architects on specific types of building, new materials and methods as well as new legislation. CPD helps to further develop the basic knowledge on fire safety acquired from the school of architecture (Stollard, 1986).

The teaching of Fire safety in the school of architecture is carried out as part of studio, technology courses by structural engineer, and/or as part of building services by either a building services engineer or environmental engineer (AA3). Part time lecturers working in design firms sometimes bring in their practical experience in the real world to support students' understanding of design for fire safety.

"*…bringing their expertise to the holistic design process… and demonstrate to the design of building*" (AA3)

Methods adopted in teaching include technical lectures, practical demonstration, one to one tutorial, informal discussion and studio reviews (AA1). Assessment of fire safety part of a module is through Portfolio submission, in which they will need to make drawing or diagrams that show where the exit route is, the travel distances, and correctly label the fire rating for building element.

4.4 Tools used for fire safety education and training

The tools used for promoting fire safety training include; combination of lectures and studio where students learn by getting involved in activities (AA3), group discussions and physical demonstrations through which students contribute to the learning process, rather than being told what to do (AA1). Fire safety teaching is also enhanced through the guidance of technically competent tutors (AA2). Technical competence of tutors entails trainers having sufficient skills on the use of wide range of training techniques to present training materials to students eithers on one-to-one or to group of learners (Buckley and Caple, 2009). Architect in practice enhance their skills by attending fire safety seminars (PA3), seeking relevant information using the internet, research projects, British Standards, AD B, as well as consultation with the Building Control Officers / Approved Inspectors (PA5). The use of Microsoft excel was mentioned as a tool that some architects used for calculating sizes and width of escape stairs and fire doors for building with large population, in compliance with the provisions of Building Regulations and the British Standard, BS 9999.

4.5 Suggestions for improving the existing modules

Interviewee AA3 encourages improvement to the modules, but made no specific suggestion as to improving fire safety related modules. AA2 was of the view that critical understanding of fire safety should be left to the time of architectural practice. Therefore, made no suggestion for any improvement besides knowing who to consult when a need arise. AA1 advocated for creating a summary of the main principles required to understand fire safety and using pictures to present alternative solutions. AA4 made no suggestion since the respondent is of the view that fire safety is not part of architectural education.

5. Conclusion

This investigation has revealed that there may be no need for a separate module to be created on fire safety education and training for architecture students. However, majority of the participants supported on the job training through continuing professional development (CPD) to enhance architecture graduates fire safety design skills. The overall opinions show that the current provision for education and training is adequate to provide the type of fundamental skills that students require, and students are told where to ask for help if necessary. Practicing Architects also believed that they have knowledge of fire safety sufficient to allow for effective fire safety design. They are willing to engage fire engineers, should the need arise, especially for complex design projects. Although some architects have conflicting opinions on the need for creating a module on fire safety within the architecture programme, future work in this study area shall seek to verify the reliability of the various assertions.

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