What is the impact of integrating language and content in higher education (ICLHE) and how do you study it?

In attendance: Magnus Gustafsson
Division of Language and Communication, Chalmers University of Technology, Sweden,
magusta@chalmers.se

Project co-members and co-authors:
Marie Paretti
College of Engineering, Department of Engineering Education, VirginiaTech, USA,
mparetti@vt.edu

Andreas Eriksson
Division of Language and Communication, Chalmers University of Technology, Sweden,
Andreas.Eriksson@chalmers.se

Abstract
Recognised under different terms in our respective higher education contexts, the notion of integrating communication development alongside content knowledge development in disciplinary courses has seen increasing application since the late 90s. We talk of ICLHE in Europe, WID in US contexts, or use the partially overlapping phrase CLIL for ‘content and language integrated learning’. Support for integrating writing development into content area courses draws from the literature in educational development and research literature from various points of view including situated learning, cognitive apprenticeship, constructive alignment, disciplinary discourse, graduate profiles, and even from policy perspectives as the Bologna agreement or certification standards. Despite this support and the growing importance if ICLHE, it seems we have not really established a reliable way of measuring the impact of integrating the teaching and learning of communication with the teaching and learning of domain knowledge. Have we even defined what impact is it that we seek and what didactic approaches we should be comparing with?

The Saunders think piece poses a critical challenge with its critical set of implicit questions, and we believe our list of questions offers a project-specific adaptation of this challenge:

• What outcomes and outputs are we measuring?
• What outcomes and outputs should we be measuring?
• For whom or from what vantage point do we assess ICLHE?
• Who ends up using the research and how does that promote HE?
• How and when do we measure?
• How do we define what an ‘effective’ intervention is?
• What are the baselines we measure against?

These questions seek to explore both what is happening now in ICLHE assessment and what can and should be happening. They address the kinds of learning outcomes ICLHE might support for students, the kinds of writing products and textual / discourse artefacts we should be examining in our assessments, the ways in which those products and artefacts should be measured and analysed, and, ultimately, the ends to which our assessment should be directed.

The presentation opens on brief descriptions of necessary settings and a short definitional section before offering examples of ICLHE interventions that require assessment. However, the structural intention of the presentation is to set aside as much time as feasibly possible to participant generated discussion around this challenging cluster of issues. We hope that we can jointly explore new avenues by drawing on our different contexts and perspectives and the different research designs and approaches that grow out these.

Keywords: Integrating content and language, writing in the disciplines, interdisciplinarity, impact studies.

Introduction
As educators involved in facilitating communication learning outcomes be it in first, second, or foreign
language contexts, we have a series of options; we can set up pre-sessional or remedial type courses, required communication courses at undergraduate and graduate levels, teach in teams with ‘content’ faculty, or offer training to colleagues in other disciplines to provide this communication education themselves. Irrespective of our choices, we will want to study that what we are doing is effective (enough). We want this both from our own perspective of refining in our practice and sharing it in a SOTL manner and we ‘want’ it from a, sometimes frustrating, managerial measurement perspective.

Recognised under different terms in our respective higher education contexts, the notion of integrating communication development in disciplinary courses has seen increasing application since the late 90s. We talk of ICLHE in Europe, or use the partially overlapping phrase CLIL for ‘content and language integrated learning’. In the US, the phrase often used would be ‘writing in the disciplines’ (WID). Support for integrating writing development into content area courses draws from the literature in educational development and research literature from various points of view, including situated learning (Brown, Collins, & Duguid, 1989), cognitive apprenticeship (Collins, 2006), constructive alignment (Biggs & Tang, 2007), disciplinary discourse (Becher & Trowler, 2001; Russell, 2001; Trowler & Cooper, 2002; Ivanič, 2004), and graduate profiles (Barrie, 2007; Jones, 2009). In addition, there is increasing support for integrated interventions across courses and curricula for instance through educational approaches such as problem-based learning (PBL) or through a curricular development model common in engineering education and known as Conceive, Design, Implement, Operate (CDIO; www.cdio.org). Despite this support and the growing importance of ICLHE, it seems we have not really established a reliable way of measuring the impact of this integration – of the impact, that is, of integrating the teaching and learning of communication with the teaching and learning of domain knowledge.

Have we even defined what impact is it that we seek and what didactic approaches we should be comparing with?

As we consider the effects of ICLE on both domain knowledge and discourse literacy, our core ‘research question’ - ‘what’s the impact of ICLHE?’ – offers an example of the questions that the Saunders think piece introduces. For instance, Saunders sets up a critical set of implicit questions of very fundamental character for assessment practices with his list of seven usability practices for HE research: what are the real reasons and purposes of said research?; who ends up using the research?; what is the actual foci of the research?; what kind of data and evidence? (what even counts as evidence?); the audience, the timing and the agency for the research output? Our local versions of some of these questions have initially included:

- What outcomes and outputs are we measuring?
- What outcomes and outputs should we be measuring?
- For whom or from what vantage point do we assess ICLHE?
- Who ends up using the research and how does that promote HE?
- How and when do we measure?
- How do we define what an ‘effective’ intervention is?
- What are the baselines we measure against?

So, our interest in this paper is the study of how effective our practice is when we are working in contexts where we promote integration of communication learning outcomes into the respective disciplinary courses and programmes we encounter at our institutions. The paper opens on offering some contexts in the literature before offering two examples of ICLHE interventions that require assessment.

Assessing interventions in ICLHE-contexts

The kinds of efforts currently underway are seeking, in a variety of ways, not simply to “add” a writing assignment to a disciplinary content course, but to leverage and build on the ways in which communicative practices in a discipline interact with, contribute to, and are shaped by other disciplinary practices, domain knowledge, and epistemology. In the educational literature, interdisciplinarity has become an increasingly critical framework for exploring student learning and development (e.g., Boix Mansilla, 2005; Boix Mansilla & Duraising, 2007; Boix Mansilla, Durasingh, Wolfe, & Haynes, 2009; Lattuca, Voigt, & Fath, 2004). Scholars like Boix Mansilla and Lattuca argue for the ways in which interdisciplinarity – the bridging of epistemologies and values from multiple domains – can enhance student learning. Similarly, Jacobs (2007, 2010) has shown how a network of interdisciplinary issues plays out between faculty in ICLHE situations. Yet, while interdisciplinarity in an by itself promotes or requires an integrated approach to communication learning outcomes, little work to date has considered assessment from this interdisciplinary perspective that appears integral to many educational situations and typical for our context in STEM education.
Needless to say, not all integrated interventions are necessarily interdisciplinary beyond asking students and faculty in any discipline to take on the values and epistemologies of rhetorics and communication. So, to some extent, then, the wide-ranging literature on for example writing assessment is relevant to assessing writing in integrated contexts as well, and studies by Huot (2002; Huot & O'Neill, 2008), Adler-Kassner and O'Neill (2010), and Yancey (Murphy & Yancey, 2007; Yancey, 1999; Yancey & Huot, 1997) address the assessment of writing generally and in writing across the curriculum contexts. For WID contexts and the promotion of these, Anson et al. have described an effective strategy that includes assessment of programmes that also appears relevant for ICLHE studies (Anson, Carter, Dannels, & Rust, 2003; Anson, 2006). In subsequent work, Anson and colleagues have also studied the problematic aspects of programme- or university-wide criteria in assessment and particularly for discipline-specific contexts (Anson, Dannels, Flash, & Housley Gaffney, 2012).

From a European scene, many researchers have contributed to the assessment literature and Gibbs and Simpson (2004), for example, have offered a useful set of assessment perspectives that suggest an integrated model would be effective. O'Donovan, Price & Rust (2008) similarly suggest a framework for assessing student learning that promotes ICLHE in its emphasis on the discourse communities the students negotiate. Related to that assessment literature, there are also some influential models of feedback which appear to imply integrated work (Hattie & Timperley, 2007; Hounsel, McCune, Hounsel & Litjens, 2008). Yet, these spheres of assessment related literature do not really enable us to fully explore the impact of the interdisciplinary educational frameworks in which integrated content and language learning occurs.

So, while ICLHE and assessment may not have its own literature yet, there are still many assessment perspectives that seem viable but we do not necessarily have a methodology for combining them. To begin to address this gap in our assessment discourse, we have begun to explore our set of questions associated with ICLHE impact based on some of the ICLHE-projects we have designed and now run. In other words, what if we take a specific ICLHE intervention (series of interventions) and try to answer our questions? We will take a brief look at two successful and much appreciated ICLHE design at one of our institutions.

**Bachelor level mechanical engineering and ICLHE**

At Chalmers University of Technology, the mechanical engineering (ME) programme starts off with the first cycle bachelor years and then splits into a number of associated MSc programmes and a shared 5-year ‘master of engineering’ degree. Our Division for Language and Communication works a lot with the bachelor cycle of the programme, and provides three linked, progressive and partially co-taught interventions for technical communication in Swedish over the first three years. We are involved in a 14-week project course in the first term; a second 14-week project course in the fourth term, and then facilitate part of the supervision for the bachelor thesis projects the students do in their third year (sixth term). Without going into detail about the interventions they typically involve co-planning of sequences of learning activities, a minimum of lecturing, more resources spent on supervision, and a significant amount of work with feedback on mechanical engineering design reports and oral presentations of the project products during the first two years and mainly supervision for disciplinary discourse of multi- or interdisciplinary bachelor thesis projects in the third year (cf. Eriksson and Carlsson, 2013; Gustafsson and Broström, 2012 for more detailed accounts of the communication interventions in the programme).

<table>
<thead>
<tr>
<th>What outcomes and outputs are we measuring?</th>
<th>Report and presentation quality relative learning outcomes, design process documentation</th>
</tr>
</thead>
<tbody>
<tr>
<td>What outcomes and outputs should we be measuring?</td>
<td>Learning impact on domain knowledge, disciplinary discourse literacy beyond the isolated case, relevance in progression of tasks toward workplace communication</td>
</tr>
<tr>
<td>For whom or from what vantage point do we assess ICLHE?</td>
<td>The objective of meeting Swedish higher education agency requirements, the programme learning outcomes, and CDIO requirements</td>
</tr>
<tr>
<td>Who ends up using the research and how does that promote HE?</td>
<td>The programme manager who, in turn, promotes similar work in related programmes, published articles about the programme get wider distribution but their citation index is low and their effect on research is uncertain</td>
</tr>
<tr>
<td>How and when do we measure?</td>
<td>Mid-course, end-of-course by criterion-based report grades, post-cycle interviews with a sample</td>
</tr>
</tbody>
</table>

---

Table 1: ICLHE impact in ME, years 1-3
of students (Eriksson & Carlsson, 2013)

| How do we define what an ‘effective’ intervention is? | Course evaluation data for the ME-course, student and programme manager satisfaction, performance in subsequent projects, annual contract negotiation with programme manager |
| What are the baselines we measure against? | -- (an unarticulated sense of performance in the past and a somewhat better sense of continuous improvement) |

Even if these answers are indeed one-liners for a short paper and interview answers (for example) would have been more elaborate, we still see that there are some problematic issues from the point of view of assessing impact. The most conspicuous ones being perhaps the inadequacy of a course evaluation system for assessing ICLHE, an assessment perspective that is isolated from any research tradition, and the lack of a solid sense of baseline.

If we look instead at another engineering programme at Chalmers and how we work in it, the bachelor level chemical engineering (Chem Eng) three-year programme might be of interest since it offers a slightly different approach. This programme has three individual courses in technical communication and the challenge for the division is to establish meaningful partnerships with other courses in the programme, invite joint learning activities, co-define meaningful chemical engineering projects and problems to be communicated or for which the learning can be enhanced with informed design of communication interventions. In this programme, the first year 7-week intervention focuses on technical communication in Swedish and the following two focus on communication in English. Therefore, there is a need to also cater for language proficiency training to an extent that is normally not necessary for L1 interventions. The first course is integrated with a parallel course in industrial chemical engineering, the second one collaborates with ‘thermodynamics’ and ‘reactor processes’, and the third course integrates with ‘separation technology’. The courses share some characteristics in that learning outcomes are co-communicated and linked, learning activities are sequenced to scaffold learning and communication in the ‘chemistry’ courses, a few exercises or workshops are co-taught, and while the courses are assessed and reported separately teachers convene for a discussion of criteria and assessment (cf. Gustafsson, 2011 for an account of a previous but similar version of this series of interventions).

Table 2: ICLHE impact in Chem Eng

| What outcomes and outputs are we measuring? | Report and presentation quality relative learning outcomes, the disciplinary literacy for a selection of threshold concepts |
| What outcomes and outputs should we be measuring? | Learning impact on domain knowledge, disciplinary discourse literacy beyond the isolated case, performance on degree thesis projects, relevance in progression of tasks toward workplace communication, |
| For whom or from what vantage point do we assess ICLHE? | The objective of meeting Swedish higher education agency requirements and the programme learning outcomes |
| Who ends up using the research and how does that promote HE? | The programme manager who, in turn, promotes similar work in related programmes, published articles about the programme get wider distribution but their citation index is low and their effect on research is uncertain (Gustafsson, 2011) |
| How and when do we measure? | Mid-course, end-of-course by criterion-based report grades, isolated reflective writing pieces, |
| How do we define what an ‘effective’ intervention is? | Course evaluation data, student and programme manager satisfaction, performance in subsequent projects (for year one and two courses), annual contract negotiation with programme manager |
| What are the baselines we measure against? | -- (an unarticulated sense of performance in the past and a somewhat better sense of continuous improvement) |

Again, the table format and the article scope make for more condensed answers than is perhaps preferable but
much like for ME, we see that there are problems. The assessment context remains uninformed or informed by policy and curricular requirements only, the baseline is insufficiently articulated, measurement is product-oriented rather than focused on disciplinary discourse literacy, the assessment perspective is insufficiently connected to current educational research. Still, what might be the most serious issue with the assessment of these two perfectly functional series of interventions is that the assessment is so similar. The two programmes are quite different, the student profiles are different, the workplace scenarios and expectations are different, and the fact that the chemistry case has its own individual courses is a significant difference which allows for a great deal of more time for us with these students (relative student numbers).

Concluding thoughts

Our questions, or versions of them, seek to explore both what is happening now in ICLHE assessment and what can and should be happening. They can potentially address the kinds of learning outcomes ICLHE might support for students, the kinds of writing products and textual / discourse artefacts we should be examining in our assessments, the ways in which those products and artefacts should be measured and analysed, and, ultimately, the ends to which our assessment should be directed. How can we begin to understand and identify “effective” for contexts that strive to facilitate (inter)disciplinary discourse literacy via integrated learning environments for domain knowledge and communication related learning outcomes?

Well, it seems we have some ground to cover still and this process must include studying multiple ways of assessing the impact of our ICLHE practice. Paretti, for instance, has self-critically studied the use of portfolio assessment in an engineering communication programme (Paretti, 2013). While the individual case might be interesting as such, the study itself and the activity theory influenced framework Paretti suggests is more important for ICLHE practitioners. With a sufficient number of assessment cases published, we might be able to embark on a meta-analysis that may well meet the complex learning environment of ICLHE and the way in which it does not seem to be captured by one-dimensional assessment strategies.

There may well be models to be adapted for this purpose. Bonnet (2012) studying German CLIL contexts identifies the diverse and somewhat scarce assessment literature for CLIL and promotes a multi-dimensional assessment approach focussing on products, processes, and participants as well as combining both qualitative and quantitative methods. Working in a very different environment but arriving at similar conclusions promoting multi-perspective assessment, Anson (2006) identifies two axes of assessment practices for WID. A horizontal axis outlines the contexts assessed from the individual course, via a departmental focus to entire institutions; a vertical axis identifies the levels of assessment ranging from intuition, via structured inquiry in action research, to systematic formal investigation. What appears to us to be the critical shared aspect of both of these studies is that no single assessment practice is ‘better’ or more important than the other but that they are all needed to paint as full-bodied a picture as possible of the multi-faceted nature of working in ICLHE contexts and wanting to improve these.

References


