

RESEARCH ARTICLE

Guidance from the Senior Engineers during the Undergraduate Training-A Case Study.

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Abstract: Senior Engineers have an ethical responsibility to enhance the engineering knowledge and professional experience of trainee engineers who work under their authority through proper supervision and guidance. This research paper investigates the incidents where senior engineers have neglected such kinds of responsibilities as perceived by final year engineering students of a state university in Sri Lanka during their industrial training period as a case study followed with a qualitative survey. An open-ended question was given to 200 final year engineering undergraduates of a state university in Sri Lanka as per the convenient sampling strategy to describe any ethical violation observed or experienced by them during their industrial training. Only 30% had reported such incidents while the rest of the incidents belong to the violation of health and safety practices and integrity issues in engineering practice. Incidents which only belong to less supportive behaviour of senior engineers were selected and analyzed following inductive thematic analysis. This study reveals the emergence of 4 major themes. They are the senior engineers' unwillingness to guide, assigning inappropriate tasks, unnecessarily blaming and negligence of training schedules. One-sided data collection is the major drawback of this research and further investigations can be done to identify the possible causes for the less supportive behaviour by having a few interviews with selected senior engineers in the industry. The outcomes of this case study will raise the awareness of senior engineers regarding their ethical responsibilities in guiding and supervision of trainee engineers to ensure proper professional development.

Keywords: *Engineers, Guidance, Ethical Responsibility, Sri Lanka*

Introduction

Engineering is a profession that has a higher level of social and ethical responsibility towards the general public. When investigating about engineering profession which evolved from the past, few famous engineering failures like the Challenger space shuttle disaster, Kansas City Hotel walkway collapse and Bhopal industrial accident happened time to time in different countries raise the awareness of the engineering community about the importance of understanding the social and ethical responsibilities of engineers. As a result of such engineering tragic failures, Engineering Ethics appears to be emerging

as a distinct discipline, taking its place with medical, legal and business ethics (Harris et al., 1996).

Ethics is simply, a system of moral principles. Applied Ethics plays a critical role in engineering, health, medicine and law and currently a required component of pre-practice education for these professions (Barry & Ohiland, 2009). Accordingly, Engineering Ethics guide the professional engineers to make correct decisions and behaviours in a professional capacity. Therefore, it is essential to incorporate Engineering Ethics in professional engineering education systems, as it helps engineers to make ethical decisions starting from their undergraduate time in universities (Kabbashi & Khan, 2013). Nowadays, many engineering

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undergraduate courses throughout the world have been incorporated with modules related to Engineering Ethics as accreditation bodies of engineering degree programs like ABET (Accreditation Board for Engineering & Technology) constantly emphasizes the importance of infusing ethics in engineering curricula (*Criteria for Accrediting Engineering Programs, 2016 – 2017 | ABET, 2018*). Teaching Engineering Ethics is not an easy task. It needs constant effort for preparation and extensive research on the social aspects of engineering. Most of the engineering curricula consist of stand-alone ethics modules for undergraduates. But, consistent support from other lecturers and professional engineers is essential across the curriculum to develop the moral aspects of future engineers effectively (O'Neill-Carrillo et al., 2008). In such a case, future engineers should be taught and guided on how to make a value judgement, understand what is ethically significant and assess the impact of their actions. In the early stages, engineering students and junior engineers encounter difficulties in establishing connections with how their decisions and actions will impact society. Therefore, the role of engineering educators including lecturers in universities and senior engineers in engineering firms is to instill an awareness of ethical obligations into the work of their students (Bauer & Adams, 2016).

In Sri Lanka, most of the universities which offer engineering degree programs, teach Engineering Ethics related course modules to their undergraduate students according to the accreditation criteria stipulated by The Institution of Engineers Sri Lanka (IESL) which is the apex body of professional engineers in Sri Lanka and also a signatory for Washington Accord (*The Institution of Engineers Sri Lanka - Accreditation of Engineering Degrees, 2013*). Washington Accord is an international agreement between bodies responsible for accrediting engineering degree programs (International Engineering Alliance, 2018). Accordingly, all engineering undergraduates follow Engineering Ethics related course modules as it is compulsory to fulfil the degree-awarding criteria. Since Ethics is a non-technical subject, many engineering undergraduates may have a negative perception of the importance of ethics for their future profession. Balakrishnan and Tarlochan (2015) in their research, had identified that engineering students who participated in their research had a negative attitude towards the knowledge on socio-ethical issues in engineering. But, Sri Lankan engineering undergraduates who study in the final year of their degree program in state universities have a positive

perception towards the importance of Engineering Ethics for their future profession (Wijesinghe & Jayawardane, 2018). It demonstrates the impact of ethics education in engineering faculties of state universities.

Different engineering associations have introduced their codes of ethics for professional engineers. Codes of ethics introduced by the Institute of Electrical and Electronics Engineers (IEEE), National Society of Professional Engineers (NSPE) and American Society of Civil Engineers (ASCE) are widely followed by professional engineers in the world. In Sri Lanka, codes of ethics introduced by The Institution of Engineers Sri Lanka is practiced by Sri Lankan professional Engineers (“The Institution of Engineers Sri Lanka - Code of Ethics,” 2013). Most of the codes of ethics introduced by such associations have similar clauses in meaning and only a few clauses may differ from each other. Most of the codes of ethics comprise clauses relevant for supporting the professional development of young engineers. In IEEE codes of ethics, it is denoted in clause 10 as “Professional engineers agree to assist colleagues and co-workers in their professional development and to support them in following this code of ethics. In ASCE code of ethics, it clearly emphasizes this in canon 07 as “Engineers shall provide opportunities for the professional development of those engineers under their supervision” (Starrett et al., 2017). Similarly, IESL in Sri Lanka also describes similar ethical obligations as “Engineers shall actively assist and encourage engineers under their direction to advance their knowledge and experience” in clause 08 in its code of ethics (“The Institution of Engineers Sri Lanka - Code of Ethics,” 2013). From these examples, it is clear that professional engineers are having an ethical responsibility to develop and advance the professionalism of trainee engineers.

Developing the younger engineering generation for a future world is one aspect of senior engineers’ social responsibility. Consequently, no senior engineer can escape from such responsibilities as it helps for the benefit of future society. In Sri Lanka, engineering undergraduates studying in state universities have to participate for at least 24 weeks of the industrial training period in different engineering firms under the guidance and supervision of a relevant senior engineer/s, to fulfil one of the degree requirements. It is also a major turning point in engineering undergraduates’ professional lives. They are new to the engineering profession and learn many practical aspects of engineering from senior engineers which helps to develop the professional life of trainee

engineers. Professional development is not limited to improving engineering and business knowledge within trainee engineers. To be good professionals, young engineers should practice engineering ethics from the beginning of their professional practice. It is impossible without support from the work environment (Starrett et al., 2017). That supportive work environment should be facilitated by senior engineers. If not, trainee engineers cannot acquire the required technical, business and ethical knowledge essential to become professional engineers soon. Creating a fair and supportive work environment for junior engineers is more difficult than it sounds. Many senior engineers try to fulfil this social and ethical responsibility as much as possible by giving full support to trainees and junior engineers who work under them. However, there is a limited number of senior engineers who do not understand this requirement. They are not supporting their subordinates to enhance their professional experience. According to Engineering Ethics, it is an ethical violation. Transfer of engineering knowledge, skills and ethical behaviour from seniors to juniors is a must for the proper development of the engineering community to support the general public. If not, finally the general public has to face troubles from the works done by incompetent engineers as a result of less guidance given by senior engineers during their undergraduate training periods. Because of that, giving proper guidance for trainee engineers can be considered as one aspect of fulfilling senior engineers' ethical and social responsibility (Whitbeck, 2011). Such unethical behaviours will create similar implications for generations of engineers. If trainee engineers are not having sufficient Engineering Ethics knowledge, there is a possibility of adopting less supportive practices and unethical behaviours of senior engineers' to their professional practice in the future. Because most of the time young engineers follow their senior engineers considering them as role models for their professional lives. Such trainee engineers will practice the same in the future causing the same problem continues to society (Zandvoort, 2008).

Engineering Ethics field is a less attentive research domain in both local and international context. At the international level, numerous researches have been conducted focusing on the pedagogy of Engineering Ethics. In Sri Lanka, there is a dearth of research works related to the ethics of engineers with wider attention to practical implications (Wijayasiri, 2009). The objective of this research is to identify the major means of less supportive behaviour of senior engineers to develop possible recommendations to

eradicate such unethical behaviours from the conduct of engineers in Sri Lanka.

Methodology

Qualitative research is the most suitable approach for studies where scholarly works are not much available (Cresswell, 2014). Thus, the qualitative research approach was selected during the design stage of this study considering the purpose of the research and later for data collection. Out of the main qualitative research designs available in the literature, the case study design was adopted since the researcher can develop an in-depth analysis of the case which is going to be investigated (Denzin & Lincoln, 2005). Convenient sampling is an emergent sampling strategy that is widely utilized by qualitative research scholars considering its convenience in selecting research participants (Marshall, 1996). Hence, by following the convenient sampling strategy, the researchers have selected final year engineering undergraduates of a state university in Sri Lanka focusing on the convenience of approaching them for data collection. They have already completed their 24 weeks of undergraduate industrial training under the supervision of senior engineers in different engineering firms and followed the Ethics module at the university. This study was conducted with the participation of 200 students, out of which 35% belong to Civil, 35% belong to Electrical and 30% belong to Mechanical Engineering respectively. All the students were asked to write about any ethical violation observed by themselves during their industrial training using a few sentences. It should be clearly understood that the students were not directly asked to write about the cases where they observed less supportive behaviour of their senior engineers.

All the responses received as participant-generated textual data were initially screened and categorized under different categories of engineering ethical violations. Out of them, responses belong to the category of less supportive behaviour of senior engineers were used for this research study. Those responses were analyzed following the inductive thematic analysis method. The inductive thematic analysis aims to develop an analysis from the data without any references to existing theories in the literature. However such analyses have been shaped by the researcher's standpoint and disciplinary knowledge to some extent (Braun & Clarke, 2013). Emerging themes of this analysis give more insights towards the senior engineers' ethical responsibility in

training junior engineers in Sri Lankan engineering firms.

Results and Discussion

At the initial screening stage of the participant-generated textual data, it was found that only 30% of students had reported about lesser support of senior engineers during their industrial training period while the rest of the incidents belong to the violation of health and safety practices and integrity issues etc. in particular engineering firms. Further analysis of responses belonging to the category of less supportive behaviour by employing inductive thematic analysis reveals the emergence of four significant themes. They were senior engineers' unwillingness to guide, unnecessarily blaming, negligence of training schedules and assigning inappropriate tasks to trainee engineers. All four themes coming under the less supportive approach for training activities of trainee engineers were clear violations of the ethical responsibilities of senior engineers. In this section, each theme is discussed with the support of varieties of responses as expressed by students.

Unwillingness to guide

Senior engineer in any engineering firm is having a vast amount of theoretical and practical engineering knowledge gathered throughout his or her professional career. Part of that knowledge should be transferred to junior engineers. The existence of a socially responsible engineering profession is highly dependent on that matter (Starrett et al., 2017). University, itself is impossible to feed everything to engineering undergraduates before they leave the university. Professional development of young engineers happens when they are working under the proper guidance of senior engineers in different engineering firms. A limited number of senior engineers have demonstrated some kind of unwillingness to guide and share their valuable experiences with the trainee engineers. Following excerpts from engineering students' responses support the theme of senior engineers' unwillingness to guide trainee engineers.

“One senior research engineer in our training place had a lot of resources in his possession. Therefore, we approached him to ask about a special micro-

controller which he had in the cupboard. But, he told us that “you do not know how to use that. Therefore, I can't give it”. Then we told him that “we would like to learn about it” and requested him kindly to teach about it. Then he said that it is too complicated for us to learn”.

Some senior engineers like to keep some valuable information with them without sharing with other engineers for different reasons. But, in this situation, the senior engineer's behaviour is not up to the standards of a professional engineer. He clearly expressed his unwillingness to teach trainee engineers. This unethical behaviour of that senior engineer had created a bad impression on trainees about senior engineers' and reduced the social value of a senior engineer. The reasons behind such kind of behaviours should be investigated as such behaviours are not socially accepted by any senior professionals.

“The engineer in-charge of that workshop was a graduate from a private institute. He did not care about trainees who come there from state universities and was reluctant to share his knowledge not only with trainees, but also with technicians. But, he always encourages the trainees who came from private institutions and share his knowledge with them.”

“When I was on training in my training place, there were other trainees who were from another state university. There was a senior engineer who also graduated from that university. Always he compared us with other trainees. It was not about our works; it was about our university indirectly. He did not motivate us and always try to make verbal abuses although other engineers appreciated us”

These two excerpts from engineering students' responses give some insights about the existence of discriminative practices among senior engineers based on graduated universities. In one incident, a conflict between private and state universities appears as above. In another incident, conflict among state universities itself emerged while creating disadvantageous situations for trainee engineers. Mainly, some senior engineers do not like to guide or help trainee engineers who studied in some other universities. As senior engineers, they have the responsibility to constructively criticize their trainees' works to guide them in the correct professional career pathway, but not the background of the trainee engineers. His or her responsibility is

there to support trainee engineers to become professional engineers. Here, senior engineers' unwillingness to guide and share the experiences with trainee engineers has emerged in the form of university-based discrimination.

"Group of us were assigned to be trained under the Operation Engineer at the control center and switchyard. But, once we went to him, he did neither give us a single training session nor assigned an authorized person to train us for the whole 2 days. Therefore, our valuable 2 days were wasted without doing anything, but for waiting until he calls us."

Due to the complexity of the engineering curriculum, undergraduates have a limited time to get industrial training. In Sri Lanka, it is only 24 weeks. On many occasions, trainee engineers have to visit different locations of their assigned engineering firms as per the training schedule to get exposure in different technical areas. If they couldn't cover that area due to any reason during the assigned period, most of the time, they cannot visit the particular section once again due to the unavailability of time. They cannot gain the knowledge, experience and management skills specific to a particular section, maybe for their entire life. Senior engineers should understand this situation. Senior engineers are also having a busy work schedule in their workplaces. If they are too busy, they can assign trainees to another experienced person to guide them. Senior engineers should go for that alternative without unnecessarily wasting the valuable time of engineering trainees.

"We went to study and get some information about a particular section from the engineer of that section. We had to contact all other personals of that section through that engineer. Since that engineer did not talk with us for hours, we could not do anything and was not able to learn anything in the whole day."

If the senior engineer ignores engineering trainees without even proper communication, a question is raised about to fulfil the training objectives of these students. Because of this immoral conduct of the senior engineer, engineering trainees could not contact other employees of that section also. As a compromise, if senior engineer assigns engineering trainees to some other person in that section for the training purpose, trainees can learn something useful. Similarly, senior engineers may have many options to train young engineers without spending their limited time. Even a one-minute discussion is enough to

motivate and encourage trainees to involve in their training activities with other subordinates in the workplace.

"I was assigned to the Quality Control section and had to work under a senior engineer. He went for site inspections with me and asked me to do the inspections work. Meanwhile, he gave phone calls to his relatives and talked with them until I finish the work. He did not teach me how to do inspections properly. Finally, he approved the work without checking the work by himself."

By approving works done by the trainee engineer without even checking, the senior engineer has done an unethical action ("The Institution of Engineers Sri Lanka - Code of Ethics," 2013). In this case, the senior engineer had not taught the site inspection process properly to the trainee engineer. So, the trainee engineer was also not confident about his or her work. Before assigning any task to young engineers, senior engineers should assess the knowledge level of the young engineer. If a trainee engineer is not competent enough to perform that task due to lack of knowledge, proper guidance should be given to reduce the knowledge gap. It is the duty of any senior engineer who involves training activities. If a trainee engineer inaccurately performs a task or produces a wrong report in official capacity due to a lack of knowledge and guidance, the senior engineer cannot escape from the underlying responsibility for such activity. It will be advantageous for both senior and trainee engineers if senior engineers can guide trainee engineers properly expecting accurate performances from trainee engineers with a lesser number of mistakes.

"In some appointed places training students were not guided by the engineer in charge according to the given instructions of the top management. In some sections, the arrival of trainees is considered as a big disturbance although trainees are eager to have better training. Some engineers directly refuse or postpone the meetings with trainees. It is an unexpected situation in training organizations."

Engineering undergraduates studying in different universities in Sri Lanka are assigned to some specific engineering establishments for a few days of training to get better industrial exposure. Hence, senior engineers working in such engineering establishments have to train a large number of

trainees throughout the year. In such instances, some senior engineers consider the arrival of trainees as a disturbance. Therefore, they do not willingly support trainee engineers to advance their knowledge. Postponing or refusing meetings with trainee engineers is not an ethical way to deal with trainees. They should try to resolve the issue of the arrival of trainees throughout the year by addressing relevant authorities in each university. As much as possible, senior engineers should try to support junior engineers. They also now shine in those senior positions as a result of the generous support given by their senior engineers in the past.

Professional engineering associations like IESL in Sri Lanka can involve in this issue by continuously organizing discussions on Engineering Ethics to educate practicing engineers regarding their ethical and social responsibilities of professional practice to minimize this issue.

Unnecessarily blaming trainee engineers

Senior professionals follow different strategies to address mistakes and inaccurate works of their subordinates to get them to the correct path (Kipnis & South, 2000). Blaming is one such strategy and there should be blameworthiness for such reactions. But, the way they blame subordinates make different implications on the professional development of subordinates. In the engineering profession, senior engineers' blames may have different impacts on trainee engineers' professional development. Following excerpts from students' answers will give a clear insight into issues associated with unnecessarily blaming trainee engineers.

"In my training place, I saw a senior engineer who was always pointing out and telling about the weaknesses of a less experienced engineer to another senior engineer who has more experience. It can be identified as slandering. That is not a good quality of a professional engineer."

Due to less experience, mistakes happen from any junior professionals when performing their professional duties. They may weak for some tasks. Here, one senior engineer was involved in a process like slandering against a junior engineer. Although the objective behind slandering was not clear according to this excerpt, however, nothing good can happen to the junior engineer from the particular senior engineer's unethical behaviour. Professional senior engineers should assist junior engineers in such a case to develop their skills to reduce mistakes.

Slandering will only leave self-abasement feelings within junior engineers. This kind of behaviours of senior engineers also reduces the professional respect maintained by junior engineers upon them.

"A trainee engineer was supervising tile laying in a certain floor. As there are lot of unknown things about tiling, he asked them from a senior engineer. Instead of explaining them and guiding him, senior engineer humiliated him in front of other laborers showing an unethical behavior".

Being a victim of humiliation in front of labourers is not good for the professional development of young engineers. Senior engineers should not humiliate junior engineers considering their mistakes or weaknesses. If the senior engineer is making the environment for other staff members to disgrace young engineers, it also is unacceptable behaviour of any senior engineer. From both these behaviours, trainee engineers will lose their self-esteem as blooming buds in the future engineering profession.

"I was trained under a just passed out graduate engineer from another university in Sri Lanka. Deputy Project Manager scolded him even at little mistakes in front of other staff and trainees."

Similar to earlier mentioned cases, here Deputy Project Manager was involved in blaming a junior engineer unethically. However, that junior engineer was the training supervisor for a group of undergraduate engineering students. Being a victim of blaming in front of trainees and subordinates may reduce the self-confidence of the particular junior engineer and may affect the professional development adversely.

"At the training place, the chief engineer did not behave as a good engineer. Technicians and junior engineers who worked under him were blamed every time. He did not share his experiences and knowledge with others. So, I had to find the answers by myself for the problems by searching the internet. Also every time, everyone had to work with very patience."

Getting tempered even for small incidents is not good and acceptable behaviour for any professional. It is a personality issue of any professional. Hence, engineers should not get tempered for every single mistake done by their subordinates (Fleddermann, 2012). This senior engineer was always blaming everybody who work under him and not willing to share experience and knowledge with subordinates.

Because of that, above mentioned senior engineer is not suitable to be considered as a professional role model, not only for junior engineers but also for technicians.

More lectures and workshops should be organized to improve the professional skills relevant to people handling aspects of engineers from the undergraduate level to the senior positions with the support of leading professionals in the society to address this issue.

Negligence of training schedules

Training schedules are essential to be followed to give maximum training experience for trainee engineers from the available limited time. For any work or project to be successful, there should be a properly developed schedule or time table. And also, everybody should adhere to that for making the intended work a success. Trainees in every discipline can achieve good training experience if they are headed with a proper training schedule to achieve many aspects in a realistic time frame. But, some senior engineers have neglected to consider training schedules showing their less support and guidance for the professional development of trainee engineers.

“In my training period, I worked in one worksite. But, there were so many work sites that belong to this company. I only had to work on the same maintenance activities limited to few machines. My senior engineer did not give any training schedule for me and his only intention was to fulfil his job role through me while finishing the work somehow. He had no interest to improve technical knowledge of mine by discussing what he knows.”

The senior engineer mentioned in the above case has utilized trainee engineers only to fulfil his or her targets. No support has been given to enhance engineering knowledge further by allowing trainee engineers to transfer to other divisions of the company. As trainee engineers, they should do valuable work for the engineering firm where they are undergoing training. But, the company should allow them to learn new things while getting works done through trainee engineers.

“We were assigned to a certain workshop for two weeks during our training under the guidance of engineer in charge of that workshop. But, unfortunately, the entire two weeks were ended up without proper training and guidance. That engineer did not pay any attention towards our training

schedule though he was supposed to do so.”

According to the above excerpt, these trainee engineers had to waste two weeks without any proper training. The main reason behind that was neglecting the training schedule by the senior engineer. As the authority of delegating works for subordinates rests on the hands of senior engineers, trainee engineers may not get any support from the other staff members of that workshop since they were not asked to do so by a senior engineer. Accordingly, senior engineers should understand that the major responsibility of training junior engineers lies in them.

“In my training place, there were 8 sections in the engineering division. I was allocated to one section on the first day. I was in that section in my entire training period doing the same thing every day. My boss did not permit me to change the section as per the training schedule.”

Getting the support of trainee engineers for senior engineers' work-related duties gives practical engineering exposure for trainees. But, keeping them allocated for the same work throughout the training period is not beneficial for the professional development of any trainee engineer. They should get the maximum exposure to practical engineering aspects as much as possible during their training period. If senior engineers are not allowing trainee engineers to achieve that, they are not supporting the development of trainee engineers.

Assigning inappropriate tasks

Trainee engineers should be assigned appropriate tasks as per the issued training guidelines by the university, which supports their professional development and further their engineering knowledge. These tasks should enhance the knowledge, skills and attitudes of trainee engineers which are essential to take responsibilities as an independent professional engineer (Graaff & Ravesteijn, 2001). Thus, this will improve the mindset of undergraduates, which is a very important quality goal of any degree program, according to the Sri Lanka Quality Framework (SLQF) guidelines issued by the University Grant Commission (UGC) of Sri Lanka. Although it is not available as published data, many trainee engineers have a lot of concerns regarding what they are asked to do during their training periods by their superiors in Sri Lanka. Several engineering undergraduates have reported about some cases where trainee engineers were not

be assigned appropriate tasks relevant to the professional development of young engineers.

“There were two engineering trainees from another university. Their senior engineer was not interested in training them. He used them to do day-to-day office paperwork which had no connection to engineering.”

Assigning inappropriate tasks for trainee engineers to complete, definitely waste the valuable time of them. In the above case, two trainee engineers were utilized to fulfil the requirement of office paper works like photocopying. The senior engineer mentioned in the above case may not have an office assistant to do this paper works. Although the case was like that, senior engineers cannot ruin the professional development of trainee engineers by assigning them inappropriate tasks always.

“In my training place, young engineers and trainees were used as labourers to fulfil their labour requirement. Appropriate tasks were not assigned for the trainees to advance their knowledge.”

“In my training place, trainee engineers and technicians were assigned for inappropriate tasks like cleaning, painting walls and other heavy works. The chief engineer assigned those tasks without considering their education level and technical skills.”

Trainee engineers are not going for training establishments to work as labourers. They are going there to be prepared for the future engineering profession. Without understanding that requirement, some senior engineers assign young engineers for labour works when the company is running out of the required labour force. In both cases mentioned above, senior engineers' sole intention was to complete their works somehow. Such senior engineers do not think about the damage that happened to the reputation of trainee engineers by working as labourers. These inappropriate tasks are not suitable for their education level also. By working as a labourer, trainee engineers can improve some hands-on skills required for labourers. But, it is not an acceptable way of developing the engineering skills of trainee engineers.

“When I was working as the trainee engineer at my training place, my site engineer did not allow me to engage with the supervision of ongoing construction work due to the reason of I am a girl. He

gave me all the office work to do. Because of that, I couldn't get sufficient practical knowledge.”

This case is slightly different from other scenarios. Since this trainee engineer is a girl, she was not allowed to engage with the supervision of construction works. Sometimes, that senior engineer might have thought about the safety of that lady trainee engineer by not allowing her to go to the construction site. Nevertheless, the senior engineer has given her all the office works to do. This kind of works will not help her to become a competent professional engineer in her discipline. But, because of that, this trainee engineer could not get sufficient practical experience in supervising construction works in that site, which is the most important aspect of training for civil engineers.

Industrial training units of universities visit engineering firms to meet both senior engineers and trainee engineers as a part of the evaluation process of the industrial training at least one time. However, it is an observed fact that trainee engineers hesitate to reveal such issues to staff members of training units while they are still working in those firms. If the industrial training units can further guide and educate the senior engineers in the industry related to the objectives of industrial training and the requirement of adherence to training schedules will be supportive in addressing these issues. The linkages and communication among industrial training units, senior engineers and trainee engineers should be strengthened furthermore to enhance the support of senior engineers for industrial training purposes.

Conclusions & Future Research

This research has investigated the less supportive behaviour of senior engineers on the professional development of trainee engineers in Sri Lankan context as a case study. Supporting the professional development of trainee engineers in technical, business and ethical aspects has been emphasized as an ethical obligation of senior engineers in most of the professional codes of engineering ethics. And also, it is a major social responsibility of any senior engineer when considering it from society perspectives. Although the requirement is like that, there is a limited number of senior engineers who do not support the professional development of junior engineers. The result of this research reveals the emergence of four themes regarding the less supportive behaviour of senior engineers as unwillingness to guide, unnecessarily blaming,

neglecting training schedules and assigning inappropriate tasks. These findings are highly beneficial for every professional engineer since this research paper discusses the major themes of less supportive behaviours of senior engineers on the professional development of junior engineers to eradicate such immoral behaviours. IESL and Industrial Training Units of Faculties of Engineering can involve in educating the practicing engineers from junior to the senior level regarding the requirement of proper guidance and supervision for the professional development of young engineers. This research work makes reminders for senior engineers who forgot their social and ethical responsibilities on developing future engineering generation. Hence, senior engineers who work in a professional capacity have an immense responsibility for that matter to fulfil.

As a continuation of this research, scholars can investigate deeply about root causes for less supportive behaviour of senior engineers on the professional development of junior engineers within the perspectives of senior engineers by conducting several face to face interviews with senior engineers in the industry and industrial training coordinators in the Faculties of Engineering. Therefore, it will help to understand the underlying factors within such senior engineers for their less supportive behaviour. And also it will be a good initiation to minimize such ethically irresponsible acts from the conduct of engineers worldwide.

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