Teaching Engineering Students to Communicate Effectively

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Abstract

The importance of clear concise communication is often overlooked by the typical engineer and scientist. Based on the research findings, the paper emphasises the importance of communication skills in training students for technical and engineering professions. The author provides research findings in analysis of the most common mistakes in preparing PowerPoint slides, and in giving oral presentations. He shows practical outcomes and methodology for proper communication training. The published findings would help teachers of engineering and science subjects to find the way how to implement communication and presentation skills into technical subjects, as well as to increase efficiency of their technical presentations in educational process.

1   Introduction

In recent years, employers have increasingly acknowledged that graduates of traditional technical and vocational education and training lack the wide range of written and spoken communication skills required to engage with members of other professional groups and with the broader community. The need for TVET students to acquire soft skills, in addition to technical skills, so as to enhance both professional community engagement and career success has been increasingly articulated by educators and industry professionals likewise. The fact that communicative competence plays critical role in both educational and professional environment has been recognised nationally and internationally by a number of authors involved in technical education (Najar, 2001, Riemer, 2002, Einstein, 2002, Hrmo et al., 2015).

Engineering is often seen as a hard-skill profession where there is no place for soft skills. Yet the importance of soft skills for engineering professionals should not be underrated; they underlie all behaviours and interactions. Both technical and non-technical professionals need to work together and learn from each other for effective professional performance. All professionals, be they in engineering or elsewhere, need to understand how their actions and reactions affect their behaviour and working relationships. All the research activities we did in order to facilitate more effective and co-operative working practices.

2   Engineering professionals and presentation skills

In an age when so much communication depends on technology, delivering messages face-to-face has paradoxically become even more vital to professional success. We all have ready access to more information than any of our ancestors did. At the click of a few keys, we can locate reams of facts on any topic under the sun. Nevertheless, although the amount of data available to us has grown, the number of hours in a day has not. Amidst this flood of information, technology can make getting to the significant bits of data much more challenging. That is where a good presenter becomes a priceless commodity. Listening to a clear and concise speaker is still the most time-efficient way to comprehend new information. In addition to the concerns that all

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speakers have, they must present specialized and complex data. Some of the fear is also because the craft of public speaking is not taught properly. For most of us, it was never taught at all.

Some technical professionals are excellent speakers. Whether through training, feedback, experience, or an intuitive grasp of how to do it, they are good at it. As a population, however, technical professionals are not known for having the greatest presentation skills. Nevertheless, the ability to give a presentation to customers at a project review meeting, to co-workers in a webinar, or to an audience of managers and technicians at a conference can significantly boost their credibility, clout, and professional status. Delivering a presentation at work, or at professional events, is an opportunity to share insights, convey important information, and gain a reputation as an expert in the topic. Being known as an accomplished presenter is an unbeatable career credential. Whether the career follows a technical, business, or management track, or something else altogether, presentation skills will help professionals accomplish more – and be more valued for what they accomplish. Whether or not they are interested in giving formal presentations, the ability to present will boost their communication, persuasion, and leadership skills.

Nearly all professionals in technical and engineering jobs must make presentations from time-to-time. If a person attends any meeting on technical issues, the person will see that many presenters have room for significant improvement. Simply making a presentation once or twice a year is not sufficient practice for becoming an effective presenter. Usually presenters receive little critical feedback on their presentations, so improvements come quite slowly. People truly do not know how they come across or what they are doing wrong. Unlike traditional manuscripts, oral presentations allow a direct interaction with the audience. When delivered properly, they can be powerful and informative. An effective presentation can help secure a job or seal a deal with a client. On the other hand, a poorly executed presentation can keep an individual in the job-search market or lose the person a potential client. Having developed a great presentation is merely the first hurdle though; one must be able to deliver the presentation effectively. This skill is also learned and needs to be developed, so there is a need for training when preparing for professional career. Many of the ideas on presentations are common-sense suggestions, but if we look around, we will find that many professionals do not follow these basic rules.

The ability to present a case clearly, cogently and confidently is enormously valuable at every stage of students' lives, whatever the subjects they study; it will bring them success at job interviews and their future working life – it is the most transferable of all their skills, and a critical part of their professional development.

3 Oral presentation skills and PowerPoint

Current educational reform is aimed at changing the traditional and encyclopaedic school system into creative and humane education, providing knowledge-based education with focus on action, personality freedom as well as the design of progressive and creative education. Together with classic presentation methods, innovated forms of study materials presentation are utilized more and more frequently. The most frequent ones are PowerPoint presentations via data projector (Labašová, Chmelíková, 2010).

The cost of a poor PowerPoint presentation is staggering. Ian Parker in The New Yorker magazine states that according to Microsoft estimates, there are more than 30 million PowerPoint presentations made each day. If we assume some relatively conservative meeting parameters of four people per presentation, a half-hour presentation on average and the wasted time due to a poor presentation is one-quarter of the presentation time, we arrive at a waste of 15 million person hours per day. At an average salary of $35,000 per year for those attending the meeting, the cost of that wasted time is a staggering $252 million and change each day.

Therefore, there is no doubt that oral presentation skills combined with technological support of presentation software are transferable competences that have to be included into technical and vocational education and training of those students being prepared for technical and engineering professions, all the more that the technical professional environment requires high degree of efficiency. This was the reason we aimed our research to analysis of the target environment and at the spring term we analyzed 112 oral presentations supported by PowerPoint slides at seven secondary technical and vocational schools in Western part of Slovakia in regions of Trnava, Trenčín, Dubnica nad Váhom, Stará Turá, Hlohovec, Nitra. As can be seen from the Fig. 1, the lacks in some crucial skill features are significant. More than a half of presenters suffered from insufficient eye contact and the interaction with the audience. We have to say, that a part of these students (at two of those seven schools) were previously trained for presentations.
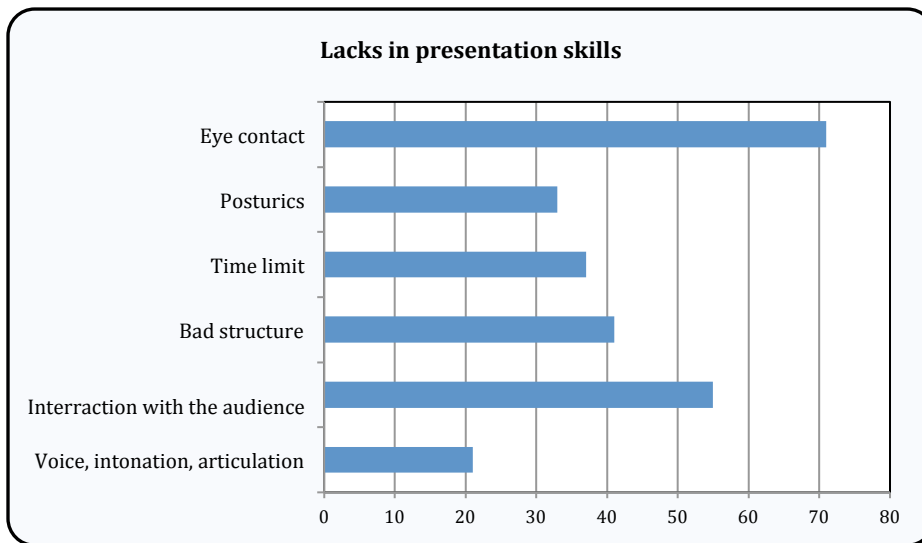
Lacks in presentation skills

Fig. 1: Lacks in oral presentation skills measured at the sample of 112 students of secondary technical and vocational schools from March to May 2015.

The other aspect we focused on was the quality and efficiency of PowerPoint slides. Here we expected better results, since working with graphical software programs and experience from using various applications, what is natural for young generation, would make an assumption of more experienced users. Anyway, the results showed statistically significant lacks in various aspects of preparing PowerPoint slides. Findings are displayed in Fig. 2.
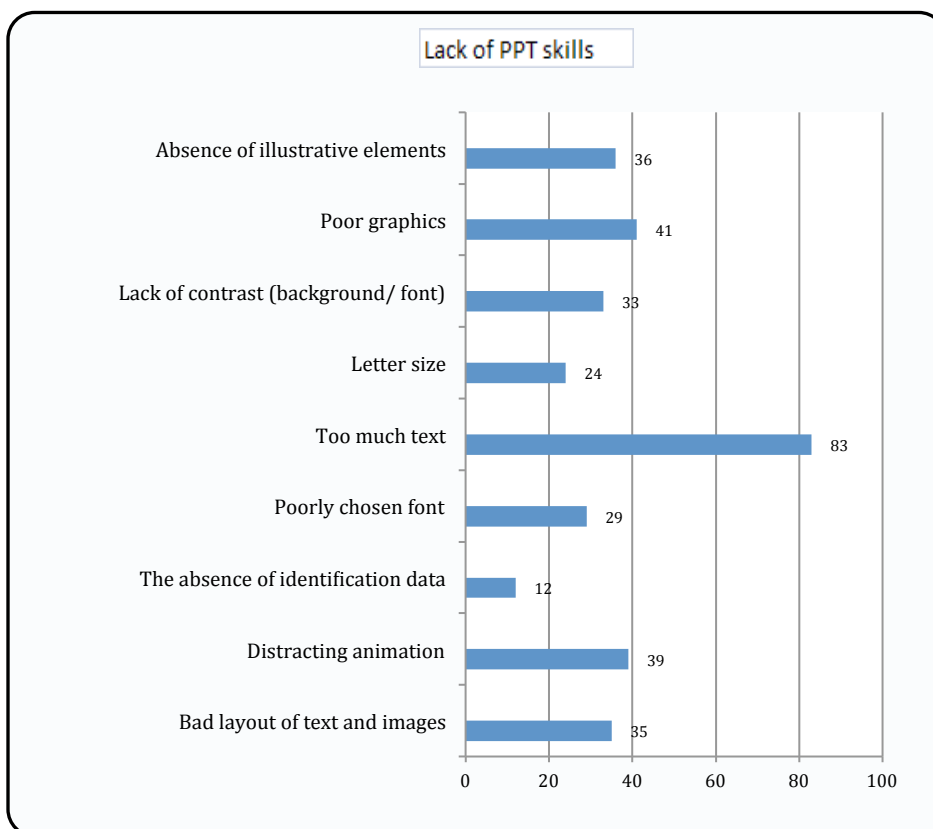
Lack of PPT skills

Fig. 2: Lacks in designing the PowerPoint slides measured at the same sample of 112 students of secondary technical and vocational schools from March to May 2015.

As seen from the graph, students suffered mostly from disability to select text, what significantly decreased efficiency of this communication tool. Also other, although statistically less significant data show that there have to be a certain time, effort and specific competency devoted to improving the observed skills, what will expect to make both the schedule and curricular changes. The analysis was just the pilot activity towards a series of follow-ups including the development of didactic materials for the target group with the aim to develop both presentation and English language communication competences.

Any tool is useful only if it is used properly. Here are four specific reasons why students did not succeed their PPT slides.

- **We could not figure out the point of the presentation**
  When a presentation has not been planned well, there is no identifiable goal to the presentation. The presenter should analyze the audience and plan the message to move the audience from where they are today to the desired goal. Without a clear message, the presentation wastes the audience's time. In a management setting, regularly wasting time with ineffective presentations to decision makers can waste tens of thousands of dollars.

- **We could not see what was on the screen**
  If the audience cannot see what is on the screen, they certainly will not be getting the message. Too many presenters choose text and background colors that have little contrast, so the words blend into the background instead of standing out. The font choice is also a problem, from too many fonts used, using hard to read script type fonts or using a font size too small. And if the room is too bright due to sunlight or the projector has a weak bulb, we are hard pressed to see anything on the screen at all. We would like to see color, font and room choices that result in clear slides that are easy to read.

- **We could not understand the points**
  Too many presenters simply put up a page full of text and read it to the audience. This insults the audience and usually is not clear because the full text gives no context or illustration of the points to help us understand the ideas. It looks much more complicated. The audience spend too much time trying to read this paragraph instead of listening to the presenter. For text, we would like to see a presenter build bullet points that take us step by step through a logical progression of ideas. We would like to see graphs or tables to give visual life to concepts and diagrams that can break down and illustrate complex ideas.

- **We were distracted by what was on the screen**
  Just because the software has all these wiz-bang features, does not mean that every presenter should be using them. We get so distracted figuring out where the next thing will fly in from or spin around that we have no time or mind energy to focus on what the message is. We would like to see relevant images and a clean presentation of ideas that gives enough visual variety to keep our mind working, but also gives the majority of the mindshare to the message being delivered.

4 Conclusions

In this paper we have outlined a problem the teachers at secondary technical and vocational schools face. Moreover, the long-term marginalization of the problem is projected to the professional practice. The paper covers one form of professional communication. Although this coverage is not comprehensive, there is a discussion of a wide variety of communication mechanisms, and the techniques provided should be extensible to other forms of communication. The incorporation of several components of the fundamentals of oral presentation skills including the effective PowerPoint slides design in education will facilitate advanced communication skills. However, given the traditionalist nature of many engineering curricula, this may take some time before change is evidenced.

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