Communication Skills across Engineering Curriculum: A Case Study

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Abstract: *Effective communication skills occupy key importance in the world of work. This study aimed to investigate the standing of communication skills courses in the engineering curriculum taught to engineering students. Additionally, it assessed whether all engineering departments implement the same credit hour course for engineering departments. The data collection source was Prospectus-2021 of Quaid-e-Awam University of Engineering, Science & Technology Nawabshah. Discourse Analysis was the data analysis method. Findings exhibit that communication skills are taught as a single subject in the university and some engineering departments implement it as a 2-credit hour and some 3-credit hour course. Unexpectedly, the department of chemical engineering implements it as (1) credit only. Findings endorse employers' concerns that engineering graduates passing out from engineering universities are not ready for industry jobs. Research results would guide engineering universities of Pakistan to revisit engineering communication skills courses to bring them at par with industry skill needs.*

Key Words: Curriculum, Communication Skills, Industry, Engineering Universities

Introduction

Education is very necessary for the sustainable development of any country. The curriculum plays a crucial role to prepare students according to market needs. The global market needs demand from engineering universities to revisit curriculum to bring it as per industry employability skills. Engineering universities of Pakistan should train engineering students for effective communication skills. training to the engineering students because an engineer is an asset for the industry proficient in this skill is an asset for the industry. Newly graduating engineers need to possess advanced communication skills to present company projects efficiently. Engineer's major time spend in communication activities (Passow & Passow, 2017) in an industry, therefore; communication plays a pivotal role in the professional life (Trevelyan, 2014) of an

engineer. Engineers have to work in different positions in the industry work environment so; communication occupies a substantial position in engineering (Werner et al., 2017). Communication and engineering practice go together (Nathans-Kelly & Evans, 2017) and they can never be separated apart in the modern industry set-up. Engineering students should be exposed to communication skills through the curriculum taught to them. Communication skills learnt from engineering universities are a mismatch with industry skills (Norback et al., 2010). Employers want engineering graduates with effective communication skills. The communication skills curriculum taught to engineering universities should be prepared in consultation with professionals working in industries. A dialogue between academia and industry is desirable about students' skills (Olson et al., 2019). The communication skills of engineering graduates are poor from an industry viewpoint (Donnell et al., 2011). This research inspected communication skills subject standing in the engineering curriculum and the harmony between credit hours of the course implemented by various engineering departments. Engineering universities should be tasked with training students in effective communication skills which is in high need of time.

Literature Overview

Industry hires engineering graduates equipped with effective communication skills. Engineering universities provide graduates with workplace skills, competencies and knowledge. Engineering universities should provide a better avenue to engineering students to hone their job skills. Communication skill is the most robust skill and employers mention it in newspapers advertising engineering jobs that applying candidates need to possess this skill. Bacon & Anderson (2004) found that employers liked graduates' communication skills.

Communication skills should be made part of academic courses (Kirby & Romine, 2009). Pedagogical approaches highlight that communication skill laboratories be developed to polish students' communication skills (Helsel & Hogg, 2006). Communication education is an important constituent of university education (Young & Murphy, 2003) thus; communication skills should occupy vital space in the engineering university curriculum. The engineering education curriculum should have better harmony between hard and soft skills. Engineers should be capable of communicating with multiple people in the industry. Research indicates that the industry needs proficient engineers armed with technical and non-technical skills (Ahmad et al., 2014). Employers emphasize the communication skills of employees (Clement & Murugavel, 2015). Cline (2005) surveyed employers and found that communication skills were the most valued skills. Nair et al., (2009) study found that university graduates fall short in skills such as communication skills. Looking at the importance of communication skills as workplace skills engineering universities of Pakistan should revisit the engineering curriculum to bring it at par with skills needed in the industry. Studies show that novice graduates possess poor communication skills (Nair et al., 2009; Gray, 2010). Griffin et al., (2014) studied undergraduate students to rate the importance of communication skills, strong work ethics, integrity, dependability, and dedication, students gave the third number to communication skills. Employers complain about engineering graduates' poor communication skills (Felder, 2012) because they are poorly trained in this skill in university classrooms (Lingard & Barkataki, 2011). Dragana Božić et al., (2018) studied students' and employers' perceptions about communication skills and concluded that students and employers' have different opinions about communication skills.

Employers demand well-versed engineering graduates and request communication skills inclusion in the engineering curriculum. Randy (2017) studied employers' satisfaction with new college graduates and said that soft skills were the top preferred skills for employers. Graduates lack employability skills (Cumming 2010), and literature supports this finding (Osmani et al., 2015). Graduates get degrees but lack skills (Andreas, 2018) and attempts have been made to bring reforms to the curriculum (Gardiner, 2014). Finch et al., (2013) reviewed the literature on employability and found soft skills to be an important skill for employability. Osmani et al., (2015) reviewed articles on employability and found 53 graduate abilities and among these communications, the skill was found most important skill. Finch et al., (2013) surveyed employers and found that they gave weightage to soft skills. Su-Hie Ting et al., (2017) collected employers' views importance on of communication skills as employability skills. Employers considered communication skills an important skill for job-seeking candidates. Finch et al., (2013) study found that employers put great importance on communication skills while hunting fresh graduates. Thomas et al., (2016) studied job skills needed in Gulf countries and found that presentations, technical discourse, explaining actions confidently, and communication effectively as required job skills. Jackson (2010) stated that graduates should be competent in oral communication skills. Employers in Kuwait desire that fresh graduates should be efficient in communicating orally and giving presentations (Abdulla et al., 2014).

Higher education institutions have failed to develop communication skills for industry jobs (Moody, 2012). Universities have to find ways to make curricula in line with industry needs (Gardiner, 2014; Manik et al., (2014). Communication skills have never remained a priority of higher education institutions (Al-Mahrooqi et al., 2014) and higher education institutions have failed to produce graduates for industry jobs (Belwal et al., 2017). Curriculum designers should develop curricula to obtain communication capability, i.e., the "ability to function effectively in the language in real-life contexts" (Byrnes, 1984: 12). The courses should be included in the engineering curriculum that practically focuses on industrial job skills. Engineering universities should develop curricula that "meet the local market needs, students' understanding, learning abilities and required skills for employment" (Baporikar & Shah, 2010: 16). This objective can be achieved by appointing curriculum experts from diverse fields. The Higher Education Commission of Pakistan has tasked National Curriculum Review Committee (NCRC) with reviewing the curriculum in all fields of education. Pakistan Engineering Council (PEC) should also play its due role to provide professionals from industries. The Universities' boards of studies and academic councils should be made bound to include industry experts for designing and approving curricula at the university level. Engineering graduates of Pakistan join multinational companies so; curriculum experts from foreign countries should be made part of this committee. Engineering graduates of Pakistan become part of multinational companies so; curriculum experts from foreign countries should also be included in this exercise. For instance; research publications and PhD thesis are evaluated by foreign field experts, likewise, the curriculum should also be sent to foreign experts for review. The committee should be mandated that all universities in Pakistan should implement its recommendations practically in the true sense. Language teachers should be tasked to engage students more and more in communication tasks such as oral presentations, meeting skills, discussion skills, and negotiation skills. According to Norback et al., (2010) communication skills

learned in academic institutions are never the same as those needed in the engineering profession. Thus, it is vital that all stakeholders associated with engineering education take efforts to train engineering students in employability skills.

Study Objectives

i. To determine communication skills standing in the engineering curriculum at QUEST.
ii. To explore whether all engineering departments, implement the same credit hours for the subject of communication skills at QUEST.

Research Questions

i. What is communication skills standing in the engineering curriculum at QUEST?
ii. Are all engineering departments implement the same credit hours for the subject of communication skills at QUEST?

Method

This study is purely qualitative in nature.

Engineering education implements qualitative methods (Walther et al., 2017) because; it is the most fitting approach to understanding engineering discipline issues. Creswell (2014) states that qualitative research is appropriate for data collection and data interpretation. The data collection source was of this study was secondary data. It was obtained from Prospectus-2021, Quaid-e-Awam University of Engineering, Science & Technology Nawabshah. Quaid-e-Awam University of Engineering, Science & Technology Nawabshah comprises three faculties namely the Faculty of Engineering, Faculty of Electrical, Electronics, Telecommunication, Computer systems, Software and Automation & Control Engineering (FEECE) and Faculty of Science. Since this study studied communication skills in the engineering curriculum thus, the Faculty of Science was discarded. Data were analyzed using the Discourse analysis technique.

Study Findings

Part I: Communication Skills Standing in Engineering Curriculum

Table 1. Communication Skills Subject in Faculty of Engineering

S. No	Department	Subject Name	Semester	Cr. Hours
1	Civil Engineering	Writing & Communication Skills	2nd Semester, 1st Year	2+1=**3**
2	Mechanical Engineering	Communication Skills	2nd Semester, 1st Year	2+1=**3**
3	Energy Systems Engineering	Technical Report Writing & Communication Skills	2nd Semester, 1st Year	2+1=**3**
4	Environment Engineering	Communication Skills & Report Writing	2nd Semester, 1st Year	3+0=**3**
5	Chemical Engineering	Communication Skills	2nd Semester, 1st Year	1+0=**1**

Source: QUEST Prospectus-2021

Table 1 indicates that in Faculty of Engineering, department of civil engineering, mechanical engineering, energy systems engineering, and environment engineering teach three (3) credit hours of communication skills subject with three (3) credit hours. But this subject has been

introduced with different tags. Nevertheless, only one (1) credit hour course is taught in the department of chemical engineering.

Table 2. Communication Skills Subject in FEECE Faculty

S. No	Department	Subject Name	Semester	Cr. Hours
1	Electrical Engineering	Communication Skills	2nd Semester, 1st Year	2+0=**2**
2	Electronics Engineering	Communication Skills	2nd Semester, 1st Year	2+0=**2**
3	Telecommunication Engineering	Communication Skills	2nd Semester, 1st Year	2+1=**3**
4	Computer systems Engineering	Communication Skills & Technical Writing	2nd Semester, 1st Year	3+0=**3**
5	Software Engineering	Communication Skills	2nd Semester, 1st Year	2+0=**2**
6	Automation & Control Engineering	Communication Skills	1st, Semester, 2nd Year	2+0=**2**

Source: QUEST Prospectus-2021

Table 2 shows that in Faculty of FEECE department of electrical engineering, electronics engineering, computer systems engineering, software engineering, and automation & control engineering contains contain two (2) credit hour courses.

However, only the telecommunication engineering department carries three (3) credit hour courses.

Part II: All Engineering Departments whether implementing the same credit hours for the subject of Communication Skills

Table 3. Communication Skills subject with Credit Hours in Faculty of Engineering & Faculty of FEECE

S. No	Department	Subject Name	Semester	Cr. Hours
1	Civil Engineering	Writing & Communication Skills	2nd Semester, 1st Year	2+1=**3**
2	Mechanical Engineering	Communication Skills	2nd Semester, 1st Year	2+1=**3**
3	Energy Systems Engineering	Technical Report Writing & Communication Skills	2nd Semester, 1st Year	2+1=**3**
4	Environment Engineering	Communication Skills & Report Writing	2nd Semester, 1st Year	3+0=**3**
5	Chemical Engineering	Communication Skills	2nd Semester, 1st Year	1+0=**1**
6	Electrical Engineering	Communication Skills	2nd Semester, 1st Year	2+0=**2**
7	Electronics Engineering	Communication Skills	2nd Semester, 1st Year	2+0=**2**
8	Telecommunication Engineering	Communication Skills	2nd Semester, 1st Year	2+1=**3**

S. No	Department	Subject Name	Semester	Cr. Hours
9	Computer systems Engineering	Communication Skills & Technical Writing	2nd Semester, 1st Year	3+0=**3**
10	Software Engineering	Communication Skills	2nd Semester, 1st Year	2+0=**2**
11	Automation & Control Engineering	Communication Skills	1st, Semester, 2nd Year	2+0=**2**

Source: QUEST Prospectus-2021

Table 3 shows that the department of civil engineering, mechanical engineering, energy systems engineering, environment engineering, telecommunication engineering and computer systems engineering carry three (3) credit hours. Whereas; the department of electrical engineering, electronics engineering, software engineering, and automation & control engineering share two (2) credit hours. Surprisingly, the department of chemical engineering has only one (1) credit hour.

Discussion

Communication skills subject is taught in the second semester, the first year in all engineering departments of the Quaid-e-Awam University of Engineering; Science & Technology Nawabshah. Presently, two (2) engineering faculties are functioning at QUEST namely the Faculty of Engineering, and the Faculty of electrical, electronics, computer systems, telecommunication software, and automation and control engineering (FEECE). This subject is taught with different labels in the same university. For instance; the department of civil engineering has implemented it as "Writing & Communication Skills", and departments of mechanical engineering, energy systems engineering and environment engineering share the "Communication Skills" tag with three (3) credit hours. Unexpectedly, the department of chemical engineering has implemented this subject with one (1) credit hour only. Additionally, departments of electrical engineering, electronics engineering, telecommunication

engineering, software engineering and automation & control engineering teach this subject with two (2) credit hours.

R.Q. 2, findings indicate that all engineering departments follow different credit hours. For example, the department of civil engineering, mechanical engineering, energy systems engineering, environment engineering, telecommunication engineering and computer systems engineering comprise three (3) credit hours. The department of electrical engineering, electronics engineering, software engineering and automation & control engineering embrace two (2) credit hours. But, the department of chemical engineering covers only one (1) credit hour.

Literature survey studies put great importance on the communication skills of engineering graduates. Employers also show concern that engineering universities never provide industry-ready engineers to hire them. But, engineering universities of Pakistan put little importance on the communication skills of engineering students. It seems that the focus of engineering universities in Pakistan is on the technical skills of engineering students. The industry needs engineers proficient in technical and non-technical skills (Ahmad et al., 2014) and employers emphasize graduate communication skills (Clement & Murugavel, 2015). University graduates fall short in skills such as communication skills (Nair et al., 2009). Fresh graduates are unprepared for communication skills (Nair et al., 2009; Gray, 2010). Employers complain about the poor communication skills of

engineering graduates (Felder, 2012). Communication skills are poorly taught in university classrooms (Lingard & Barkataki, 2011). In this perspective, looking at global market needs engineering universities of Pakistan should focus on the communication skills of engineering students and add more communication skills courses to the existing engineering curriculum.

Conclusion

The global market scenario demands well-rounded engineering graduates equipped with both hard and soft skills. Unfortunately, the focus of engineering universities in Pakistan is too little on soft skills such as communication skills. Resultantly, there is huge unemployment in the engineering profession of Pakistan. Engineering students of Pakistan need a global skill set knowledge and competencies to be part of multinational companies. Thousands of engineering graduates are passing out from engineering nurseries without proper employability skills and they cry for jobs. Employers recruit engineering graduates equipped with effective communication skills and engineering graduates who fall short in this skill are rejected during the interview stage. Engineering universities of Pakistan should make necessary arrangements for proper communication skill trainings for engineering students to make them better human capital for industry. This is high time for engineering universities of Pakistan to think critically and minutely and update and upgrade the engineering communication skills curriculum taught to engineering students. The curriculum is the first step to producing proficient engineers in both hard and soft skills.

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