IMPROVING WRITTEN COMMUNICATION SKILLS IN ENGINEERING PROGRAMS

Magnus Andersson, Hossein Nadali Najafabadi, Joakim Wren

Department of Management and Engineering, Linköping University

ABSTRACT

This study focuses on the improvement of students’ written communication skill in higher education, aiming at higher quality of reports at different course levels. Towards this aim, two supportive guideline documents, “report structure” and “report format”, have been written aligned with the courses’ syllabi and introduced as complementary material.

INTRODUCTION

Today’s engineers are required to have a high competence level in e.g. analytical reasoning, problem solving and communication skills. It is therefore of great importance that higher education institutions promote these skills within their system. These skills, among other aspects, are addressed extensively in the CDIO syllabus and are thought to be important for the curriculum design, teaching and assessment in engineering education. Moreover, CDIO standard 2 addresses the importance of identification of learning outcomes for personal and interpersonal skills including written communication skill, aligned with the program objectives.

One of the important interpersonal skills within the CDIO syllabus is written communication, which is considered to be an active learning method, Bean (2011). This project in progress addresses an ongoing study about implementation of an approach in order to improve students’ written communication skills within several engineering programs at Linköping University, Linköping, Sweden. Examples are programs in Mechanical Engineering, Design and Product Development, Energy and Environmental Engineering and Management, and Industrial Engineering. Despite quite extensive report writing practice within many courses in the above mentioned programs, it has been found that the students have difficulties in writing their master theses with sufficiently high quality standards, and the common opinion is that the situation has become worse during the last couple of years. The most problematic areas of the written communication were associated to organizing and structuring, relevance, clarity and conciseness (excessive wordiness), poor writing and spelling/grammar mistakes.

OBJECTIVES

To convey a message of a study in a clear informative way towards a specific audience requires certain communication skills that could be challenging to learn, but is an essential part in academia as well as in industrial professions. The objective of this study was to investigate if and how documents on report formatting and structuring can be used in undergraduate courses to supporting and enhance students written communication skills. These documents are intended as a natural part of the course syllabus at different stages of the educational process, aiming for a progressive development towards the final thesis writing.
CURRENT STATUS

To assist students with appropriate tools to complete good reports from both structural as well as formatting point of view, two supportive guideline documents have been created. At the initial stage these documents have been focused towards the master thesis written dissertation.

The first document, referred to as “structural outline”, deals with the extent and nature of the content to be covered within the technical report. This includes details about what should be included in different parts of the report, such as the abstract, introduction, theory, etc. The document also gives the motivation on why and how certain contents should be included or excluded. The second document, referred to as “report formatting”, highlight text formatting requirements as well as artwork guidelines adjusted for different typewrite formats. The former requisites are directly aligned with a provided report template. Beside our own experience, these documents have been design in accordance to the faculty and departments thesis requirements at advanced level and also inspired by recommendation from the scientific community.

Improving report writing skills demands time and effort, and it is not sufficient to start this process at the final stage of the student’s education (i.e. during the master thesis). Instead we argue that a clear progression throughout the engineering program is necessary, and that it is insufficient to just let the students write a bunch of reports without general as well as specific guidance. To promote this progression, these documents were introduced into a number of courses at different levels of the master programs. This should facilitate to reach the objective of improved writing skills in the education context and also promotion students critical thinking abilities and problem solving skills, Larkin-Hein (2000), aligned with CDIO Standard 2 objectives.

These documents have assisted the students with appropriate implementation of the written communication and obtaining a quality standard that can be benchmarked. This approach can limit the potential for misinterpretation, inefficiency and time wastage, Keane & Gibson (1999). Initial evaluations indicate that these documents have been supportive for finalizing a good report, and an effective active learning process of written communication improvements.

CHALLENGES

One of the main challenges is associated with students’ motivation for actually reading and following the provided guidelines. Since the students’ are not enforced to follow the guidelines strictly, some students’ may not follow them and others may only consider some parts of these guidelines. Therefore, a question is how one can motivate students, without enforcement and/or penalty assessments that could be counterproductive.

Another important aspect is related to the comprehensiveness level of these guidelines to be devoted to different levels of education, and how the need for and interaction with other supportive activities should be addressed. How extensive should either of these documents/activities be in order to sustain continuous progress in written communication throughout the education?

A further challenge is associated with the integration of such documents at different program level due to the inherent variations of course syllabuses. This can lead to misperception and hinder students from improving their communication skill. How should these documents be adjusted to meet course-specific necessities?
REFERENCES


BIOGRAPHICAL INFORMATION

Magnus Andersson is currently a Ph. D. student at the division of Applied Thermodynamics and Fluid Mechanics, Linköping University, Linköping, Sweden. In addition to his research in the field of biofluid mechanics, he is involved in developing courses such as Computational Fluid Dynamics and Heat Transfer.

Hossein Nadali Najafabadi (Ph. D.) is currently a post-doctoral fellow at the division of Applied Thermodynamics and Fluid Mechanics, Linköping University, Linköping, Sweden. In addition to his research in the Turbomachinery field, he is involved in developing courses such as Gas Turbine Engines, Fluid Mechanics and Computational Fluid Dynamics.

Joakim Wren (Ph. D.) is an Associate Professor at the division of Applied Thermodynamics and Fluid Mechanics, Linköping University, Linköping, Sweden. His main research interests include applied heat transfer, especially for energy recovery purposes, and sustainable energy engineering. At present he is teaching engineering thermodynamics, heat transfer and energy engineering.

Corresponding author
Magnus Andersson
Department of Management and Engineering
Division of Applied Thermodynamics and Fluid Mechanics
Linköping University
S-581 83 Linköping
magnus.andersson@liu.se

This work is licensed under a Creative Commons Attribution-NonCommercial-NoDerivs 3.0 Unported License.