

# STUDENTS' AND TEACHERS' PERCEPTIONS OF CDIO-BASED COMMUNICATION ACTIVITIES

**Carl Johan Carlsson**

Division of Language and Communication, Chalmers University of Technology

**Andreas Eriksson**

Division of Language and Communication, Chalmers University of Technology

## ABSTRACT

CDIO-based curriculum and course design involves many components that need to be integrated in projects, laboratory work and classroom activities. Communication is one such component that is both an integrated skill as well as a cognitive tool throughout the CDIO-cycle of any activity. However, comparatively little research has been done on students' actual perception of communication and communication activities in integrated content and language (ICL) environments. In this study, student statements about communication and communication activities have been collected via interviews and surveys from students at a mechanical engineering programme. These statements are compared with statements from content teachers at the same programme. Results suggest that students and engineering faculty share a basic perspective that communication activities should focus on a few key genres that students will use in their future profession. Consequently, there seem to be good reasons for identifying and practising the use of so-called apprenticeship genres. However, the focus on a few genres is problematized as some students show frustration when encountering genres unfamiliar to them. The paper therefore also discusses the potential need for a role where communication teachers facilitate not only communication activities but also students' perception of communication and communication activities in order to better prepare them to confidently engage in various types of communicative situations both in their further studies and in their future roles as engineers.

## KEYWORDS

integrating content and language (ICL), student and teacher perceptions, communication, genre, communicating in the discipline

## INTRODUCTION

Language and communication has a well-established role in a CDIO-based curriculum, and often this is manifested in integrated content and language (ICL) modules. These ICL activities often involve content teachers, communication teachers and students. How the participants understand and perceive these activities is likely to influence how both students and teachers act in these modules. Teachers' perceptions of such modules have been commented on and investigated from various perspectives. One view of the connection between content and language that is probably shared by many language specialists has been expressed by Lillis & Rai [1], who state that "at the heart of our approach is an understanding that 'content' and 'language' cannot be separated. Whilst apparently obvious, we think that this is an important point to make within the context of 'ICL'". There is research showing that Lillis & Rai's point is

pertinent in the ICL context, as not all people involved in ICL hold this integral view on the relationship between content and language. For instance, in studies of content teachers' conceptions of communication and other so-called generic attributes, Barrie [2] shows that teachers' understandings of the relationship between content and language vary considerably, at least when presented in terms of generic attributes and that many teachers see generic attributes as a mere complement to disciplinary knowledge.

Even though the issue of how teachers understand ICL activities has been described and problematized from various perspectives, less has been done to investigate how students perceive ICL collaborations and their purpose. This is particularly noteworthy as it has been shown that students' perceptions of teaching and teaching activities strongly influence student behaviour and therefore also their approach to learning [3] [4]. Therefore it seems reasonable to assume that students' perceptions of ICL modules and activities influence their engagement and learning in such modules.

The present conference article is compiled from a study carried out at the Mechanical Engineering programme at Chalmers University of Technology by the authors during 2011 and 2012 [5]. This research project finds its epistemological base in previous research where communication has been investigated in a higher education context. This includes Lea & Street's *academic literacies approach* [6], Thaiss & Zawacki's investigation on perception of standards of academic writing in the disciplines [7], and Ivanič discourse framework on writing [8]. However, these studies take a fairly broad approach to writing in higher education, while we investigate how students and content teachers in an ICL environment within the disciplinary realm of engineering education perceive communication and communication activities. Also, in our study, we include a wider perspective on *communication activities* within the discipline, and do not only limit this to writing.

## **INTEGRATING CONTENT AND LANGUAGE AT THE MECHANICAL ENGINEERING PROGRAMME AT CHALMERS UNIVERSITY OF TECHNOLOGY**

The five-year Mechanical Engineering programme is a comparatively large programme, with approximately 150 new students every year, following the CDIO model. The programme has been successful, and in 2008 it was awarded the title of Centre of Excellence in Higher Education by the Swedish National Agency for Higher Education.

In terms of integrated content and language interventions, three integrated modules are distributed over the first three years. This design has strong support from programme management and is a well-established part of the programme. The integration takes place in project development courses during years 1 and 2 and as part of the collaborative bachelor thesis project in year three.

The courses in years 1 and 2 are designed to introduce central aspects of product development processes, and students work collaboratively to solve a product development problem. This process is carefully scaffolded via regular meetings with content teachers and milestones for when particular steps in the process should be completed. In the first year, the students develop a product that solves an everyday problem. In the second year, the students face a different situation as projects are initiated by companies, and the students interact with the companies during the project and present their solutions to them. Both projects are documented and presented in the form of written reports and oral presentations.

In the third year, the students conduct a study and present it both orally and in a bachelor thesis essay. The thesis project is a collaborative project in the spring term of the students' third year. At Chalmers, the Bachelor project is a university-wide initiative, where supervisors announce projects that students from all programmes can apply for, provided that they fulfil particular requirements that supervisors may set up for their projects. Consequently, many of the projects are multidisciplinary, and a project group may contain students from several engineering fields.

For the mechanical engineering students, this project means that they are faced with a genre that is different from the product development reports that they have produced in year 1 and 2, for instance because the project sets higher requirements on the students designing their own research methodology, on reading and evaluating secondary sources and on creating a document that is longer than the product development reports.

The projects are scaffolded by content supervisors, but also through three tutorials where the focus is on the communication aspects of the project. Content supervisors are invited to join their group for these tutorials but in the majority of cases they do not. There is also a lecture series of five lectures that supports the writing of the thesis and preparing the presentation.

The communication interventions distributed over the three years aim at strengthening students' ability to communicate in speech and writing, but as communication teachers we also want students to be able to develop communication strategies that facilitate the ability to adapt to new situations that they will meet in their future careers. In order to be able to do so, we ultimately want students to develop awareness of the connection between *language* and *content* in their discipline and of the importance of selecting, preparing and adjusting material for different situations and audiences.

## **METHOD**

The collection of student data involved interviews and a survey with open-ended questions with free text answers from the students, whereas the teacher material consisted of interviews only.

The survey was distributed electronically to all students in years 1-3 during the spring of 2011 and an additional collection of student statements was made among first-year students in the spring of 2012. The response rates were between 24 and 39 per cent for the different groups, and all in all 171 student surveys were collected. Interviewees for the student interviews were selected by means of a random number generator. After the selection, students were invited via email to participate in the study. The invitation clearly stated that participation was voluntary and out of 30 students invited, 15 agreed to participate in an interview. The interviews were semi-structured and lasted between 15 and 40 minutes. All these interviews took place in a classroom at the authors' department. The interview and survey questions can be found in appendices 1 and 2 respectively.

The collection of teacher data consisted of semi-structured interviews with five teachers. The questions did not directly address the integration of content and language since we wanted to avoid questions that could become an evaluation of our work and role on the programme. We also wanted to avoid leading teachers' answers into the direction of writing-to-learn. Instead, we wanted to see whether they brought up writing-to-learn and writing within their discipline as an aspect of why ICL modules were part of their engineering programme. The interviews were between 25 and 40 minutes long and were carried out at the interviewees' department.

## RESULTS

From an overarching point of view, both students and teachers seem to share a common basis regarding the role and function of the communication activities in the programme. This is grounded in a view of *communication as a product* and *communication as transferring information* where there is a focus on the report and oral presentation as communication products and on their function of displaying information. An extra dimension, shared by many students and teachers, is that of acknowledging communication as being important for the *socialisation* of becoming an engineer, where writing reports and giving presentations is a part of what an engineer is expected to do.

Still, there is considerable variation when it comes to how individuals articulate the role and function of communication within engineering education. This spread in perceptions is true both for content teachers and students as statements in the survey as well as the interviews encompass a broad range of views. In this context, it is important to stress the fact that individuals also display this range where one understanding of communication activities does not exclude another standpoint.

### ***Communication as a communication product***

A majority of the students and most content teachers share a view of communication as a product. Many of the responses hold the words 'report' and '(oral) presentation', and many statements describe communication in terms of communication products. For instance, one student states that the reason for integrating communication on their engineering program is that students should learn to "*write and present reports*" (student survey, year 1) and another student expresses it in the following way: "*So that we practise report writing and the preparation of presentations, which can be used in working life*" (student survey, year 2).

From this perspective, the rationale behind integrating communication is that it gives students the opportunity to practise the production of a couple of communication products that are considered important in the engineering profession: the report and the oral presentation. Since most of the ICL activities during the first three years revolve around the report and the oral presentation, it is not really surprising that this is a pronounced perception among students as well as teachers.

Another indication of the strong focus on communication products is that, when asked about what students need to be able to communicate or communicate about, content teachers often respond by referring to what types of documents and presentations students will have to produce as engineers (for example reports, presentations and posters).

The perception of communication as communication product is often connected with a focus on format, language and style, and these are quite often perceived as skills that students may or may not master. For instance, one teacher states that:

*"They learn a basic structure with abstract, table of contents, introduction, and to explain what they have done and references and all that. I think they improve as we go along...I think that if one compares what they produce at the beginning of the course and what they produce at the end it is possible to see an improvement. It is of course possible that someone who knows how to write has taken responsibility for the writing...but they produce a decent result in the end".* (teacher interview)

A similar skills view of writing is shown by another teacher who states that “*if they already know their Swedish and if they know how to use references correctly in the text, there is not much I can do as an engineering teacher*”. This reflects the perception that it is format, language and style that constitute writing and that all of this is manifested in a piece of text that is separated from the student’s content learning.

### **Communication as transferring information**

There are clear connections between this category and the category of *communication as a communication product*, but here respondents have used a different lens when describing their perception of the role of communication in their education. The emphasis is instead on what communication is used for and what it is supposed to achieve. This perspective therefore differs from the view of *communication as a communication product* in the sense that communication here has a *function* and that it is directed towards an audience. This means that there is a perceived reason for communication that may be lacking, or that is at least not expressed, in the product perspective.

For instance, one student states that communication modules should lead to students being able to “*convey their results and conclusions*” (student survey, year 2). Another student states that “*...one does not write in order to make it [the text] beautiful but just to convey what you want to convey....as effectively as possible*” (student interview, year 2).

This emphasis on the function of transferring information to an audience is obvious both among the students and the content teachers. The role of writing and communication is to present work that has already been completed, and communication is therefore seen as fulfilling a *transferring* function. This means that the function is primarily to inform an audience, and many informants highlight the importance of transferring their information in a clear and concise manner so that someone else can understand what they have done.

Consequently, with this lens, respondents add a functional perspective to their perception and they also acknowledge the importance of adjusting communication to a particular audience. It is worth noting is that it is primarily the students who emphasise the importance of adjusting to audience, which may be an effect of the fact that they have presented to multiple and mixed audiences, particularly during the second year where the audience in the ICL module contains students, teachers and company representatives.

However, what may be lacking in this transferring perspective is the role of communication in negotiating content and knowledge, both as a reciprocal act and as a cognitive act. This means that communication is not perceived as being transformational or knowledge-building in its function, but instead an act where facts and information are simply displayed or made available to an audience. So, communication is viewed as something that takes place after the knowledge-building process, rather than being an integral part of the creation of knowledge.

### **Communication as socialisation**

There is evidence, both among students and content teachers, that communication is perceived as an intrinsic part of the engineering profession, and learning and being able to communicate is therefore seen as a step towards entering the professional engineering community. The fact that communication activities, such as report writing and oral presentations, are part of the students’ education is perceived as a way into the profession and an engineer’s professional duties. The great majority of students also see communication activities such as the writing of technical

reports and oral presentations as meaningful since these activities meet the expectations on what type of writing they will encounter as engineers after they have graduated. Both these perceptions on the role and function of communication within and beyond engineering education can therefore be seen as part of a socialisation process into the discipline and into the perceived role of an engineer.

The content teachers see the ability of communicating within the discipline as something that is important for the students in their professional careers. Several teachers emphasise that communication is an intrinsic part of the engineering profession today, partly because a great deal of engineering work is project and team-based. By communication they primarily refer to the ability to produce reports and give oral presentations.

At an overall level, there is therefore a common view on the role of communication as socialisation. However, within the view of communication as socialisation, there are two ways or levels of describing what this socialisation actually means. First of all, there is one level that highlights communication or writing as a skill and that connects it with a particular communication product. For instance, some students say something like *“you need to know how to write a correct report when you work as an engineer”*, and also some teachers take this perspective when highlighting “correctness” and “language” as skills necessary for an engineer. From this perspective both students and teachers connect the socialising procedure of “becoming an engineer” with the capability of producing communication products typical for the discipline.

The second level from which the meaning of socialisation is viewed takes a less atomistic perspective on the role of writing. Here students see the ability to communicate with others (i.e. a reciprocal act rather than mere transfer) as the primary goal for writing as an engineer: *“we need to be able to communicate with others”*. It is clear that the concerns lie less in the surface factors of text production (such as “correctness” or “language”) but rather highlights the importance of discussion and mutual understanding.

However, despite the general agreement that communication is an important part of the engineering profession, to which extent being a good communicator is perceived as an important quality for an engineer is less certain. Even if students and teachers claim that communication is an important part of the engineering profession, the two levels of perceiving the role and function of communication as socialisation may still be seen as complements to, rather than part of, disciplinary content. In addition, several students claim that they have not done a great deal of (what they perceive as) communication in the first year, and some second and third year students argue that they do not perceive communication as being prioritised on the programme. There are also examples of teacher statements that signal that communication may not be a central aspect of becoming a mechanical engineer as *“being a good writer isn’t always necessary in order to be a good engineer”*, but being a good communicator can be an added value.

### **Communicating to learn**

Only very few students connect the function of communication to the learning process. However, in these cases, students make statements about the relationship between content and communication where writing is a means for creating knowledge and understanding: *“writing increases understanding”* and *“it’s not until you write things that you see what and how much you actually understand”*. On the whole, however, students do not provide any detailed accounts of the influence from communication on their learning. It is possible that this is because the

questions asked were too general to generate elaborate student accounts on the effects of writing on learning. In another study, Carter et al. [9] were able to collect such accounts when focusing on one particular genre, the lab report. However, Carter et al. very explicitly asked about how writing (in their case) influenced their learning (e.g. “Has writing the lab reports helped your understanding of concepts you had to write about?” [9]). Without this specific prompt, we see in our study that issues relating to writing- or communicating-to-learn were not what students immediately came to think of when asked about the role of communication in ICL modules.

In comparison to the students’ statements about writing-to-learn, two of the teachers comment on the dual role of writing as a tool for presenting something as well as a tool in the learning process. For instance, one of them argues that report writing:

*“helps them structure thoughts and ideas...it becomes a backbone in their process...it becomes a goal for their process...when you write it down you can more easily see when it does not make sense...when you can see if it is not coherent...the medium that you can see whether students have understood or not, if there are pieces missing in their logic...and help them identify these themselves...” (teacher interview).*

There is also one teacher who comments briefly on report writing as a tool that helps students structure and question their own ideas. The two remaining teachers do not discuss communication in relation to learning.

This difference in teacher statements about communication and learning is not surprising in itself. There are several studies that, in relation to various issues and perspectives, have recorded differences within a group of teachers. For instance, Thaiss & Zawacki showed that teachers often use similar terms to express what ‘good writing’ entails but when investigating what these terms actually meant, it was possible to find individual as well as disciplinary differences [7]. They therefore argue for the importance of regular assessment meetings where faculty identify points of agreement and disagreement. In the context of our study, it seems as if it would be valuable for faculty to have such workshops around the concept of ‘writing/communicating to learn’. We know that the students are involved in writing-to-learn activities (for instance via regular hand-ins during the product development in the second year), but some teachers do not talk about this type of writing when being asked about why students write (reports) on the programme. In addition, a couple of the teachers state that they find it difficult to find out what the students know on the basis of the reports they mark:

*“I think it is very difficult...I know how to correct an exam...that I have an idea about how to assign credits...well, that can also be discussed of course, but how people write is very difficult to assess...I have a strong subjective opinion but I find it difficult to relate it with some sort of objective facts.” (teacher interview)*

With this background it seems important to have discussions among faculty about what and how to assess, and what role writing has in the learning and assessment process.

## **DISCUSSION**

Despite differences both within and between the teacher and student groups, the picture that emerges when asking these two groups about their perception of communication and communication activities is one of consensus, which is primarily grounded in a view in which communication is described as transferring information via a number of key genres. The fact that

the perceptions highlight a number of communication products is not really surprising as these are genres that the students meet in the integrated content and language interventions at the programme. The results may therefore reflect the fact that there has been an attempt to sequence the learning of particular genres in several courses during the first three years. In addition, the consensus may be influenced by a shared understanding that these are genres that are important in the engineering profession. The focus on these so-called apprenticeship genres may have both strengths and weaknesses, and in the following sections we will therefore try to problematise our findings—first from the perspective of genre awareness and then in relation to conceptions of writing and generic attributes.

### ***Limited genre awareness***

Statements from the survey and the interviews indicate that students' genre awareness is limited both in the sense that they focus on the format of a genre and in that they have problems when having to address and adjust to new genres. As long as the students work with genres they are familiar with, for example technical product development reports, they manage fairly well. The written report and the oral presentation seem to be what Carter et al. [9] refer to as "apprenticeship genres" for mechanical engineering students, i.e. genres that are established in the discipline and that can offer a means of socialisation into their discipline. Carter et al. [9] found that lab reports had the same function for life science majors studying biology.

The limited genre awareness is indicated when students have to use genres that are different from the key genres. For instance, one student gives evidence of the difficulties she and her project group had when meeting a genre they were not familiar with: the case study report. This is a report type that the students meet in a course called *Industrial production and organization* during the second year. The course is given by the department of Technology Management and Economics, and the course does not involve any collaboration between content lecturers and communication lecturers. What the student noticed in this course was that the conventions for and expectations on this report were different than the conventions of the product development report:

*"It seems as if there is a difference between different departments at Chalmers...They [The Department of Technology Management and Economics] structure it [the report] differently or have a different perspective or a different structure...It feels as if they do not want it to be structured in the same way."* [student interview, year 3]

The student also states that it was frustrating to work with this unknown genre as it did not seem to matter how much effort their team put into the text; they could simply not write a text that was good enough: *"we do not know how to write these [case reports] and we always get...that they are not very good, as feedback...irrespective of how hard we work and how good we feel that the report is"*. Statements like this one obviously raise questions about how the writing of case reports is taught in the course, but it also shows that these students were not expecting requirements to be different for this type of report or at least that they were not prepared to deal with these differences. From the students' point of view, there is a conflict between the writing they have learnt and the new and seemingly arbitrary requirements of the new writing assignment. Instead of being a genuine and very useful learning opportunity, it seems that, for some students, frustration becomes a hurdle that prevents some students from developing conscious genre awareness.

Another indication of limited genre awareness comes from another student who also expresses her frustration about the differences between product development reports and case reports.



Her view of the problem is however not that the genres are different and that she needs to know how to use both of them, but rather that there is a lack of a clear template that covers all writing assignments:

*“I would like to have something at the beginning of our education that tells us about the parts of a report so you that you know...sort of like a template that you could have throughout your education”* (student interview, year 2).

The students' frustration indicates something about their development as writers in the discipline. Thaiss & Zawacki [7] identified three stages in students' development as writers within a discipline at university. At the first stage, students tried to find common requirements that seemed to apply to all assignments that they needed. In the next stage, students developed a relativistic view where all teachers seemed to be requesting different things in their writing assignments. In the third stage, students had learnt to handle the uncertainty and different requirements (real and perceived). Students had learnt to navigate within the discipline, for instance by knowing how to channel their interest in a topic into a piece of text. Thaiss & Zawacki [7] argue that it is possible to envisage more advanced stages, but they also claim that not all students reach the third level. The frustrated students in our study have obviously not reached the third stage.

One issue that becomes important in this context is therefore what can be done to facilitate students' stepping into the third stage where they have developed “a complex, but organic sense of the structure in the discipline”. We believe this is important in terms of being able to write and communicate within the discipline, in terms of handling communicative situations where all requirements are not completely familiar, and in terms of building self-confidence and an identity as someone who is allowed to act within the discipline.

It seems as if a role where a communication teacher works as a facilitator and negotiator of what different assignments and disciplines require, is a role that could be valuable at a programme. In our context, the main concern for communication teachers has been to be active in course design and course delivery, but it may also be beneficial for programmes to consider other roles. One such role could involve the negotiation of assignments and expectations from different departments, and this negotiation could involve teachers as well as students in different steps of a process.

One last point that we would like to make in connection with genre awareness and students' development as writers is that at the same time as it is important for student motivation to learn to use genres that are central to the discipline, focusing *only* on a few genres may have negative effects. First of all, students may then have difficulties dealing with other genres when the use of them is not carefully scaffolded. Secondly, there is research indicating that exposure to a variety of genres is important for writing development [10]. Thirdly, there is research exemplifying the difference between university and work place genres [11] and challenges that students have to address as they try to meet the expectations of work place genres [12]. Having had the experience of meeting communicative situations which are different from the situations and the genres one is used to may therefore be of value because they develop their awareness of strategies that can be used in such situations. Our data also indicate that it is good if such experiences can be dealt with in scaffolded environments so that student uncertainty and frustration can be turned into learning experiences.

## CONCLUSION

It is highly unlikely that a university education will prepare students for all the types of genres they will meet later in their professional career. They will face communication situations that are new to them and where they do not know exactly what to do. One important aspect of communication interventions, we believe, is therefore to prepare students for addressing new communicative situations and new communication products. The extent to which students are prepared for such situations is likely to be affected by their perception of the role of communication in their discipline. This perception is likely to be shaped during their university education. Our results show that students develop an understanding of what genres seem to be important in their profession, and since their perceptions seem to meet with teachers' perceptions, the approach taken on this programme has a socialising function. At the same time, we suspect that the perceptions that relate to the lower levels in Barrie's, Lea & Street's and Ivanič's frameworks (conceiving communication as a complementary skill rather than something that enables disciplinary knowledge construction) [2] [13] [6] [8] will make it more difficult for students to handle new communicative situations and communication products. To what extent this is true, would need to be further investigated.

An area of concern is students' ability to develop an understanding of communication practices within their specific discipline while they also need to develop an ability of handling new and unfamiliar communication contexts throughout their education. This is particularly difficult within the educational design of the Bologna system where students may choose a two-year Master's programme after their three Bachelor years. This system gives, for instance, mechanical engineering students the opportunity to give a management angle to their degree. The concept of the mechanical engineering student has thus widened from an earlier system where all students followed the same basic set-up in a full-fledged five-year programme

In an educational system and on a global market that emphasise inter-, multi- and/or transdisciplinarity [14], it seems increasingly important to practise and discuss communication in various settings. This does however not mean that we are moving towards a generic attributes understanding of communication in the sense that communication should be separated from disciplinary content. We still believe that communication should be practised within the content disciplinary context, but that a potentially important task for communication teachers is to identify a variety of genres that students meet in the programme and use these to make students aware of and practise addressing a wide range of communicative situations.

## REFERENCES

- [1] Lillis, T. & Rai, L. A Case Study of Research-based Collaboration around Writing in Social Work. *Across the Disciplines*, 8(3), 2011.
- [2] Barrie, S. C. Understanding what we mean by generic attributes of graduates. *Higher Education*, 51, 2006, 215-241.
- [3] Trigwell, K., Prosser, M., & Waterhouse, F. Relations between teachers' approaches to teaching and student learning, *Higher Education*, 37, 57-70, 1999.
- [4] Entwistle, N., McCune, V., & Hounsell, J. Investigating Ways of Enhancing University Teaching-Learning Environments: Measuring Students' Approaches to Studying and Perceptions of Teaching. In De Corte, E., Verschaffel, L., Entwistle, N., & van Merriënboer, J. (Eds). *Powerful Learning*

*Environments: Unravelling Basic Components and Dimensions*. (pp. 89-107). Oxford: Pergamon, 2003

- [5] Eriksson, A. & Carlsson, C. J. From apprenticeship genres to academic literacy: problematizing students' and teachers' perceptions of communication activities in an ICL environment, *Journal of Academic Writing, Forthcoming* (2013)
- [6] Lea, M., & Street, B. Student writing in higher education: An academic literacies approach. *Studies in Higher Education*, 23 (2), 157-172, 1998.
- [7] Thaiss, C., & Zawacki, T. M. *Engaged Writers and Dynamic Disciplines. Research on the Academic Writing Life*. Portsmouth, NH: Boynton/Cook Publishers
- [8] Ivanič, R. Discourses of Writing and Learning to Write. *Language and Education*, 18(3), 220-245, 2004.
- [9] Carter, M., Ferzli, M., & Wiebe, E. N. Writing to learn by learning to write in the disciplines. *Journal of Business and Technical Communication*, 21(3), 2007 278-302.
- [10] Russell, D. R. *Writing in the academic disciplines: A curricular history* (2nd ed.). Carbondale: Southern Illinois University Press, (2002).
- [11] Dias, P., Freedman, A., Medway, P., & Paré, A. *Worlds Apart: Acting and Writing in Academic and Workplace Contexts*. Mahwah, N.J.: Erlbaum Associates, 1999.
- [12] Dias, P., & Paré, A. *Transitions: writing in academic and workplace settings*. Cresskill, NJ: Hampton Press, 2000.
- [13] Barrie, S. C. A conceptual framework for the teaching and learning of generic graduate attributes. *Studies in Higher Education*, 32(4), 2007, 439-458.
- [14] Paretti, M. C. Interdisciplinarity as a lens for theorizing language/content partnerships. *Across the disciplines*, 8(3), 2011.

## Appendix 1. Survey and interview questions

### 1. Student survey questions

- Has your way of writing changed since you started at Chalmers?
- Have you become better at writing?
- If you feel/think that you have become a better writer, what is it that you have improved?
- What does it mean to become a better writer? What can one become better at when it comes to writing?
- What is the aim of having communication modules in some of your engineering courses?
- What do you think communication modules at an engineering programme should lead to?
- Have the modules you have attended so far affected your view on communication?
- Do students become better engineers by writing reports in their education?

### 2. Interview questions – students

- In what way have you practised communication on your programme during the years you have been studying at this programme?
- What have you done, and what was the purpose?
- What is your previous experience of writing (at school or at university)? Are there similarities and/or differences between that writing and the writing you do here?
- What does it mean to you to become a better writer, i.e. what can one become better at?
- Have you become a better writer? What are you better at?
- What is the purpose of having communication modules in some of your courses?
- Has your view of why there are communication modules on your programme changed while you have studied here at Chalmers?
- If you were given the opportunity to design a communication module – what would that module contain?
- Is there anything you would like to know more about or practise more in terms of communication?
- Do you receive support about language and communication from content teachers?
- Do you feel that content and communication teachers say roughly the same thing about communication?
- What is it like write in a project group in comparison with writing individually?

### 3. Interview questions – teachers

#### *General questions*

- Why do students write reports?
- What do students learn from writing reports?
- Is that what you would like them to learn?

#### *Assessment*

- Is the technical report sufficient as a tool for grading and assessment?
- Can you assess what you want to assess? What do you want to assess?
- Do students become better engineers by writing reports?

#### *Supervision*

Do you discuss communication in your tutorials? What do you discuss? What do the students ask about?

#### *On being and becoming an engineer*

What do you need to be able to communicate about as an engineer within this discipline?

Is there anything that the students would need to practise more when it comes to communication in your discipline?