

THE IMPACT OF COVID-19 ON COMMUNICATION PRACTICES IN THE ENGINEERING WORKPLACE: A STUDENT-DRIVEN SURVEY AND AN EXPLORATION OF POTENTIAL CURRICULAR RAMIFICATIONS

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Abstract

In 2012, the Faculty of Industrial Engineering Technology of Leuven University, Campus Diepenbeek, initiated a student-driven action research project to optimize the communications curriculum and tether it to trends and evolutions in the engineering workplace. The methodological pivot of the action research cycle is a questionnaire that students send out to professional engineers on a yearly basis. To date, the questionnaire has been completed by over 2000 engineers. The survey polls the importance and salient features of contemporaneous communication practices for engineers, on the basis of which the curriculum is continuously refined and optimized to match workplace expectations. The existence of this historical dataset allowed for an accurate measurement of the impact of COVID-19 on communication practices in the field of engineering. The perhaps unsurprising, but nevertheless striking rise in online meeting and collaboration practices in the engineering workplace prompts urgent curricular questions with potentially far-reaching ramifications, as the communications curriculum rests, as yet, on a bedrock of traditional, face-to-face interaction. With urgent 21st century concerns surrounding mobility and climate change, screen-to-screen interactions might well evolve into the “new normal” for business communication. This presentation discusses the findings of the questionnaire on the impact of COVID-19 on engineering communication practices and follows through with a preliminary exploration of the ramifications of these findings on the future communications curriculum for engineers.

Keywords: *Engineering education, COVID-19, communication, action research, curriculum.*

1. Introduction

It is a truism to state that the COVID-19, and particularly the lockdowns that were set in place in the attempt to mitigate the ensuing health crisis, had a strong impact on the professional domain. As educators, for instance, we were suddenly forced to move our classes from brick-and-mortar to virtual learning environments and we found ourselves, in many cases, engaged in what soon came to be known as “Emergency Remote Teaching” (ERT) (Hodges, Moore, Lockee, Trust, Bond, 2020). It was the experience of many that ERT affected the teaching and learning experience quite fundamentally. Apart from the obvious technological challenges, we also found ourselves facing a communicative situation with parameters quite different from traditional face-to-face educational settings. The lack of physical proximity made a clear difference, as I am sure all of us can attest to, even if pinpointing what this difference actually consists of is much less self-evident.

Obviously, also in business and the industry the COVID-19 lockdowns heavily affected communication practices: in many cases, meetings between teams, partners and clients necessarily shifted to virtual environments. Even apart from the COVID-19 context, it seems fair to assume that virtual meetings (VM) are to become – to the extent they were not already - a staple instrument in business communication, due to their obvious advantages in terms of cost, expedience, ecological footprint and practicality (Lindeblad, Voytenko, Mont, Arnfalk, 2016). This observation prompts a clear question for educators: if we strive to prepare students for the workplace as well as possible, then should we not account for these changes in communication curricula and reserve curricular space for designated learning outcomes related to VM? This paper aims to provide a preliminary exploration of this question for the field of Industrial Engineering education.

At the Faculty of Industrial Engineering Technology of Leuven University, Campus Diepenbeek, we have been employing - for almost a decade now - a particular student-driven action-research approach to the communication curriculum in order to ensure that it remains firmly tethered to current practices and trends in the industrial engineering workplace (Lievens, 2012). The methodological pivot of the action research cycle is a questionnaire sent out to professional engineers by students every year. The survey polls the importance and salient features of contemporaneous communication practices for engineers, on the basis of which the curriculum is continuously refined and optimized to match workplace expectations. Besides curricular optimization, the dataset serves several other purposes. Most importantly, it raises awareness for industrial engineering students (and even for faculty), who typically do not identify communication as a core competency for their field of study, that communication is, in fact, a crucial competency for an industrial engineer and that it deserves the claim it makes on increasingly precious curricular space. At the same time, the action research project provides an interesting case for academic writing, as students write a research paper on the project as part of their learning trajectory in academic communication.¹

In 2015, a question was added to the questionnaire to assess the importance of VM in business communication. As a result, the survey results allow for an analysis of the extent to which COVID-19 effectively impacted on the perceived importance of VM in business communication among engineers. This paper presents the survey results and follows through with a preliminary exploration of the ramifications of these findings on the future communication curriculum for engineers.

2. Method

The questionnaire was built - and is shared - using Google Forms, and it consists of ten multiple choice questions regarding communication practices in the engineering workplace (e.g. the importance of several foreign languages, of several types of written and spoken communication, perceived difficulties, extra courses followed...). Respondents also indicate age, gender, size of the company, type of engineering job (managerial, commercial, technical or otherwise) and their sector of employment. The questionnaire is sent out on a yearly basis, typically during the month of October, by second bachelor students to engineers in their wider circle of acquaintance. The last available results date from October 2021. In this paper, the results from 2015, which is when the question regarding VM was added to the questionnaire, up to 2021 are taken into consideration. In this period, 2176 engineers completed the survey.

The students are assigned to analyze the survey results and write an academic paper reporting on their findings as part of the second bachelor course “Statistics +”. The main part of this nomer refers to the classes in statistics that the students receive, and which they also apply onto the survey dataset, while the “+” refers to the classes in academic writing. All students are expected to provide an answer to the overall research question - which is, of course, whether communication skills are in fact important for engineers - while also adding an extra research question that befits their own particular interests (e.g. Which foreign languages are most important for Flemish industrial engineers working in the construction sector?). In addition to the quantitative research that the questionnaire enables, students are also expected to undertake qualitative research efforts, such as interviewing engineers, to arrive at deeper insights that the quantitative research in itself cannot provide.

3. Results

Before moving onto the findings that are central to this paper, this section briefly offers some general results that may be of interest to any practitioner in the field of engineering communication. Figures 1 and 2 are those that students typically produce in order to answer the overall research question (“Are communication skills important for engineers in the workplace?”). Figure 1 shows the percentage of time professional engineers spend on communication on a daily basis, while figure 2 shows the respondents’ perceived importance of communication skills for their career trajectory on a 5-point Likert scale, ranging from 1 (“irrelevant”) to 5 (“all-defining”).

¹The author wishes to credit the second bachelor students Lore Gielkens, Ruben Goddé, Brecht Kaczmarczyk, Jonas Sikorksi, Franne Vandervoort, Gert Weckx, who wrote an inspiring paper investigating what is the topic of this paper as well, i.e. a the importance of virtual meetings in the pre- and post-COVID-19 era.

Figure 1. Time spent on communication.

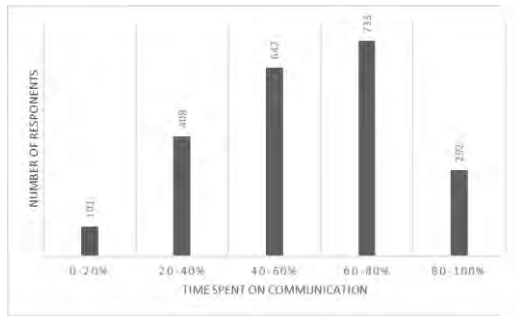
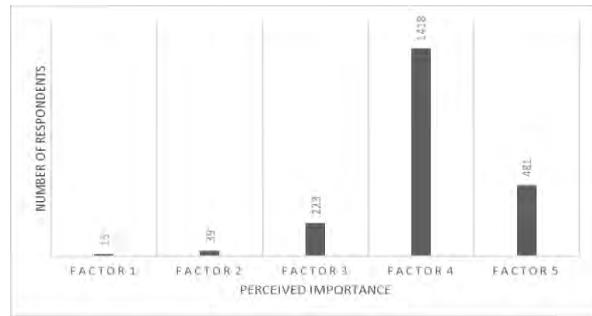


Figure 2. Perceived importance of communication skills.



The findings displayed by Figures 1 and 2 serve to make the point quite definitively - for the reader as well as for the students writing the paper - that communication should in fact be a crucial part of any industrial engineering curriculum.

Now we zoom in onto the particular research question that is central to this paper: what is the perceived importance of VM for professional engineers in the period 2015-2021? Figure 3 shows the full results on the basis the 5-point Likert scale that was presented to the respondents, while Figure 4 simplifies the same results by disregarding the neutral option (“moderately important”) and by summing the two directional answers (“very important” and “important” on the one hand and “somewhat important” and “not important” on the other hand).

Figure 3. Perceived importance of virtual meetings (on 5-point scale).

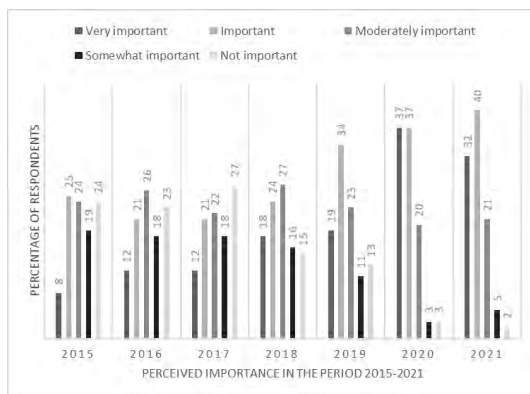
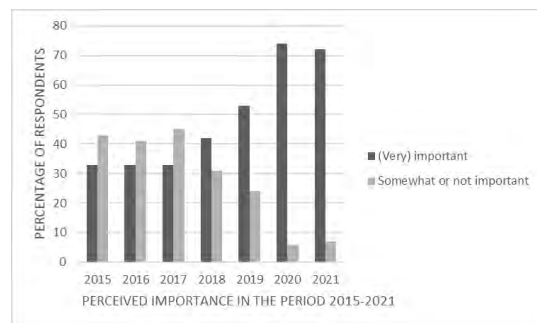


Figure 4. Perceived importance of virtual meetings (simplified version).



These figures indicate that already prior to COVID19 a clear increase in the perceived importance of VM can be observed. While in the period 2015-2017 the perceived importance remains stable with around one third of respondents with a directionally positive answer (see Fig. 4), a clear uptrend commences in 2018, intensifying into 2019 to take the perceived importance above 50%. Taking into account that the questionnaire was sent out in October 2019, which precedes the COVID19 lockdowns by roughly half a year, we can safely state that the rise of VM is not exclusively due to the pandemic. At the same time, the largest shift in perceived importance did take place in the course of 2020, adding roughly another quarter of respondents. This observation suggests that even if COVID19 was not the primordial cause of the rise of the perceived importance of VM, it seems to have further propelled an already accelerating trend.

One might wonder whether the rise of VM in business communication has an impact on face-to-face communication. Interestingly, the questionnaire also happens to contain a question that aims to assess the perceived importance of face-to-face communication (Fig. 5). Figure 6 compares the summation of the directionally positive assessments of the perceived importance of face-to-face communication compared to virtual meetings.

Figure 5. Perceived importance of face-to-face communication.

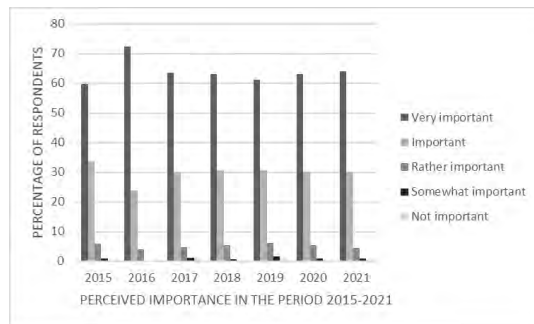


Figure 6. Perceived importance of face-to-face communication and virtual meetings.

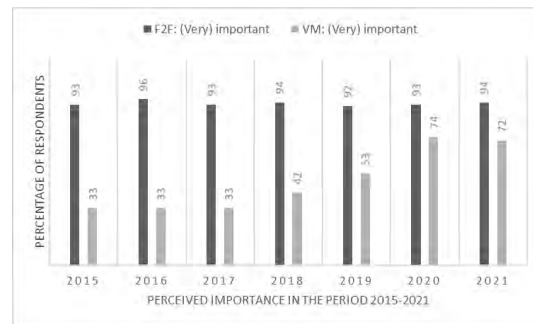


Figure 5 does not provide any indication that the perceived importance of face-to-face communication somehow suffered from the rise of VM in business communication. The importance of face-to-face communication remains constantly high in the observed period, with less than 10% of respondents opting for a neutral or directionally negative answer. Figure 6 demonstrates that even though VM has more than doubled in perceived importance over the last seven years, it can still not compete with the perceived importance of face-to-face communication, which has consistently scored above 90%. VM is definitely on the rise, but it is, one may conjecture, considered a useful additional option for business communication more so than a replacement of face-to-face communication.

4. Discussion

Next to several learning outcomes in written communication, the current communication curriculum at the Faculty of Industrial Engineering Technology at Campus Diepenbeek (University of Leuven) focuses on oral communication objectives (such as presenting, having team meetings, negotiating,...) in – as yet – exclusively face-to-face settings. The survey results shown above, however, beg the question whether the curriculum should not also include oral communication in virtual settings to keep up with changing workplace habits. With urgent 21st century concerns surrounding mobility and climate change, screen-to-screen interactions are not likely to diminish in importance, even if they are equally unlikely to replace face-to-face interactions. Crucial to the argument in favor of devoting curricular attention to VM is the assumption that virtual interactions are, at least to a certain extent, effectively different from face-to-face interactions: if, as the (in)famous Mehrabian's rule goes, up to 55 % of the impact of communication is determined by body language (Mehrabian, Morton, 1967), then VM, with an inherently more limited bandwidth to transmit non-verbal cues, will likely require strategies specific to this particular communicative setting.

The question then becomes: what are we to teach within the curriculum as it comes to VM? This paper does not seek to provide a definitive answer by any means, only to explore summarily some possible levels of interpretation of the curricular needs. A first, superficial level is related to the technological challenges that VM presents. It seems justifiable, however, to assume that technologically savvy users, which industrial engineers may be expected to be, have no particular need for support on this level. A second and probably more appropriate level, then, is related to strategies to cope with – and or even compensate for – the lack of physical proximity and the relative absence of social cues in the more “lean” type of communication that is VM. On this level, the curriculum could address issues such as online etiquette, protocol, techniques for self-presentation or even strategies for building shared mental models of effective communication. Research suggests, interestingly, that VM teams who implemented dialogue theory to build such a shared common ground performed as well as face-to-face teams that did not (Guo, D'Ambra, Zhang, 2009). A third, more abstract level pertains to the broader communicative context and the appropriateness of VMs within that context. To which communicative purposes, for which type and size of audience and in which organizational context, is VM a medium of choice, and for which it is not? As the data shared above indicate, face-to-face communication is unlikely to be replaced by VM entirely, even if the latter has clear, practical benefits. For certain communicative goals, face-to-face communication is destined to remain the preferred option. The literature indicates that for complex social interactions that rely heavily on interactivity, reciprocity and creativity (negotiations, workshops, seminars, brainstorm sessions, start-up meetings...) physical meetings are considered more suitable. For short, routine, follow-up or informational purposes, on the other hand, VM is perceived to be more effective (Guo et al.,

2009; Ivancevich, Konopaske, Defrank, 2012; Lindeblad et al., 2016)². Arguably, then, an important goal of the curriculum should be to have the learner reflect on the parameters involved in the choice for a particular communication medium.

A final reflection relates to *how* these curricular goals, once they have been clearly defined, could be achieved. At Campus Diepenbeek, our didactic approach hinges onto the notion of task-based learning: learning outcomes with regards to communication are maximally integrated within engineering projects that create a realistic, meaningful and rich context for the communicative goals that are to be achieved. It is our experience that students are more motivated to engage in communication activities when some form of actual task completion beyond the communicative activity itself is at stake. The challenge then becomes to devise didactic set-ups in which VM is integrated in such a way as to make “real-life” sense to the learners. As it turns out, the current curriculum already provides opportunities to this end, for instance in bachelor’s thesis projects where student teams develop technological solutions for real-life clients, often in cooperation with one of the university’s research groups. Such multi-stakeholder projects provide an excellent opportunity for having students reflect on the suitability of VM for the meeting’s purposes and circumstances, and if indeed VM is the option of choice, for having students prepare and execute the meeting in such a way that they maximally compensate for the limitations inherent in the medium.

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²In the paper by Gielkens et al., the students refer to an interview with an industrial engineer with a position in sales, who states that, in his experience, for sales talks – which are also, of course, are interactionally and psychologically very complex – face-to-face communication is vastly preferable.