

## Industrial Advancements and emerging need for Collaboration between Industry and Engineering Universities of Pakistan

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### Abstract

Industry academia collaboration plays paramount role for both stakeholders and there are numerous benefits of that collaboration. This study aims to determine the role of this collaboration and its potential advantages for both the parties. The respondents for this study were 40 working engineers from two engineering organizations of Pakistan. Purposive sampling method was used to draw the participants. Data were analyzed using Statistical Package for Social Sciences (SPSS 15.0) to draw percentages for each variable such as gap between technical and non technical skills at workplace and communication skills in engineering curriculum that assists engineering graduates to perform workplace jobs efficiently following graduation at workplace. The results of the study suggest that there is a gap between technical and non technical skills at workplace and the subject of English or communication skills taught to engineering students does not significantly improve communication skills of engineering students. The findings of the study can be used as a guideline to overcome prevailing technical and non technical skills gap at workplace and to add more communication skill subjects in engineering curriculum in order to better train future engineers for the workplace which has become more demanding in terms of skills of engineers compared to past decade engineers.

**Keywords:** Collaboration, Industry, Engineering Universities

### 1. Background of the Study

All fields of life such as commerce, science, medical and engineering has made significant development in every spheres of life. Thus, due to these advancements engineering organizations conduct business around the globe. In order to meet global demands engineering organizations demand new skills and competencies of engineering graduates to function efficiently in this competitive work environment of organizations. In addition, these organizations do not carry one business but they carry multiple businesses in order to facilitate its valued customers. In this perspective, these organizations require diverse engineers to promote business of organizations productively. It has been best seen in corporate culture of organizations engineers who possess effective communication skills better promote business of organizations. Thus, employers look for engineering graduates who possess both technical and nontechnical skills such as communication skills. On the other hand, many workplace surveys indicate that communication deficiencies prevail among modern engineering graduates which are never in the better interest of organizations. Atkins (1999) stated that graduates enter the workforce without necessary skills required in modern industry. Thus, a gap exists between skills taught at university and the skills demanded in modern industry (Andrews & Wooten, 2005; Shivpuri & Kim, 2004). Industry and engineering university collaboration can easily close this skills gap which is in the better interest of organizations. Engineering universities of Pakistan should collaborate with industry to prepare better engineers for modern industry who can contribute towards economic stability of the country. This collaboration is not a novel idea but all over the world universities have established collaborations with industries such as Griffith University, University of Canberra, University of South Australia, Curtin University of Technology, University of Leeds, University of Leicester, University of Texas and University of Pittsburg. All these

universities have identified generic skills such as communication, oral communication and oral presentation skills that graduates need to develop in order to be part of global work environment of organizations. Engineering education is usually guided by the needs of industry since industry is the biggest employer of engineering graduates (Todd, Sorenson and Magleby, 1993). Thus, engineering programs utilize industry advisory committees (American Society for Engineering Education, 2010; Genheimer & Shehab, 2009) that include representatives from industry to assist engineering universities to prepare better human capital for modern industry.

Industry academia collaboration plays important role to achieve its goals (Boswell & Canon, 2005) and universities are called upon to contribute to economic development (Feller, 1990) of the country. If we analyze the situation in the context of Pakistan the government of Pakistan spends billions of repress annually on engineering universities. Thus, in return it is the responsibility of engineering universities to produce better human capital in terms of skilled workforce who can be capable to join multinational organizations at global level and contribute towards economic growth of the country. The benefits of industry and engineering universities collaboration may include enhancing workplace productivity and minimizing unemployment from engineering profession of Pakistan since many graduates tend to be unemployed due to skill deficiencies. The industrial skills during past decades were considered punctuality and following instructions of boss, managers and supervisors but modern industry demands competitiveness in terms of technical and non technical skills. According to Nguyen (1998) besides technical capability industry is shifting its focus on non technical skills in the engineering profession. Thus, it raises the need that modern engineering graduates need to possess effective communication skills such as oral communication and presentation skills if they want to be productive for organizations.

There are multifarious benefits of industry and engineering universities collaboration. For example, it helps to determine non technical skills for engineering graduates to perform workplace jobs efficiently at workplace. Second, it assists and guides engineering universities to design communication skills curriculum that helps to prepare engineering students according to the demand of modern industry. It is well established fact that effective communication skills of employees assist organizations to increase its workplace productivity. This is because engineering graduates equipped with effective communication skills persuade customers to buy company products through logical and persuasive arguments. Thus, employers look for engineering graduates equipped with effective communication, oral communication and presentation skills. It is a fact that there is a skills gap between the acquired skills of engineering graduates (Andrews et al., 2005; Shivpuri & Kim, 2004). There can be various reasons for that but engineering universities of Pakistan mainly focus on technical skills of engineering students. They tend to be ignorant from this reality that non technical skills such as communication skills play significant role in the job career of an engineer at workplace. Resultantly, graduates entering the workplace possess poor workplace skill (Shaw, 2008) which is never in the better interest of organizations as well as engineering universities of Pakistan. Employers emphasize communication skills of graduates (Firth, 2011) and oral presentation is an important aspect of workplace communication (Cook, 2011). Engineers often perform oral presentations at workplace to keep management of the organization well informed about work progress and the barriers that confront increased workplace productivity of organizations. An Irish study revealed that 78% engineers were required to perform oral presentations at workplace (Keane, 1999). Hommrichhausen (2002) noted that employees 70% performance is related with soft skills and 30% with technical skills. Employers usually complain that they do not fill job vacancies due to mismatch of skills (Ford, 2007). Although, industry recognizes importance of communication skills (Korte, Sheppard & Jordan, 2008) for engineering graduates, unfortunately engineering universities of Pakistan still lack behind to address communication deficiencies of engineering graduates. Philpot (2006) suggested that employers and academic institutions should fill this "skills gap. National Association of Manufacturers America Skills 2005 Gap Report shows that 83% of respondents indicated skills gap in job skills (Jasinowski et al., 2005). A survey conducted by James and Lippy (2005) indicated that communication skills were rated the most important skills for graduates. In addition, according to Employers Value Communication and Interpersonal Abilities (2004) twenty first century employees should possess effective communication skills. Todd, Sorenson and Magleby (1993) stated that industry is the biggest employer of engineering graduates, and if industry is not satisfied from engineering graduates this means there is a skills gap in their academic programs which need to be upgraded parallel to industry demand.

Communication skills curriculum taught to engineering students need to cover all aspects of communication such as oral communication and presentation skills. Traditionally, it is a common practice in engineering universities that either the subject of English or communication skills focuses grammatical competence of engineering students for

the last many years. There can be numerous reasons for this but it is worth mentioning there that language or communication teachers of engineering universities of Pakistan possess little exposure of industry and the skills required in modern industry. Thus; they follow traditional methods of teaching and focus grammatical knowledge of engineering students. Resultantly, engineering graduates of Pakistan entering the workplace tend to face various communication barriers. In addition, many engineering graduates work on lower posts on lower salaries against professional degrees acquired from engineering universities. An Australian survey employed 300 engineers with 5 to 20 years work experience (Male, Bush & Chapman, 2010). The results of survey indicated deficiencies in communication skills of engineers. These authors further reported that communication is frequently reported deficiency in Australian surveys. Additionally, other studies conducted by Ashman et al. (2008) and Nair et al. (2009) also reported communication deficiencies of graduates. Although these studies have not been conducted in the context of Pakistan but they are closely related with the situation in Pakistan. Thus, scholars demand curriculum that prepare students for workplace jobs (Bray, 2006). Although communication skills are required skills in engineering profession but these skills lack in engineering curricula (Darling & Dannels, 2003). Industry can play important role to design curriculum (Ronalds, 1999) that assists engineering students to perform workplace jobs effectively at workplace. Thus, there is an emergent need between industry and engineering universities of Pakistan to prepare better engineers for modern industry.

## **2. Research Methodology**

The research methodology used for this study was quantitative methods based on self administered questionnaire. The researcher could not manage interviews with respondents due to certain time constraints although it was in the schedule of this researcher.

### **2.1 Sample**

Forty (40) engineers from two engineering organizations of Pakistan participated in this study. Purposive sampling method was used for data collection purpose. Respondents were drawn on specific criteria of engineers with maximum 5 years work experience. According to Ary, Jacobs and Razavieh (1972) purposive sampling is a non probability technique in which subjects are analyzed on the basis of characteristics incorporated in the sample. The rationale for selection of engineers with maximum 5 years work experience was based on the notion that these engineers would be better able to provide appropriate feedback relating to gap between technical and non technical skills at workplace and communication skills in engineering curriculum since they have recently graduated from engineering universities of Pakistan.

### **2.2 Instrument**

The instrument used for this study was a self administered questionnaire. Questionnaire is relatively an easy method to sample large population without waste of time (Best and Kahn, 1998). Thus, questionnaire was considered a suitable instrument for data collection purpose.

#### **2.2.1 Questionnaire**

The questionnaire set for this contained two parts. First part was related with demographic information asking about gender, qualification, age, field of discipline, nature of job and work experience. Thirty nine (39) male and one (1) female engineer participated in this study. Twenty nine (29) engineers possessed Bachelor of Engineering (B.E), one (1) Bachelor of Science (B.Sc.), one (1) Bachelor of Technology (B.Tech) and nine (9) Master of Engineering (M.E.). Eighteen (18) engineers fall between the ages of 24-26 years, seven (7) 27-29, seven (7) 29-30 and eight 30-35 years respectively. Four (4) engineers were from the discipline of civil engineering, four (4) mechanical engineering, nineteen (19) electrical engineering, two (2) electronic engineering, and nine (9) from other engineering disciplines. Thirty three (33) engineers were working as full time engineers; four (4) part time and two (2) of them did not mention their nature of job. Eight (8) engineers, possessed one year experience, six (6) two years, thirteen (13) three years and twelve (12) five years. The second part of the questionnaire was related with statements relating to technical and non technical skills gap at workplace and communication skills in engineering curriculum. A 5 point likert scale ranging from 'strongly disagree', 'disagree', 'neutral', 'agree' and 'strongly agree' was used to draw percentages for agreement and disagreement for the variables included in the questionnaire.

## **3. Data Analysis**

Data were analyzed quantitatively using Statistical Package for Social Sciences (SPSS 15.0) to draw percentages for

variables such as technical and non technical skills gap at workplace and communication skills in engineering curriculum.

#### **4. Findings**

The research findings of the study provided valuable insights on technical and non technical skills gap at workplace and communication skills in engineering curriculum. These findings have been categorized into two headings for instance technical and non technical skills gap at workplace and communication skills in engineering curriculum.

##### ***4.1 Gap between Technical and Non Technical Skills Gap at Workplace***

The results for the first dimension indicated that 4% engineers strongly disagreed, 11% disagreed, 6 % responded neutral, 61 % agreed and 18% strongly agreed that there is a gap between technical and non technical skills at workplace (Figure, 4.1).

##### ***4.2 Communication Skills in Engineering Curriculum***

The results for the second dimension indicated that 2% engineers strongly disagreed, 13% disagreed, 11% responded neutral, 58% agreed and 16 % strongly agreed that communication skills curriculum does not significantly improve communication skills of engineering students (Figure, 4.2).

#### **5. Discussion**

This study suggests that there are several advantages of collaboration between industry and engineering universities of Pakistan. Thus, it would be better for both stakeholders to reap its maximum benefits from this collaboration. For the first dimension on non technical skills gap at workplace, engineers agreed that there is a skills gap between technical and non technical skills of engineers at workplace. This is because engineering universities of Pakistan mainly focus on technical skills of engineering students ignoring the fact that communication skills play significant role for engineers at workplace. They further indicated that technical skills alone are never sufficient for engineers to perform workplace jobs efficiently because effective communication skills assist engineers to conduct meaningful discussions with clients and customers. Thus, engineers should acquire both technical and non technical skills in order to be successful at workplace. Engineers opined that engineering universities of Pakistan should focus communication skills of engineering students to prepare them better engineers for the workplace. They further indicated that engineers with effective communication skills work on management positions compared to those engineers who lack in this skill.

On the other hand, the results for second dimension on communication skills in engineering curriculum engineers indicated that communication skills curriculum taught to engineering students does not significantly improve their communication skills. Engineers showed apprehension that only 1 subject of communication skills out of 40 engineering subjects is never sufficient for engineering students to upgrade their communication skills. It is highlighted here that the respondents of this study were taught one only subject of English or communication skills during study time. Engineers further identified that the subject of communication skills should focus on communicative competence compared to grammatical competence. In addition, engineers indicated that the syllabus of communication skills should focus oral presentations of engineering students. Moreover, they agreed that employers value effective communication skills of engineering graduates at workplace. The findings of this study are consistent with other literature review findings that engineers 68% time spends communicating with people at workplace (Tilli & Trevelyan, 2008) in various communicative tasks such as meetings, conversations, discussions and client conversations. Thus, communication skills should be given top priority in engineering curriculum because they are inadequately developed in engineering curriculum (Darling & Dannels, 2003). Academic institutions should relate curriculum with workplace needs (Harris, 2005). In view of this, it is suggested that industry and engineering universities of Pakistan need to establish industrial collaboration in order to prepare productive engineers for the workplace. No doubt, this collaboration will contribute to boost the economic stability of the country.

#### **6. Conclusion**

This study identified technical and non technical skills gap at workplace. It further identified communication skills curriculum does not significantly improve communication skills of engineering students. It is a fact that graduate poor communication skills affect job performance of engineers at workplace. Resultantly, it affects workplace productivity of organizations and employers can never bear this loss. In this perspective, they demand from

engineering universities to prepare better engineers for the workplace. If the situation is analyzed industry academia collaboration is the need of the hour because without industry assistance engineering universities do not know the type of skills and competencies engineering graduates need to perform workplace jobs effectively according to employer and customer satisfaction in this changing work environment of organizations. The role of industry is that it should facilitate maximum workplace visits for engineering students in order to understand skills that are required in modern industry. It would be more beneficial if industry arranges some seminars or workshops in engineering universities to keep abreast engineering students about technical and non technical skills required in industry. In addition, some internship programs should be introduced by industry and engineering universities should be invited to recommend engineering students according to their field of discipline. Moreover, faculty also should visit industries from time to time to gain knowledge about the latest skills required in modern industry. Employers and executives from industry should also be invited to help engineering universities to prepare curriculum taught to engineering students. This needs some practical efforts that tend to be presently lacking in this present scenario. Thus, engineering universities can bring its curriculum at par with industry needs. In view of this, it is envisaged that this collaboration is in the better interest of industry, engineering universities and engineering students as well.

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### Biographical Notes

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### Appendix

#### Gap between Technical and Non Technical Skills at Workplace

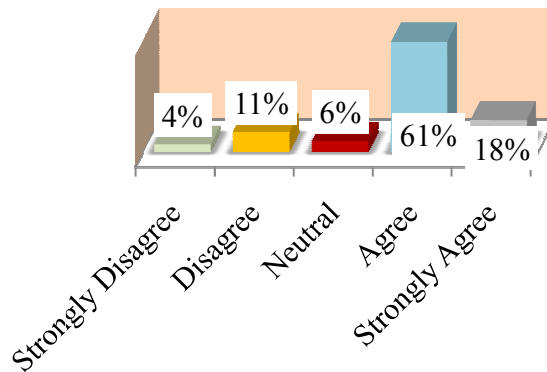


Figure 1: Engineers level of agreement and disagreement for Gap between Technical and non Technical Skills at Workplace

#### Communication Skills in Engineering Curriculum

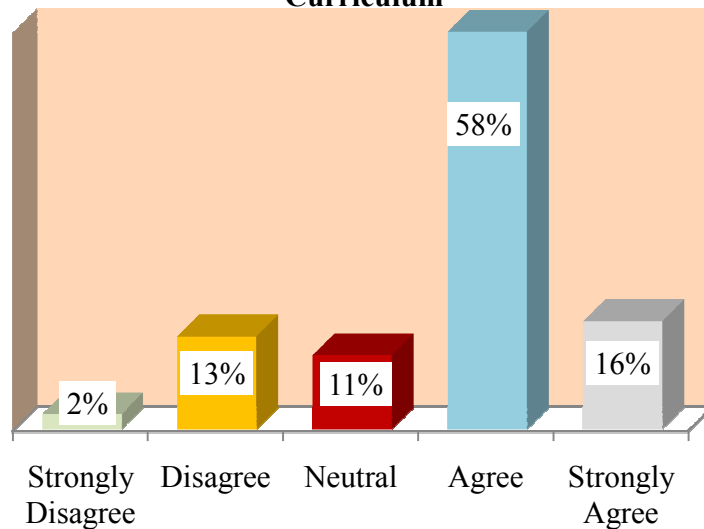


Figure 2: Engineers level of agreement and disagreement for Communication Skills in Engineering Curriculum