WORKSHOP ON IMPLEMENTING COMMUNICATION ACTIVITIES IN ENGINEERING EDUCATION – INTEGRATING CONTENT AND LANGUAGE

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ABSTRACT

This workshop aims to establish the main aspects of incorporating *CDIO Syllabus 3.2 Communication* in engineering education. Various aspects of communication and writing in the disciplines have been central to the CDIO initiative since the start. However, to institutions new to CDIO, this may not be as well-known. Therefore, this workshop will investigate some of the reasons for having communication education in engineering disciplines. These reasons include *writing as a cognitive tool*, *writing for disciplinary socialisation*, and, of course, *writing to communicate disciplinary knowledge*.

In the workshop, we will look at how communication (writing and speaking) can be implemented and integrated in different types of courses and student projects. We will also look at how such learning activities can be designed to meet assessable learning outcomes while at the same time scaffolding content knowledge-building and professionalization.

Curriculum design and progression of learning sequences are also important aspects of integrating and designing learning activities around writing and speaking in engineering programmes, and this is something that will be addressed in the workshop.

Participants in the workshop will be able to work on existing communication activities in their respective engineering programmes, or on potential learning activities that can be implemented as new components in an engineering programme. Thereby, the workshop is designed to cater for both those who have worked extensively with CDIO-implementation, as well as for those whose institutions are new members in the CDIO initiative.

KEYWORDS

Communication, Writing, Speaking, Integration, Curriculum design, Standards: 1, 2, 3, 7, 8

WORKSHOP INTRODUCTION

Communication skills in various aspects are important engineering attributes that we need to equip our students with. This is also acknowledged and promoted in the CDIO initiative through Syllabus 3: *Interpersonal skills: Teamwork and Communication* which emphasizes communicative aspects that students need to acquire. There are many different educational

concepts in higher education in general, and in engineering education in particular, where writing and communication are integral components. In many cases these components are seen as generic graduate attributes and in other cases they are seen as more discipline specific attributes. There are many different approaches and initiatives in higher education that deal with teaching and learning these communicative attributes such as *Writing-Across-the-Curriculum* (WAC) and *Writing-in-the-Disciplines* (WID) where writing is seen as central and something that goes against the misconception that writing (instruction and learning) is separate from content (instruction and learning).

Within these approaches, apart from the concept of *Learning-to-Write*, writing is therefore seen as a cognitive tool (Tynjälä, Mason, & Lonka, 2001) for understanding and contributing to disciplinary knowledge – *Writing-to-Learn*. With this view, it is fair to say that communication is part of several of the CDIO Standards in terms of understanding the context (*Standard 1)*; learning objectives (*Standard 2)*; integrated curriculum (*Standard 3)*; integrated learning experiences (*Standard 7)*; and active learning (*Standard 8)*.

The importance for our engineering students to develop good communication skills (with well-defined learning objectives, clearly designed learning activities, and suitable assessment practices) is recognized by most teachers and programme managers alike. The problem is how to fit it into an already full curriculum without taking away what is already there. One solution to that problem – which is also the theme for this workshop – is to integrate communication and content and not treat it as a separate subject.

This integration can also be seen as a shift from a pure skills model to academic literacy and writing as academic socialization (Lea & Street, 2006) which means that communication activities support students' active participation in the academic and discipline specific discourse. By introducing "apprenticeship genres" (Carter, Ferzli, & Wiebe, 2007) students are given different assignments typical to the specific disciplines that help them understand and reproduce communicative patterns and text types within their field of study.

With the help of the CDIO curriculum, we are going to define learning objectives for written and oral communication in different engineering educational settings. We are also going to explore different ways of integrating communication objectives and activities in existing content courses. In this sense, we are also going to discuss potential "added value" to students' learning by using communication activities for acquiring content knowledge and skills.

Workshop organization

Participants in the workshop will work actively with learning objectives for writing and speaking within existing engineering education. This can be carried out at a curricular level or in a specific course or course component. During the session, we will explore potential communication activities (written and oral genres) that can be used as learning activities in various disciplinary settings, with a focus on STEM education. This can of course also be transferred to other disciplinary contexts outside of STEM for any participants who would want that.

The discussion on "who should teach?" and "who should assess?" is an important part of the workshop, and we will look into different ways of sequencing and integrating learning activities in content courses, and ways of enabling engineering content teachers to teach and assess this with the help of language and communication experts. The concepts of peer

response and self-assessment will be explored to further scaffold communication learning activities and assessment.

The development of rubrics and criteria will be introduced to make the connection between learning objectives and assessment practices clear, and participants will create an outline for assessment strategies and assessment goals within their own disciplinary setting.

Overall, the workshop aims to cater for participants from all disciplines and at any stage when it comes to CDIO implementation. Therefore, it is the ambition to provide useful outcomes for faculty new to CDIO and new to integrating communication and content, as well as for faculty who are well familiar with writing and speaking instruction in a CDIO context.

Workshop outcomes

The workshop has a broad scope in order to provide a foundation for integrated language and communication activities in engineering education. This means that it is possible to "tailor" some of the workshop components or activities to suit individual participants' needs. However, the basic outcomes for the workshop are that participants should have the opportunity to explore and develop an understanding for ways of working with language and communication in higher education. This can be summarized in the following list:

- *Identifying different purposes for communication learning activities*
- *Finding appropriate (apprenticeship) genres and communicative contexts in STEM education*
- *Establishing a relationship between content learning and participation in the disciplinary discourse (integrating communication and STEM specific content)*
- *Designing learning outcomes for integrated writing and speaking activities*

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BIOGRAPHICAL INFORMATION

Carl Johan Carlsson is a university lecturer at the Division for Language and Communication. He is involved in communication courses with a focus on technical communication and academic writing in several educational programmes, primarily within the fields of mechanical engineering, design engineering, and civil engineering. As the director of Chalmers Writing Centre, he is responsible for the development of writing centre pedagogy and the peer tutors working there. His research interest includes various aspects of writing and communication in higher education, intercultural communication, pedagogy and pedagogical development work.

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