# Engineering Conferences - An Innovative Course for Master Students in Engineering

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**ABSTRACT**
A course called "Engineering Conferences" is presented that the authors have developed and installed as a mandatory part of the curriculum in Master programs for engineering students. The idea is to go beyond teaching the standards of academic writing and skills for working with scientific publications. By using a learner-centered approach, we get the students engaged in typical activities around an active attendance of a real conference. They write a paper complying with common academic standards, submit the paper and review submissions of their fellow students. Students also produce a poster and have to defend it in a poster session held publicly on campus. In this article, we present our rationale to develop the course and our results from the first semester teaching this course. This includes the presentation of useful resources for teaching and organizing scientific publishing as well as our reflected learning experience regarding the student's understanding of significance for scientific publishing.

*Keywords* - active learning, challenge based learning, liminal space

## I INTRODUCTION & CONTEXT

When developing the curricula for three new master courses in engineering it was decided to include an introduction of students to publication of research in general and particularly to the world of engineering conferences. It was clear from the beginning, that this course should go beyond the kind of skill training which deals with limited details of the publication process in a classroom and leaves out the fun part: the rewarding conference event. With this in mind, the new course was called "Engineering Conferences". On the way to a suitable course concept, the following limitations had to be taken into account: Students admitted to the master course are a heterogeneous group with respect to their Bachelor degrees, their nationalities and their experience with scientific research. Furthermore, resources of the faculty are limited, i.e. an annual real conference with an open call for papers cannot be organized and a participation in an existing conference can neither be guaranteed nor sponsored for every student.

Starting from these initial considerations, we set out to examine five different aspects of teaching and learning as applied to publication of research and developing scientific communication skills.

### Aspect #1: Undergraduate conference concepts and research journals

The opportunity for publication of research at an undergraduate level exists for a long time, especially in English speaking countries. The National Conference on Undergraduate Research (NCUR) has been running in the United States of America since 1987 and has been copied by numerous other countries, such as the British Conference on Undergraduate Research (BCUR). The latter is held annually since 2011 and has been surveyed in a study among 90 student participants across three years by (Walkington *et al.* 2016). In the same way, quality controlled publication of research is possible for students by submitting their work to undergraduate research journals, which are also available from institutional to international levels. These approaches have at least four features in common, namely: The organization and review-process is similar to professional conferences and journals, the orientation is multi-disciplinary, the event or process is fully run by students and the latter act on a voluntary basis as author and/or organizer.

The last point implies a natural selection process, which distinguishes the participants from the average student in an undergraduate course, where not everybody can be excellent or motivated by good example. However, with our course, we aim for no less than a better communication culture between professionals across disciplines and social divides. To achieve this, we expose all our master students to the basic standards of peer-reviewed research and provide the opportunity to present their own work on a conference-like level.

### Aspect #2: Existing publishing resources and related courses for undergraduate students

At an institutional level, various approaches to learn and train the written and oral presentation of scientific work can be found. Commonly, the required skills of students are developed throughout continuous assignments to write lab reports, project documentations and, finally, the Bachelor thesis. Ideally, the student develops his own style and skills with respect to authorship by learning from various staff members, but the learning process itself and its result or success is rarely made explicit or guided. Exceptions presented by those with disciplinary knowledge are both available and inspiring, see e.g. (Dirrigl & Noe 2014). However, ambitious and valuable courses like “Writing your thesis” or “Presentations for engineers” are often offered on a voluntary basis and outside the faculty, see e.g. (Leydens & Olds 2007, Neilson 2013). This can convey misleading messages with respect to developing a self-confident authorship: "Writing is only an add-on for the best" (they usually book the course first) and/or "I am doing this only to get rid of my defects, but it has nothing to do with my professional development as an engineer". This situation has been observed and evaluated by (Durfee *et al.* 2011), who consequently developed a writing-enriched curriculum from within the faculty at the University of Minnesota.

For the development of our own approach, we argue that the emergence of scientific communication skills should not only be an explicit and integral part of the curriculum but must be developed as a competence from within the faculty.

### Aspect #3: Relation of (disciplinary) research and teaching in general and with respect to undergraduate education

While research and teaching have at least co-existed if not cross-fertilized each other for centuries, it has been suggested and surveyed that there is little statistical evidence for a correlation between the two (Hattie & Marsh 1996). The perception of the relationship between research and teaching is dependent on the current orientation of the institution(s) as well as the history of universities and is thus changing with time (Brew 2006). It can therefore be argued, that the increased awareness for competences based learning outcomes in the development of curricula, as opposed to technical knowledge production, has spread the idea to design research-oriented undergraduate courses, see e.g. (Healey *et al.* 2014) or instruction – despite earlier perceptions of the relation of research and teaching. The move is both not new and natural: While looking for more complex, interdisciplinary challenges, which can be dealt with by groups or students and which are at least partly related to their field of study, teachers and students may find themselves simulating if not carrying out research. While the value and the judgement of research quality in general is currently challenged by governmental influence to develop high-level research in selected universities, see Jenkins & Healey 2010), it may be helpful to remember the medieval meaning of the word “research”. It remains the act to “go about seeking”, see (Merriam Webster Inc., n.d.), and there is no shortcut for students from being involved in this activity to become self-reliant learners. At the latest, students gain some sort of this experience during their Bachelor thesis, which therefore can be regarded as research in their field of study – regardless of quality and outcome. In a nutshell, research is learning, and learning is research and should be supported by teaching.

Thus we regard the Bachelor thesis of each student as an existing piece of research and take it as a starting point for our course module on scientific publishing. According to (Healey & Jenkins 2009), our concept follows a research-based approach. This means it is more focused on the research process rather than on the

research content – which has already been dealt with during the thesis – and it addresses students as participants rather than an audience.

### Aspect #4: Active learning in engineering education

From the above paragraphs it can be concluded that personal engagement in research is an activity allowing students and university staff to meet as learners. However, active learning in higher education can appear in a lot of different forms other than carrying out research and has seen a strong increase in related publications since the turn of the millennium (Lima *et al.* 2017). Consequently, the number of available tools and resources is vast, calling for guides which map and/or navigate through current best practice, see e.g. (Eddy *et al*. 2015). Some of the concepts are often mentioned in the same breath as active learning such as the flipped classroom, and problem or project based learning (PBL). The appreciation of active learning is influenced by the personal learning biography as well as by what we currently know about how learning works in general. A sketch of the philosophical and pedagogical underpinnings of active learning in engineering education is drawn by (Christie & de Graaff 2016), while others have delivered ample proof for the effectiveness of active learning, see e.g. (Prince 2004).

For our own course, the aspect of active learning led to the following conclusion: Participation in an engineering conference requires that the author actively prepares, revises and presents her/his paper or poster. When implementing this as a goal for a master course, the publication process becomes a project with the author as the manager of her/his success, thus placing the responsibility for the associated learning experience into the hand of the student. Despite the overall PBL approach, the supporting course units are also suitable for group exercises and other interactive learning elements.

### Aspect #5: The transition phase - from institutionalized learning to learning on the job

While higher education should generally equip students for their future career, it is particularly apparent for most of those enrolled in a master course that "real life" will start soon. This is no reason for students and teachers to become sentimental, but fertile ground for enhanced learning experiences.

First of all, the way of learning changes anyway: After university, life-long learning becomes much more informal and self-reliant - as it was before school enrollment. The alumna/alumnus will have to change from the consumer of packaged learning goods to the hunter for life-sustaining nutrition, as "experience and education cannot be directly equated to each other" (Dewey 1938). So why not help students *before* leaving university to become self-learners (again)?

Secondly, advancing into new and open terrain may look like trouble ahead but is often the threshold to new advances in learning. This is well described by (Meyer & Land 2005) with the threshold concept of learning, which can ultimately "*lead not only to transformed thought but to a transfiguration of identity and adoption of an extended discourse"*. This transformation can be stimulated by the creation of liminal spaces. (Walkington *et al.* 2016) have shown that undergraduate research conferences are perfect opportunities to open such spaces, helping students to *"reformulate their taken-for-granted frames of meaning by engaging in critical reflection, through a process of dialogue with others. Such dialogue is a central element of transactional communication."*

Finally, this underlines that advances in learning are often related to advances in communication skills, leading to changes in the perception of identity. This is most obvious in the development phase of a child while acquiring the ability to speak but equally valid for other opportunities where the capability to appropriately express oneself is expanded.

This justifies the preparation of the following challenges for the master students:

1. Implement a course design different to the classical concept of lecture, exercise, lab testing or project etc. The feeling, not to know what to expect, and the experience that engineering-specific

knowledge is not in the focus pushes students beyond their comfort zone (opens liminal space for new learning experiences).
2. Work with language in new forms: Let students explore the language of the scientific community. Use English as a means of instruction (EMI) with non-native speakers and as the standard in international scientific communication. Expose students to the structure and form of scientific discourse. Introduce them to new tools and means to express her/himself.
3. Bestow self-authorship upon the learner (facilitates transactional communication for the development of personal and social judgement and responses)

## II COURSE CONCEPT & CONTENT

While preparing for the accreditation of three new master courses, the faculty decided to give the writing and presentation part of the final thesis more emphasis. The module we developed accordingly is designed for 30 master students per semester, while the students are free to enroll to the mandatory course in any of their regular three semesters. Participants are students of a medium sized engineering faculty (approx.. 1500 students) of a University of Applied Sciences in Germany. Since two of the degree courses involved are international programs, we have a share of overseas students, English as a means of instruction (EMI) is set. Six credits can be earned according to the European Credit Transfer Scheme (ECTS). All facts and figures are summarized in Table 1.

With our concept, we aim to address at least some of the seven high-impact educational practices identified by (Kuh 2008). Most obviously, our course meets the need for writing intensive courses, but also underline the value of undergraduate research and includes collaborative assignments. The resulting learning outcomes and the related challenge-based learning opportunities in alignment with the background outlined in the introduction are presented in Table 2. They do not in itself excel beyond state-
of-the art courses in academic writing or scientific publishing. However, the simple approach towards achieving those aims is turned into the following project: You have already earned your first credits with research (bachelor thesis), now prepare to communicate your findings to your peers in the scientific community and go public. Your admission ticket is a research paper and you will be rewarded for your poster (see Figure 1). This cannot be better accomplished than by preparing for an engineering conference. Ideally this would be an exercise involving a real conference, as described by (Watkins *et al.* 2014), for example. For obvious practical reasons, we opted for a simulation of an engineering conference, which exhibits all elements of scientific publishing in a timely order. In more detail, this concept is presented as

**Table 1:** Course details - facts and figures

| | |
|---|---|
| Module Name | **Engineering Conferences** |
| Master Courses | Mechanical Engineering (3 semester)<br>Simulation and Experimental Technology (3 semester)<br>International Business Engineering (3 semester) |
| Module Type | mandatory |
| Credits | 6 ECTS |
| Language | EMI (English as a means of instruction) |
| Exam Elements | paper, two paper reviews, poster presentation |
| Semester | first, second or third |
| Number of participants | approx. 30 per semester (60 per year) |

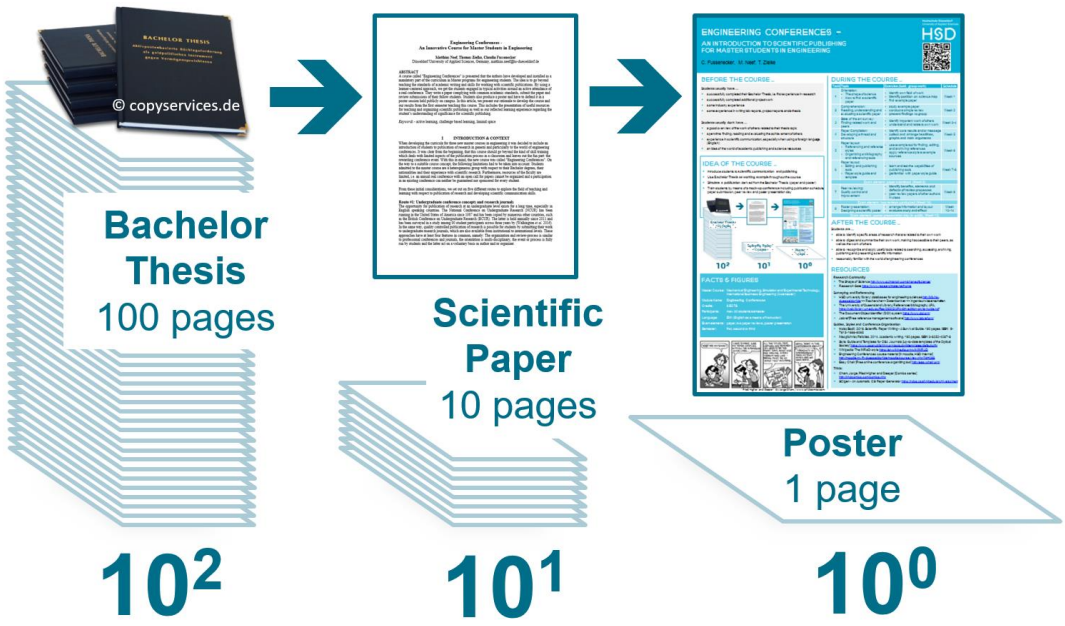


**Figure 1**: Reducing page numbers by two orders of magnitude: Evolution of key findings and the core message from thesis to paper to poster

the basic working instructions for the participants:

1. take your bachelor thesis as a starting point
2. re-visit your thesis as research and relate it to research in the relevant scientific community
3. condense, compress and compile the main arguments of the thesis , consider related work, and produce a paper
4. walk through a simulated publication process from abstract over paper submission and peer review to poster presentation in the form of a mock-up conference
5. go public: course finishes with a poster presentation day held in public on campus

Following the storyline of an engineering conference, we identified several tasks to help the students in the process of preparing their research for publication. This also means that we as the teachers are becoming help agents in the publication project with the students managing their own project and learning experience (directing towards a flipped-classroom concept). With reference to the introduction (Aspect #2), it should

**Table 2:** "Engineering conferences" - learning-outcomes and opportunities

| **Learning Outcomes, directly related to scientific publishing** | **Related challenge-based learning opportunities** |
|---|---|
| After participation in the course, students are …<br>▪ able to identify specific areas of research that are related to their own work<br>▪ able to recognize and apply useful tools related to searching, accessing, archiving, publishing and presenting scientific information<br>▪ able to digest, evaluate and summarize their own work as well as the work of others<br>▪ able to make their own work accessible to their peers<br>▪ reasonably familiar with the world of engineering conferences | ▪ How do I pose a problem precisely?<br>▪ How do I raise and defend a hypothesis supported by facts and arguments?<br>▪ How do I present my main arguments within limited boundaries (space, time, level of interest and knowledge of peers)?<br>▪ How do I relate my work to the work of others?<br>▪ How do I excel in a larger group? |

be highlighted again that we are able to approach the students as researchers and as experts with disciplinary knowledge in engineering on a peer-to-peer level and not solely as instructors for communication skills. It should be noted, however, that at the same time we remain the examination board, which naturally limits the level of student-teacher proximity and which is a distinctive disadvantage over the "real" conference experience.

Each of the tasks on the road to complete a paper and a poster comprises an introduction by the lecturer, followed by one or more exercises (see Table 4). This can be exercises in class or additional homework that has to be prepared for the next sessions. The homework exercises deal with aspects directly related to the preparation and emergence of the final paper serving as supportive suggestions of how the compilation of the paper can be tackled in a useful order. Special care was directed at the design of group work exercises: Students develop content and gain learning experience ,with the lecturer standing aside serving as moderator (see exercises in bold face of column 3 in Table 4). As an example for these active learning exercise, the course starts with an "elevator talk" (Annesley 2010): Each student has a few minutes time for preparation and then has to explain the topic of her/his bachelor thesis to another student within two minutes. This exercise is repeated before the students have a chance to reflect their experience. For most of them, it is the first time taking about their thesis topic in English in a very limited amount of time with the clear aim to convey a message (pushed beyond comfort zone).

**Table 4**: Course Outline: Tasks and Exercises

| **Task** | **Tasks** | **Exercise** (**bold face**: group work) | **Schedule** |
|---|---|---|---|
| **1** | Orientation:<br>▪ The shape of science<br>▪ How to find a scientific paper | ▪ **"Elevator talk": my thesis is about …**<br>▪ identify own field of work<br>▪ **identify position on science map**<br>▪ find example paper | Week 1 |
| **2** | Comprehension:<br>Reading, understanding and evaluating a scientific paper | ▪ study example paper<br>▪ conduct a simple review<br>▪ **present findings to group** | Week 2 |
| **3** | State-of-the-art survey:<br>Finding related work and peers | ▪ identify important work of others<br>▪ understand and relate to own work | Week 3-4 |
| **4** | Paper compilation:<br>Developing a thread and structure | ▪ identify core results and/or message<br>▪ **collect and arrange headlines, graphs and main arguments** | Week 5 |
| **5** | Paper layout / references:<br>▪ Referencing and reference styles<br>▪ Organizing a bibliography and referencing tools | ▪ use example tool for finding, editing, and archiving references<br>▪ apply reference style to example sources | Week 6 |
| **6** | Paper layout / style:<br>▪ Editing and publishing tools<br>▪ Paper style guide and template | ▪ learn and test the capabilities of publishing tools<br>▪ get familiar with paper style guide | Week 7-8 |
| **Exam element: paper submitted (Week 8)** | | | |
| **7** | Peer-review:<br>Quality control and improvement | ▪ **identify elements, stakeholder, effects and defects of review processes**<br>▪ peer-papers of other authors in class | Week 9 |
| **Exam element: two reviews conducted (Week 10)** | | | |
| 8 | Poster presentation:<br>Designing a scientific poster | ▪ arrange information and layout<br>▪ **evaluate story and effect** | Week 10-14 |
| **Exam element: poster presentation day (in public, Week 15)** | | | |

Before the students are asked to re-visit the content of their bachelor thesis, we make sure that they spend a considerable amount of time to orient oneself in the scientific community and to identify and digest related work of others. In many cases this is a new experience for the student: Her/his bachelor thesis may include references to methods described in textbooks or technical articles, but a deep survey of latest international scientific efforts in her/his field of work were not part of the task given to her/him when starting the thesis (for comments on this situation see the conclusions).

As can be seen from Table 4, a lot of emphasis during the first half of the course is directed at the orientation before some formal details of the publication process are introduced. Students are repeatedly encouraged to chew on the summary, main results and thread of their thesis, e.g. by oral short presentation, mindmap of the important figures etc., before molding everything into a given (real) paper template.

To model the paper submission and review process, we use the free web-based conference management system EasyChair (easychair.org), which allows us to set deadlines, upload papers, define roles such as authors, reviewers and chairs, organize reviews etc. This is not only easy to use for teachers and students but also a real conference standard. After the paper submission, students are requested to conduct two reviews of their peers in class. This includes filling out a review form, which requires to state a reason for each rating and also the upload of the reviewed paper with the reviewer's annotations. If nothing else, the latter is an important and visual verification of the engagement of the reviewer with the papers. In real life, reviewers are volunteers, highly motivated, and usually concerned about their scientific reputation. For the student reviewers, we have not yet found an optimal incentive being both highly effective and practicable for our course.

The last part of the course is dedicated to the preparation of the poster. The poster presentation day is the final event of the course and takes place in the main entrance hall of the faculty building (see Figure 2). While each student has to deliver a two-minutes keynote on his/her research topic, the others are free to browse the final product of their peers or to answer questions of visiting faculty members and students. Both poster and keynote are assessed on the spot by the lecturers resulting in the final grade for the course.

A few results from the 1st semester of the course with 36 participants give an indication of the examination process: The submitted papers were rated by the students (two reviews per paper) including the following aspects: originality and significance; technical soundness, clarity, structure and length, language and writing, figures, references. The average rating across all these categories was 86%. Additionally, the reviewers had to give an overall rating, which yielded an average of 80%.

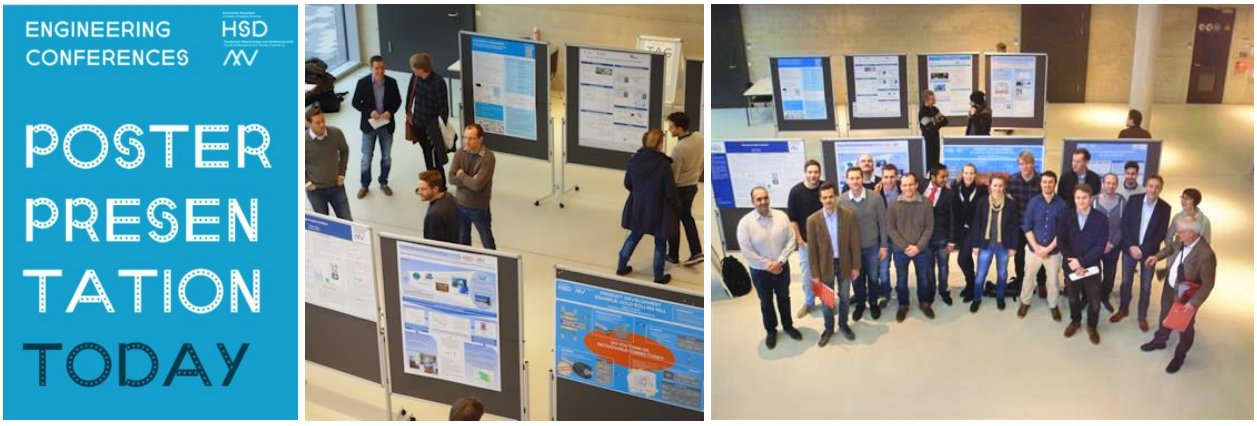


**Figure 2:** Impressions from the poster presentation day

Credits for the course were earned by the poster presentation, rated by the teachers. The evaluation was based on the performance in the following categories: header, main message & idea, figures & tables, conclusions, references, layout & structure for the poster plus message & delivery for the oral presentation. The average rating was 92%. The good quality of the presented posters supports the idea to qualify, select and sponsor students for a real conference participation as an additional benefit from the course.

## III EXPERIENCE & REFLECTION

With the experience from the design and the completion of the first course semester, we revisit the aspects we examined in the introduction for reflection.

### Adaptation of undergraduate conference concept

We succeeded in organising and applying the conference concept in the form of a paper submission and poster presentation as a compulsory master course module for 30 students in an engineering master's degree. The setting provided both an underlying story for the project of producing a research publication as well as an open space to present the results outside the classroom. During the course, we observed a significant increase of activity among both faculty staff and students in social networks for researchers and scientists. This positive side effect of the course was boosted by the final event of the poster presentations which vividly enhanced scientific and informal exchange within the home faculty and its neighbouring faculty. It now stands as one of the rare events in the curriculum where the result of learning is proudly made visible outside the classroom. Students were very positive about this culminating event, providing personal satisfaction and success beyond good exam results, despite the effort required to earn credits (see Figure 3).

However, we are well aware of the limitations of our mock-up concept – the real conference remains the ultimate experience: Voluntary participation and a rigorous selection process are key drivers to self-motivation and "one-off" experience. Additionally, the conference location outside the home institution is virtually promoting the step beyond a threshold out into the open and unknown, yet protected learning space filled with enthusiastic peers.

### Appreciation of scientific writing resources

While preparing the material for the various tasks, we were both overwhelmed and positively stimulated by the vast resources available on scientific writing practices and research communication. As an example, we

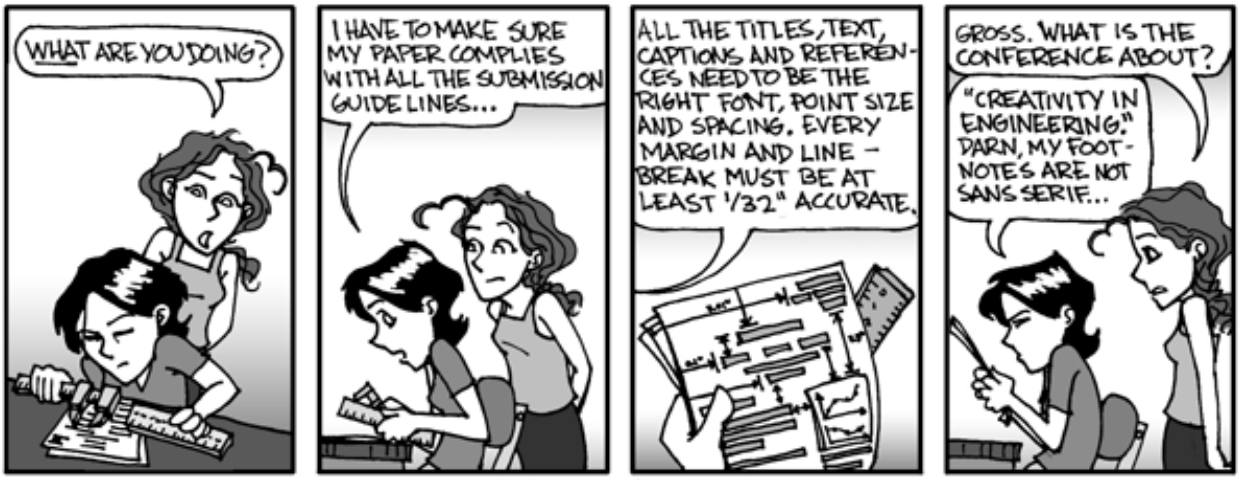


**Figure 3:** Creativity in Engineering ("Piled Higher and Deeper" by Jorge Cham /www.phdcomics.com)

explicitly want to highlight two sources that have already appeared to be useful to a large community: Firstly, the survival guide on paper writing by (Holst 2015), salted with worldly-wise glimpses behind the scene and peppered with sketches by Jorge Cham, the maker of PhDcomics.com. Secondly, the compilation of the reference style required by the American Psychological Association (APA), provided by (University of Queensland Library 2013). It provides a precise answer, including examples, to the question of how to cite virtually anything. For those curious and interested in more, we list a number of keywords, loosely arranged in the order of increased caution required when employed in class: DOI.org, IMRaD-Style, JabRef, Shape of Science, ResearchGate, PhDcomics, SciGen, SciHub.

It becomes clear from the above paragraph that we as teachers, while preparing the course, had naturally embarked on the course for ourselves which we claimed as a task for the faculty (as opposed to centralized institutions) in the introduction, namely to develop the emergence of scientific communication skills. We had become inspired enthusiastic learners, fuelling each other with new ideas, searching for more.

## Agglomeration of research, learning and teaching

Eventually, we found ourselves doing research in teaching methods and scientific communication, resulting in a recursive learning – research – teaching experience. How did this work out for our students?

When working on the state-of-the art, several students openly expressed, what we had expected from browsing their thesis reference list: “Had I known this before …” When compiling a thesis, searching for similar work of others is only one feature of research, which may – in some cases – be skipped altogether due to time constraints and the many other new things to tackle (understanding of the problem, application of tools, writing the longest peace of text ever produced so far etc.). This still means the student can obtain a good result in solving the engineering project set out before her/him and why should she/he not repeat (i.e. research) the same thing for the hundredth time again in order to get some exercise? However, not being able to receive the impulses of others and to reflect one’s own results back to those findings strips the student of a vital skill in terms of communication with their peers. This was most openly revealed by one student who, after several iterations of looking for corresponding work in her field, wanted to give up: “I do not find anything”. This could only mean two things: She was still not in the position to apply appropriate criteria to her search or her thesis was a strong candidate for the Nobel Prize. We realized, therefore, that students do not naturally accept their role as researcher despite its closeness to being a learner.

The student’s role as a researcher surfaced again when we became aware that many students initially viewed the course as having little to do with their future job in industry. This can partly be blamed on the way we introduced the course, where we tried to tell how great it was to visit a real conference. This may have produced some frustration as students realized that most of them would probably never visit a real engineering conference. The question "Do I need research skills in working life?" (Murtonen *et al.* 2008) has to be addressed early in the course. This we will definitely change in our next run, conveying the message “you can do it” and trying to highlight how much enhanced communication is vital even for engineers. What we cannot immediately chance is the effect of a widespread exam- and content-focussed culture of learning, which is counteractive to the appreciation and positive experience of liminal space.

## Application of active learning

From the beginning the students were pushed out into the open and exposed to active learning experiences such as group activity and, overall, to master their publication process as their own project. However, some sense of unease was noticed, whenever the results of a classroom session could not be measured in minutes spent for the consumption of information, i.e. when the students were responsible for producing their own learning outcome.

Not only the students had to grasp the changes in the learning process. Whenever free from transmitting information from the front, it was a privilege to watch students in the process of building skills to overcome barriers and to express oneself. The most prominent example of the development of self-authorship started

with the confession of a student, who was reluctant to revisit her bachelor thesis. It appeared she had been at unease with the topic all along, being very glad that it was all over. We asked her about the topic and together, in a short discussion, we tried to arrange in our minds what she had been doing as her thesis. Weeks later, in a group exercise, she delivered the most precise outline of her thesis using a supportive sketch explaining it all. The breakthrough was at hand, howsoever it had happened.

### Anticipation of liminal space and life-long learning

We had thus witnessed at various occasions that troublesome knowledge led to transformed thought and dialogue acted as a central element of transactional communication. This reassured us of our inspiration by the work of others, outlined in the introduction: Such "magic moments" are likely to occur by opening the liminal spaces, which small active learning elements can provide as well as exposure to a conference situation. As the students are near crossing their next threshold when entering working life, we hope to have served them to more readily accept the challenges ahead.

Additionally, we were able to share success (and failure) of our course development and implementation as we were operating as a teaching team. This helped us to increase the variety of challenges for achieving the same learning goals as well as to find different approaches to engage with the students. Not only because Engineering Conferences was our first genuine team teaching experience, we ourselves had entered liminal space and considerably stimulated our life-long learning adventure.

## IV CONCLUSIONS & OUTLOOK

A master course module was designed, implemented, and tested with the goal to improve scientific communication skills of engineering students. As the name "Engineering Conferences" suggests, training is based around a mock-up conference, where students have to present the results of their bachelor thesis as a poster. The combination of the following features distinguishes the course concept from similar approaches:

1. It has a storyline (conference preparation) with a public finish (presentation day).
2. It engages the students as researchers, turning the publication of their thesis into a project.
3. It is mandatory for all master students of the faculty.
4. It is delivered by teachers/researchers from within the faculty,
   i.e. from "engineering native speakers".
5. It can easily be copied and integrated into any STEM curriculum.

For further development of the course, we still see ample room for extension of active learning methods. On a more structural and strategic level, this could lead to placing full responsibility for the organisation of the publication process into the hands of the students. This may require a change in the curriculum for a two-step approach for the student – first semester: participate only, second term: participate and facilitate.

In the future, the course could also serve as an active qualification and selection process for promotional activities of the faculty aiming at an increase in the number of research publications. To start with, we are working towards encouraging and sponsoring the best graduates of our course to participate in a real (undergraduate) engineering conference: The next liminal space waiting to be explored is only a doorstep away.

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