Restructuring Strategy for The Technical Report Writing Course in Engineering Universities of Pakistan

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Abstract - This paper is based on the idea that Technical Report Writing course in engineering universities should be taught in order to fulfill the professional needs of potential engineers. The course contents and credit hours are redefined here to avoid repetition of several topics and save time for teaching the contents essential for future engineers. Teachers barely provide ample time to specific topics instead they touch these topics superficially so as to cover the syllabus of the entire course. This practice results in students' ineffectiveness in various areas, which is obvious from the data collected through the survey conducted during the research. The proposed research also supports exploiting the contents of Communication Skills course to make it more useful for the computer science and engineering students. It is proposed that Technical Report Writing (TRW) course should be a comprehensive resource for teachers to provide a wide selection of multimedia tools designed especially for workplace writer.

Keywords – *Engineering education, Technical Report Writing, oral communication, Communication Skills.*

1. Introduction

The ultimate aim of restructuring the courses is to enable the potential computer scientists and engineers not merely to pass their academic exams but to establish a sound foundation from which they may later proceed in accordance with their career needs. It is a practical approach as knowing technology tips, using graphics and building online communities are essential factors in technical Communication learning. The Higher Education Commission (HEC) of Pakistan appreciates modification in curriculum if it benefits students. For this purpose HEC always welcomes ideas and suggestions from various universities. Designing a curriculum is said to be the most agonizing and time consuming activity but it helps measure the intellect and growth of a nation. Therefore, it is necessary to improve curricula regularly by providing the current information and advancement in the particular field (HEC).

2. Literature Review

The conventional paradigm in communication for computer science and engineering students does not satisfactorily fulfill their needs as it includes certain contents which are not the key focus for the specific fields. In addition these topics are being repeated in both courses; Technical Report Writing and Communication Skills, where as in order to complete the syllabus, teachers rush and leave out a few important topics which are a must to learn for computer science and engineering students. In a world where communication is paramount to survival, we cannot risk sending out ineffectively written communication to our customers, clients or readers [1]. The categorization of course contents for engineering students is indispensable as every business or industry has its particular needs to present comprehensive and meaningful information [2]. Sorting the contents of technical report writing and communication skills courses will definitely help avoid repeating several topics in both courses as well as make learning enjoyable.

3. Research Methodology

To support and make this research credible, an online survey was conducted. The close ended questions were designed for the survey keeping the three main sections in mind.
1. Communication and Presentation Skills
2. Technical Writing (TW)
3. Technical Report Writing. (TRW)

The reason for using online questionnaire was to get maximum participation with minimum cost and less efforts. The survey was emailed mainly to the engineering and computer science faculty who are teaching the above mentioned courses in eight well reputed universities. There were approximately 350 respondents that filled the survey and are running their engineering and computer sciences programs in the educational hub of Pakistan.

3.1. Findings

The survey findings are displayed below.

3.1.1. Communication and Presentation Skills

According to the respondents, 50% to 60% teachers reported that the students lack in communication and presentations skills. Moreover 65% of the respondents show that student's presentations were not structured well and content conclusion was not done properly as shown in Fig   1.
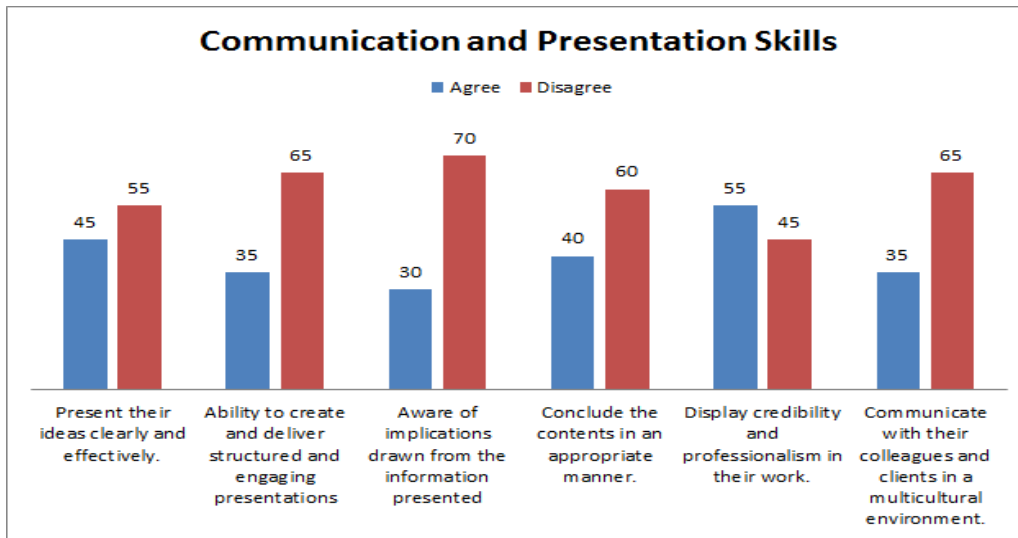

Fig 1 - Survey results for communication and presentation skills in bar graph.

3.1.2. Technical Writing

The results displayed below in the graph shows the shortcomings of the engineering students in the technical writing domain as 70% to 80% of students face difficulty in writing technical reports, drawing diagrams and drafting and analyzing the questionnaire results as shown in Fig 2.
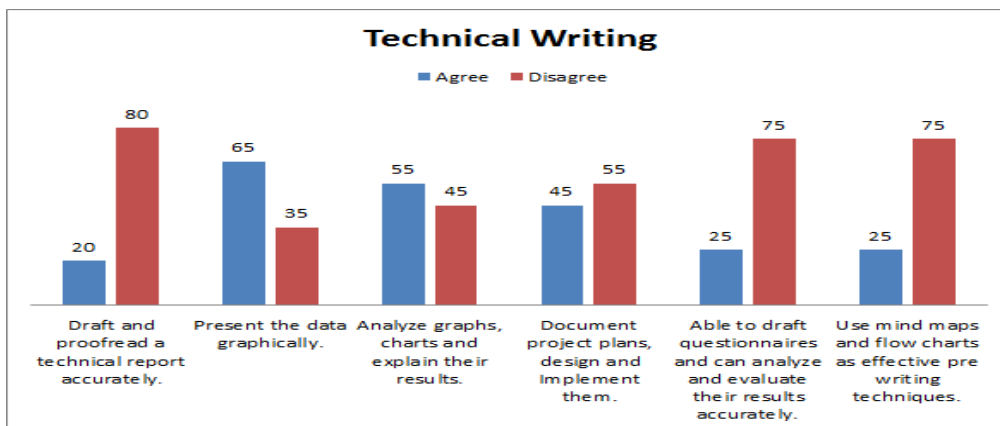

Fig 2 - Survey results for technical writing skills in graph form.

3.1.3.   Technical Report Writing

Almost 90% of the responses to the questions related to technical report writing were answered negatively. The results presented below indicated that 60% to 70% of the students were unable to effectively plan and structure their presentations and reports. There is a big variation in the questions answered in negative and positive as show in Fig3.
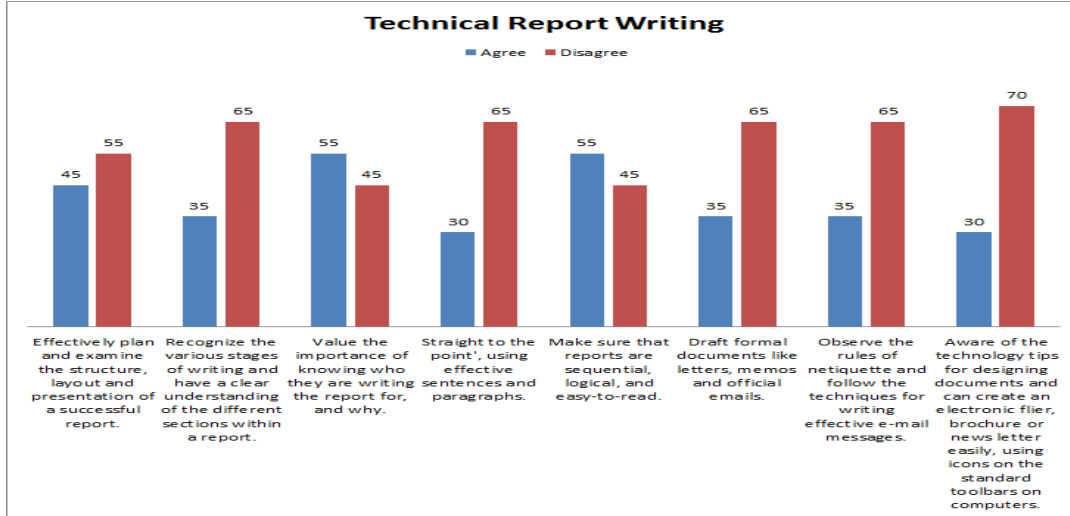

Fig 3 - Survey results for technical report writing in bar graph

4.   Results Analysis

Based on above findings, it is proposed that in universities, Oral Communication should replace Communication skills course as it is a social skill which needs to be developed in the present age. English speaking is an essential tool which is used to reach the top of the field. In Pakistan, majority of students learn English language many golden years in their school and colleges by grammar translation method, but they cannot speak good English as they do not find English language learning environment in their school and colleges. Besides that, Communication Skills course comprises various topics which are repeated in Technical Report Writing course so these topics can easily be merged in Technical Writing course.

Oral Communication course must provide practice in various aspects of oral communication tests. For example pronunciation practice, describing and interpreting pictures, group discussions, conversation practices etc. otherwise it would result in waste of time, efforts and money. The most effective ways of learning and mastering theses social skills are games and logically designed activities.
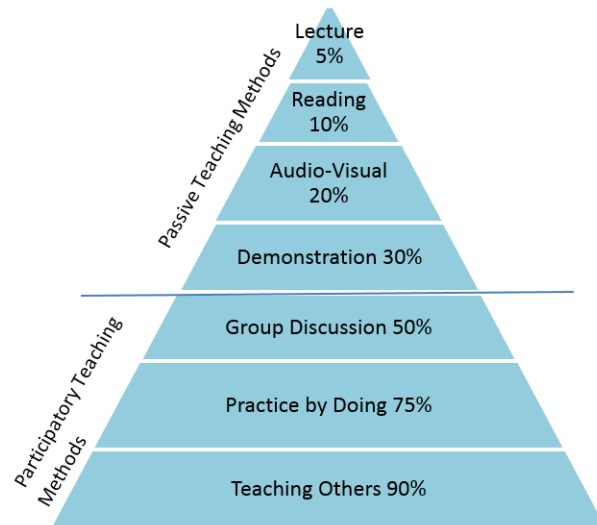

Figure 4- Average Learning Retention Rates National Training Laboratories, Bethel, Maine [3]

As shown in the fig 4 below, according to National Training Laboratories, students learning retention rates depend on their active involvement in the learning process. Students gain only 5% knowledge through lectures where as they learn the most through practicing that knowledge.

We all are not brilliant writers neither we want our computer science and engineering students to be a

playwright but we can facilitate our students to achieve sufficient writing skills to write simple sentences and comprehensible information. Barrass laid emphasis on importance of writing to engineers in helping them to observe, to remember, to organize, to plan, to think and to communicate [4].

Writing is part of science, but many scientists receive no formal training in the art of writing [4]. Hence, to meet the academic and professional needs of potential computer scientists and engineers, teachers need to prepare them within their four years bachelors' program. Maria, Suzanne and Walley agree that writing should be done purposefully, no matter what type of profession we are in [2], [5], and [6].

Hence the division of the total English language based courses, through the program, is proposed in Table 1.

Table 1- Division of the total English language based courses, through the program

s. no	Course name	Semester	Credit hours	Total hours	Preferred Faculty
1	Functional English	1	2+0	30	English
2	Oral Communication Skills	2	3+0	45	English
3	Technical Writing	3	2+0	30	English
4	Technical Report Writing	6	2+0	30	Engineering/ Computer science

Communication isn't only about sharing information it's about creating appropriate messages via different communication channels to obtain shared understanding among interacting people [7]. Today's workplace is constantly evolving. Language is not the only difference between doing something well and not doing it properly at all. Teachers should teach students important current issues encountered in real life communication, for example social media and its impacts on technical communication, use of blogging, face book, collaboration and team work especially with Wikis, Google and other technological tools. Thus updated documentation information should be taught by an engineer, using templates in MS Word which save time and efforts. Some

classes should at least be taught by the specialized person of that particular domain because writing a technical report is a strict genre, where the content is most important [8]. In addition English language teachers are not comfortable as this is not their area of expertise and students can deceive them easily when they are assessed.

Integrating core subject knowledge with technical writing course saves time which is our basic objective; moreover it creates interest as students find it related to their chosen field. At times it is difficult even for the experts to teach those topics which students have not yet learnt. Such as, students from early semesters are unable to create instruction manuals and reports related to their final year projects or website/ web pages to market their products and services. Therefore it is strongly recommended that TRW should be taught to computer science students in sixth semester in an eight semester program as at this stage students are capable enough to produce acceptable texts using their knowledge and skills learnt.

The suggested course contents and credit hours for Technical Writing (TW) and Technical Report Writing (TRW) are shown in table 2 and 3 respectively.

Table 2- Suggested Course Contents & Credit Hours for the Technical Writing Course

S. No:	Topics	Credit hours
1	Difference between technical and literary writing + avoiding plagiarism	2
2	Basic principles of effective TW & Audience analysis	2
3	Making & giving presentations	3
4	Advertisements (Fliers/brochures)	3
5	Summary Writing	2
6	Writing Reviews	2
7	Informal Report Writing	3
8	Newsletters & Articles Writing	3
9	Memos & emails	3
10	Preparing C.Vs & Job Applications	2
11	Job Interviews + Mock Interviews	3
12	Meeting Minutes	2

180

Table 3-Suggested Course Contents & Credit Hours for the Technical Report Writing Course

S. No:	Topics	Credit hours
1	Introduction to TRW & Types of TR	2
2	Feasibility reports	2
3	Incident/investigative reports	2
4	Progress reports	2
5	field /lab report	2
6	Trip Reports	2
7	Proposals	3
8	Writing directions & instructions	2
9	Preparing Manuals/ User guides	3
10	Case studies	2
11	Projects presentations	4
12	Term paper writing	4

5. Conclusions

No research work and nothing happens until actions are taken commensurately. The proposed courses have been designed specifically to assist engineering and computer science students in creating, compiling and managing technical documents in sufficient time using Standard English. It is said that good technical reports don't just happen. They are designed. Language is a social, real world inspired phenomenon in humans, so it is what the courses should be based up on but academic researches prove that teaching English as Second Language (ESL) doesn't help speak in English. If English language teachers want students to speak good English and gain confidence during presentations, then communication courses should include such activities and games which are focusing more on verbal practices.

6. Future Work

No one can deny the significance of oral communication for the foundation of one's personality. A huge research gap is there for the teaching strategies and assessment processes of Communication Skills Course that needs to be explored. Games and activities that promote teamwork would automatically improve the communication expertise therefore, to sharpen students' communication ability and for fast learning, it is required to design such activities that should be performed in pairs and groups.

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