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Leading the teacher team – balancing between formal and informal power in program leadership

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This continuous research within Nordic engineering institutions targets the contexts and possibilities for leadership among engineering education program directors. The IFP-model, developed based on analysis of interviews with program leaders in these institutions, visualizes the program director's informal and formal power. The model is presented as a tool for starting a shared discussion on the complexities of the leadership of engineering program development. The authors liken program development to hunting in teams. Each individual expert in the program is needed, and all experts will need to work and collaborate for the same target. This calls for strategic and long-term thinking of engineering education development. Institutions should support the development of both formal structures as well as informal leadership skills among their program directors, but never fall for the temptation to see the program director as the only actor on the stage.

Keywords: academic leadership; program director; engineering education; education development

Introduction

The Nordic Five Tech (N5T) is an alliance between the five largest technical universities in the Nordic countries. The member universities are Aalto University (Finland), Chalmers University of Technology (Sweden), Technical University of Denmark (DTU), Royal Institute of Technology (KTH, Sweden) and the Norwegian University of Science and Technology (NTNU). The five universities are comparable in size and have strong traditions and long experience with the development of engineering education. KTH and Chalmers, along with Massachusetts Institute of Technology (MIT) and Linköping University (LiU) were the founders of the CDIO initiative in year 2000. This curriculum framework and community for engineering education sets standards for engineering education curriculum, design, teachers' competence, accreditation and development. The acronym stands for Conceive, Design, Implement, Operate, to emphasize the engineering design process in engineering education. (Crawley, Malmqvist, Östlund, Brodeur, &

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Edström, 2014). This community now has over 130 member institutions from almost all continents.

Since 2009, Program Directors from the N5T institutions have collaborated in yearly assessment and development projects for engineering education programs. This process of peer evaluation (N5TPE) is described in Hussmann et al. (2012). The heart of the working model is the peer collaboration between the leaders of two corresponding programs from two different Nordic universities. The program directors, together with teams of teachers, students and staff, assess each other's programs on a more equal ground than in traditional assessment and accreditation settings. This, together with the similarity of fields and programs, provides a fruitful starting point for detailed discussions and feedback. This N5T collaboration has revealed that the tasks for a program director at N5T institutions can be ill-defined, and that the support mechanisms vary considerably among the member institutions.

Similar conclusions regarding the vagueness of the function, role and mandate for a program director have been reported by several other researchers (Ladyshevsky & Flavell, 2011; Vilkinas & Cartan, 2015; Vilkinas & Ladyshevsky, 2012). The main reasons for this could be argued to lie in the academic organizational structures, where program directors' responsibilities fall in between 'a general academic staff position and head of school/department' (Ladyshevsky & Flavell, 2011; p. 128). The complexity of program leadership is further increased by the varying policies in resource and personnel allocation in academic institutions. From recent research (Chiu, Balkundi, & Weinberg, 2017), power structures among formal leadership positions have shown that socially accepted people, who are in a central position in their respective network, are socially powerful and are seen as leaders by individual followers. In contrast, leadership positions that lack informal social power are not seen as leaders and will face potentially more resistance in their work.

From a leadership perspective our work presented in this paper seeks to create a better understanding of the nature of program directors' work situation. The main purpose is to explore program directors' power to influence development of engineering education, and to argue for strategies that aim at supporting both the informal as well as the formal power among program directors.

Continuous research among N5T program directors has been carried out recently (Högfeldt, Lund Christiansen, & Bodsberg, 2016; Högfeldt et al., 2012, 2013) in order to discover the nature of their leadership. In this paper, a summary of the ongoing research is presented. A tool to visualize the program directors' power to influence the development of the program that they lead has been a result of the research. This tool is called the IFP (Informal/Formal Power) model and will be presented in this paper. Two distinct forms of power were distinguished that were labeled as *informal* and *formal power* respectively. Here, informal power refers to influence through communication, collaboration and networking. Formal power refers to provided tools such as mandate and financial resources.

The primary strength with the IFP model is the visual aspect (see Figure 1). It is relatively easy to target the estimated level of informal as well as formal power one holds and thereby where to be plotted in the graph. The IFP graph in itself does not display the program directors' personal attributes, strategies or approaches in their work, as compared to for instance the Integrated Competing Values Framework (Vilkinas & Cartan, 2015). Instead, the IFP targets the power you have (or perceive you have). With this quite straightforward plotting as a starting point, stories can be shared on different reasons, strategies and approaches that program directors have in their work. The paper contributes a discussion on the values and impact of formal and informal power

Figure 1. The IFP-model (informal-formal power) with estimated and relative positions of the interviewed program directors' formal and informal power.

respectively on program directors' possibilities for influencing the program that they lead. Finally, we argue for a well-informed balancing act among the N5T institutions in order to make it possible for subject expertise to be integrated properly in complex engineering programs.

Contextual challenges for an engineering education program level approach to leadership and development

A program director at each of the Nordic Five Tech (N5T) institutions has the mission to lead the design, maintenance, evaluation and development of an engineering program, on Bachelor or Master level, or both. The program director holds an academic position at the university, researching in a field in relation to the program, and most often teaches in courses/units within the program. In recent years the program director has become increasingly recognized as holding a key position for engineering education development. Similar tasks have been assigned in universities in other countries as well (Bing-You, Wiltshire, & Skolfield, 2010; Henriksson et al., 2011; Ladyshevsky & Flavell, 2011; Vilkinas & Ladyshevsky, 2012), although the titles used vary, e.g. program coordinator, program manager or program leader.

From a study program development perspective, leadership of maintenance and development is different from the isolated course or module perspective. Often, prevalent program structures and combinations of modules in higher education programs could be improved to better optimize the student's growth and development over the years. The development of 'long-term' learning (Boud & Falchikov, 2006), should be mapped to 'create connections, sequences, timing and logical flow' (Jessop, El Hakim, & Gibbs, 2014, p. 86). Some argue that the traditional way of organizing education is the main challenge, not a lack of good available teaching and learning techniques or activities (Angelo, 1999; Jessop et al., 2014, p. 74). Collaboration among teachers, and not only on a departmental level, but across the study program's different courses, is seen as a key step to make this happen (Angelo, 1999; Boud & Falchikov, 2006).

For a program director to receive the mandate to organize collaboration among teachers, the higher education institution will need to understand that this is called for. But education development initiatives have mainly been targeting the development of students' learning process within individual course units and lectures (Gibbs, 2013). Also, higher education teachers' competence development has been on an individual level, with no emphasis on how to collaboratively build good education (Lee, 2010). In the light of several trends in higher education, such as massification, internationalization and an emphasis on quality in teaching and learning, the need for well-informed pedagogical actions, including the professionalism of higher education teachers, has become evident (Baume, 2006; Becher & Trowler, 2001; Gibbs & Coffey, 2004; Lindberg-Sand & Sonesson, 2008; Postareff & Lindblom-Ylänne, 2008). Higher education is moving towards an 'increased sophistication and understanding of the way change comes about and how it becomes embedded and secure within organizations' (Gibbs, 2013, p. 5). Gibbs distinguishes 14 thematic trends of higher education development. While many of the trends point at teaching, classroom and learning environmental aspects, the following three trends are relevant for this work:

- from a focus on individual teachers to a focus on course teams, departments and leadership of teaching
- from small, single, separate tactics to large, complex, integrated, aligned, multiple tactics
- from a focus on quality assurance to quality enhancement

To apply a program level leadership approach to education development actions across an institution's courses and departments involved in the program will inevitably demand forces that can exceed the organizational borders and powers (Edström, 2011). These forces may come in different shapes. The pressure on universities in recent decades has been argued to be an important factor influencing the strong tendency to shift from traditional collegial discussions and decisions to more typical management approaches to decision-making in higher education (Becher & Trowler, 2001; Hellawell & Hancock, 2001). Universities are under pressure 'to establish more sophisticated and well-managed organizations for the procurement, support and administration of contract research... in the attempt to stay competitive' (Becher & Trowler, 2001; p. 9). New public management, managerialism and leaderism are concepts strongly affecting the discourse of higher education institutions (Ekman, Lindgren, & Packendorff, 2017).

On the other hand, Gronn (2000) argues that leadership in education is best described as distributed, and not as a focused single individual act. This he draws from 'the dawning realization that the roughly two decades-long preoccupation with visionary champions is flawed, particularly in respect of their demonstrated accomplishment of direct effects on organizational effectiveness' (333). Still, in the analysis of legislation documents for Swedish universities, there emerges a picture of 'managers – strong leaders, more or less born with leadership as an innate personal quality – are the ones who shall take organizational responsibility, being sure to make the decisions that are the best for the organization as a whole rather than attending to the wishes of individual members of the organization' (Ekman et al., 2017, p. 15). The core of distributed leadership, on the other hand, is that plenty of factors can diminish or promote the effect of the leader (such as the people, processes and work tasks): 'couplings form in which the extent of the conjoint agency resulting from the interdependence and mutual influence of the two parties [leader and any 'subordinate'] is sufficient to render meaningless any

assumptions about leadership being embodied in just one individual' (Gronn, 2000; p. 331). Distributed leadership can be explained with activity theory, Gronn argues. Gronn refers to an example given by Leont'ev (1978) of hunting in teams, where one man's mission can be to frighten the animals, one of many *actions* in a chain that leads to the *activity's* goal. An action in itself could be useless if not part of an orchestra of actions.

Thus, 'the beater's action is possible only on condition of his reflecting the link between the expected result of the action performed by him and the end result of the hunt as a whole'. (Leont'ev, 1981, pp. 212–213, cited in Gronn, 2000, p. 328)

Second, in conjoint actions such as those comprising a hunt, the labour relations between individuals are interdependent. (Gronn, 2000, p. 328)

The relations and collaborations with and among academic teachers seem to influence, and seem to be influenced by, the leadership and management approaches applied. In cultures with a high focus on management, 'academic staff may be viewed as exchangeable deliverers of learning outcomes rather than as subject specialists with unique contributions to make. From a managerialist point of view such a trend can be seen to have very attractive characteristics' (Becher & Trowler, 2001; p. 10). This word of warning on the academic disempowerment of individual teachers is also reflected in the discussion of school leadership by Fullan (2005, p. 7): 'centrally driven reforms can be a necessary first start (when performance is seriously unacceptable) but can never carry out the day of sustainability'. Fullan (2005, p. 4) therefore argues for 'capacity building' among the teachers. Roxå, Mårtensson, and Alveteg (2011) complement this by concluding that higher education teachers' commitment and willingness to change teaching and learning cultures will most likely not be influenced by short-term, isolated events. Rather, faculty communities should be supported (Furco & Moely, 2012) in an environment where teachers normally work autonomously and individually (Van Waes, Van den Bossche, Moolenaar, Stes, & Van Petegem, 2015). Koeslag-Kreunen, Van der Klink, Van den Bossche, and Gijssels (2017) study how university teachers collaborate in teams where they are 'teams of professionals that are interdependent and share responsibility'. Conclusions are drawn that more effective team learning behaviors are shown when their respective leaders apply 'vertical transformational and vertical transactional leadership' (13).

In summary, some higher education academic leadership trends point to a stronger management approach, while others argue for distributed leadership approaches. Furthermore, academic leaders themselves seem to dislike the management approach, wanting to 'maintain some academic profile, generally regretting it could not be a greater one' (Hellawell & Hancock, 2001, p. 184). Lumby (2012) argues in a review on leadership in higher education that there are 'oppositional narratives [that] form a sort of yin and yang of higher education leadership, the one displaying more stereotypical masculine characteristics of rationality and competitiveness and the other one more stereotypical feminine qualities of intuitive people-centered practice. Such a stark dichotomy understates the complexity and interplay of values and practice that emerges ... the acceptance, resistance and accommodation of different positions over time' (Lumby, 2012, p. 11).

Research scope and method

From 2010 until 2016 continuous research among different program directors at the Nordic Five Tech (N5T) institutions has been carried out. The research has been explorative, in the search for a variety of practices as well as problematic aspects of the program leadership assignment. A mixed method approach has been applied in order to include a broad spectrum of data for this relatively unexplored area.

This paper brings forward findings from a document review and questionnaire study (Högfeldt et al., 2012), an interview study in year 2013 which resulted in the IFP model that is displayed in Figure 1 (Högfeldt et al., 2013), as well as results from workshops with program directors and other academic leaders in the years 2013–2015 where the IFP (Informal-Formal-Power) model had been tested.

The analysis and comparison of work descriptions in 2012 aimed at understanding the definitions and described missions on program leadership given by each institution within the N5T alliance. The questionnaire research in year 2012 included 30 statements to be rated on a rating scale (from 1 to 5, where 1 = ‘not at all’ and 5 = ‘very much’). The categories were role specification; organizational influence, and networking and developing as a leader. The questionnaire included one open-ended question regarding their strategy for educational development. The questionnaire was sent to 358 program directors, and got a response rate of 25%. This number can be compared with a recurrent employee survey at one of the universities in year 2011, where the response rate was around 60%. One factor that may have influenced the relatively low response rate from the program directors could be that the questionnaire was sent from the authors, most likely perceived as colleagues without any formal purpose with the study. Furthermore, at the time of the questionnaire mailing, the role and identity of the program director was not a well understood topic to discuss or investigate. This could perhaps mean that many of the program directors referred to themselves as higher education teachers and researchers firstly, not (yet) having so much interest in analyzing their work as a program director.

The questionnaire provided the possibility to compare perceptions among a quite large number of program directors within the N5T institutions. The final open-ended question revealed crucial differences in education development strategies, where the relation to teachers within the program seemed to be an important factor for success or failure. Therefore, the 2012 study was followed up with deeper semi-structured interviews with the goal of further exploring the qualitative variation of experiences of power among program directors. One or two program directors at each N5T institution were interviewed in 2013.

The interviews were carried out in the following manner. First, each N5T institution’s author(s) made a selection based on availability within the given time frame. Second, an analysis was made to ensure variation in different engineering fields, as well as whether the related program was on bachelor or master level, or both (see Table 1). For anonymity reasons, the fields of the programs are specified separately (see Table 2).

A template for the semi-structured interviews was jointly agreed upon among the authors. The overarching goal was to answer the question on the obstacles and opportunities the program directors perceived in their role as leaders of maintenance and development of engineering study programs. This especially targeted the relation to the faculty who are teaching and managing course units within the study programs. All interviews were carried out locally by an author/interviewer affiliated to the university, except for one of the interviews in Sweden. A researcher from one of the Swedish uni-

Table 1. Background information of interviewed program directors.

	A1	A2	B1	B2	C1	C2	D	E
Years as PD	5	8	18	11	5	5	4	2
Program type	MSc	BSc	BSc	MSc	MSc	MSc	MSc	MSc
Duration	2 years	3 years	3 years	5 years	5 years	5 years	5 years	5 years
Courses owned by	Head of respective department. Managed by the study board	As with A1	Head of respective department and controlled by the PD	Head of the respective departments	PD regulates the course syllabus/ specification for all courses in the program	As with C1	Head of each department	As with D
Nr of students/year	~90	~60	~20–50	~50	~90	~65	~30	~100
Financial resources/ year	For student meetings and other arrangements	As with A1	All running costs for the program including courses and teachers	Money for course development, extra time as PD and logistic al problems	Program development budget based on nr of students. 2.5 MSEK this year; and course budget. Approx 45 MSEK	As with C1	15000 euro for student arrangements, PD's travelling + representation costs	5000 euro for coffee and events
Official workload	20%	20%	20% (+20%)	30% (+10%)	30%	30%	Not defined	Not defined
Existing formal work description	YES	YES	NO	NO	YES	YES	YES	NO

Table 2. Field and educational level of the study programs which the interviewed N5T program directors are leading.

Educational level	Included fields
MSc	Industrial engineering and management Computer science and engineering Engineering and education Industrial design
BSc	Electrical engineering Software technology Chemical engineering

versities in the N5T alliance carried out a phone interview with a program director at the other Swedish university. In some cases there were two interviewers. The interviews were recorded and notes were taken in the local university language. Transcriptions were translated and sent to the main author for analysis. The transcripts were analyzed qualitatively with a thematic analysis. Through the various stories on strategies for implementation of change and development, and relations with teachers in the program, different perceptions were grouped and categories developed. After the analysis, all authors made a review of the results. Two of the interviewed program directors were consulted to check whether they could spot themselves in a graph (see Figure 1) where all interviewees had been plotted, which they did successfully.

Based on these findings, a pilot study was carried out in order to test the IFP model (Figure 1) that was the result of the analysis of the interviews. One of the N5T institutions was chosen for this study. Three workshops were carried out with program directors and other academic leaders. All leaders were divided based on their function. Two of the workshops were integrated in a faculty development program for academic leaders on two separate occasions with different workshop attendees (fall 2013 and fall 2015 respectively). The third workshop was given during an educational development day during fall 2013, organized by the university management of the institution. The results from the workshops are only descriptive.

Findings phase 1 – document review and questionnaire study

The document review (see Table 3), which analyzed the regulating documents on the mandate, role, function and responsibility described for the program directors at each N5T university, revealed that their tasks are fairly similar. On the other hand, administrative support, the peer fora, allocated working time as well as financial possibilities are examples of provided support mechanisms that vary considerably (Högfeldt et al., 2012).

The analysis of the questionnaire data looked at the program directors' perceptions in relation to the categories role specification, organizational influence, and networking and developing as a leader. For instance, Question 4.8 asked how well they agreed with the statement: 'The quality assurance system of the program I lead needs to be improved' (rated from 1 to 5 where 1 = not at all; 5 = very much). The highest average among the N5T institutions was 3.5, while the lowest was 2.5. Statement 5.1 'I have the possibility to influence the competencies of the teachers within the program' showed an even larger variation, with the lowest average of 2.0 at two universities, and the highest at 3.2. It was soon realized, though, that at least some of the pessimism was per-

Table 3. Overview of research scope and mixed method approach for N5T program leadership explorative study, year 2012–2015.

Phase	Years	Method	Research question	Main finding
1	2012	Document review of work descriptions for PD's	How is the mandate, role, function and responsibility described for a N5T Program Director?	Variation among N5T universities of mandate, role. More responsibility than mandate, most often.
1	2012	Questionnaire study	How do N5T Program Directors perceive their role specification, the organizational influence as well as their possibilities to develop as a leader?	The final open question revealed thoughts, ideas and experiences that should be explored further with interviews
2	2013	Interviews	How do N5T Program Directors find themselves as leaders of a teacher team?	Power is a central theme. Two distinct forms of power revealed. IFP-model developed.
3	2013–2015	Pilot study: Testing the IFP model in workshops at one of the N5T institutions	By using the IFP-model in an interactive visualization activity, can we support Program Directors in expressing their experiences about being leaders?	The model is valued for its visual strength, and good starter for discussions

haps influenced by a large internal assessment and evaluation activity (Berglund, Högfeldt, Karlsson, Klasén, & Sandberg, 2012), with invited international juries, who pointed out the lack of possibilities for the program leaders to manage their programs.

The closed-ended statement 'I'm happy with my work as a Program Director' distinguished 'happy program directors' (who had rated 4 or 5) from 'unhappy program directors' (who had rated 1 or 2). By cross-referencing to other replies in the same questionnaire, it was shown that happy program directors more clearly perceived that they

- have a clear task, mandate and allocated time
- have strategies for initiating and driving change
- can influence learning objectives of single courses
- have good support from administrative staff and boards/committees
- network with home university peers and others

The following open-ended question in the questionnaire provided the most input to the analysis:

Let's say you were about to improve the integration of for instance innovation or sustainable development (or some other aspect, competence or perspective that is not the main subject, but asked for by future employers) in the study program you lead. Please provide a short description of the strategies you have for this situation. What are the normal steps you would take? What options would you like to have?

The answers varied from hopelessness:

It is actually rather hard with these things, I have tried with sustainable development but the teachers are very stressed and have no time.

to more systematic approaches:

- (1) I would identify the need and get support from the council.
- (2) Set aside some money in the budget for the project.
- (3) Offer the relevant departments to take part in the project by assigning the teachers in the relevant courses to the project and maybe someone else.
- (4) Form a project group with the teachers assigned by the departments and maybe some students and some external experts. In some cases I would join the team myself.
- (5) Get the project running by gathering the project group, tell them about the needs, the goals of the project and inspire them to do their best, and start brainstorming.
- (6) Have the project group report at some different stages and in the end they should come up with a course design that could be implemented the year after.

Findings phase 2 – interviews leading to the IFP model

Based on the results from the questionnaire, the interviews were designed to better understand how program directors perceive the obstacles and opportunities as ‘leaders of teachers’ (see Table 3). The interviews with the eight directors from the five universities all revealed that the *power the program directors have in order to influence the program that they are leading* is a central theme. From the analysis of the interviews, two distinct forms of power were distinguished that were labeled as *informal* and *formal power* respectively. In this research, informal power refers to the possibilities the program directors have in order to make an impact, as well as how well they receive information and ideas, through communication, collaboration and networking with teachers and others involved in the program. Formal power on the other hand, refers to tools provided by the institution/organization, such as mandate and financial resources that support the program director’s impact on and information about the program.

Due to the revealed high variation in the amount of formal and informal power respectively among the interviewed program directors, a graph was designed with the x-axis corresponding to informal power and the y-axis corresponding to formal power. Each program director’s estimated and relative position could be plotted on the graph (see Figure 1). While this plotting originally was made only to support the analysis, it was soon realized that the graph could be fruitful as a model for future work and shared discussions on academic leadership weaknesses and opportunities. The following examples explain different positions in the graph.

Example 1: low formal power

At University A, the work description for A1 states that the program director should: ‘lead the development and evaluation of the program’. Still, A1 has no formal tools since the courses are owned by the sections set up by the head of department and managed by a study board. Normally, the program directors are not members of the study boards at University A. Furthermore, A1 has no financial resources except for a budget for student meetings and small activities. More time to allocate on development projects, as well as more mandate to influence courses, are asked for by A1.

Example 2: high formal power

At University C, all program directors have a relatively high formal power. The program directors own the budget for the program, unlike all the other program directors at N5T universities. Every year C1 goes through and approves the regulating syllabus documents, including the stated intended learning outcomes, the contents of the course units as well as which teachers should be the examiners of the respective course units. By this, C1 is notified of changes made, and can send suggestions back for revisions if for instance a course evaluation shows unsatisfactory results. C1 states though that the formal tools for program leadership are ‘a bit toothless, theoretical constructions’.

Example 3: low informal power

C2, coming from the same university as C1, has the corresponding formal power to use as a program director. The engineering program C2 is leading spans six departments. ‘It makes it difficult for all to feel responsible for the program’s entirety and also leads to conflicts over space in the curriculum. What department should deliver a particular course and how many credits should it give?’

C2 continues: ‘I do try to inform teachers of the outside requirements on our education, for example, that students should be trained in ethical issues in engineering’. However, it can be tough to convince the teachers that this is their responsibility too, C2 argues. C2 thinks that the teachers have not been aware of all national degree requirements, specifically those that concern generic skills. When asked how C2 thinks teachers in the program are looking at C2 as a program director, C2 says: ‘I think that many teachers view me as a figure, pretty far from the program. There are more than 200 teachers in the program. They may come in contact with me mainly as an administrator who poses requirements on how course plans and learning outcomes are written. I want to strengthen my contacts with the teachers by creating a teacher team, at least for the bachelor level courses’.

Example 4: high informal power

After having been working as a program director for the same program for over a decade, B2 has the feeling of having succeeded with reaching a level of high informal power, in combination with a quite low formal power. The program, which was initiated under the leadership of B2, is a relatively small, multidisciplinary program. Five faculties within university B, as well as three departments within two faculties at another university in the same city are involved in the program. In addition, workplace courses are given for the program students. B2 states that this organizational complexity makes it evident that the program director could and should not have any firm mandate. ‘I don’t think it should be up to me to decide how a course should be designed... I can only say what I want, would like’. At the same time, B2 points at situations of hard struggle with some course leaders, when giving up the program directorship was considered. This happened more often early in B2’s career.

To overcome the challenges, B2’s strategy has been to distribute the leadership by contriving a number of working groups related to the program. The ‘small office group’ consists of B2 and the education office staff. The ‘big office group’ consists of the ‘small office group’ together with the director of studies for each of the study tracks within the program (a completely new position at university B, invented by B2), as well

as three contact nodes from the other university delivering courses to the program. Furthermore the 'core teachers' within the program who are teaching in the mandatory courses are gathered for meetings a couple of times per year. Finally, there is a program advisory group, involving the program directors who are managing other engineering programs which share course units with B2's program, as well as the corresponding heads of department for those course units. Now, B2 is happy over the teams of faculty and administrative staff that have successively joined the work with the program. 'Talking, talking and talking', has been B2's way to create a common vision for the program.

Preliminary findings phase 3 – pilot study description, testing the IFP model with academic leaders

In the third phase of the ongoing research, the IFP model is applied and tested in interactive visualization activities. By this it is explored whether program directors can be supported in expressing their experiences of being leaders.

At one of the N5T institutions, the IFP (Informal-Formal Power) model has been tested within three different workshops between 2013 and 2015. Two of the workshops have been carried out within the faculty development course 'Leading Educational Development', during fall 2013 (24 participants) and fall 2015 (16 participants) respectively. The third workshop was carried out at an Educational Development Day during fall 2013 (10 participants) organized by the university management. The academic leaders attending each of the workshops held positions as director of studies, deans of education, educational developers as well as program directors.

The workshops started with an introduction, followed by hands-on activities, continued with briefing and presentations, and were finalized with conversations about the workshop. The introduction included a presentation of the results from the study among the N5T program directors presented earlier in this paper. After this the academic leaders were asked to plot themselves on an IFP graph drawn on a whiteboard. In order to minimize possible confusion among the academic leaders, the workshop leader emphasized that the positions are only relative estimations. An explanation was given that it might happen that some might wish to move their position as more details are shared among peers. Academic leaders with equivalent tasks made plots on the same graph. As the leaders plotted themselves, they kept discussing and sharing ideas with each other. Some decided to mark their progress as they had perceived it over the years, depending on various influences such as educational or organizational reforms, or as they as individuals had developed and matured along the way. Others visualized their different current positions depending on the different assignments they had at hand as leaders. In the smaller group of 10 participants during fall 2012, the briefings and presentations were carried out in the full group so that each individual shared his/her story with everybody. This was quite time consuming. In the larger groups, the briefing was carried out in smaller groups, followed with a mingle where the participants and the workshop leader had the opportunity to walk around and look at and discuss the different plots that were drawn.

The workshop debriefing showed only positive results within the faculty development course. At the education development day, only one participant had some remarks about the goal of the workshop. The introduction to the workshop with the findings from the questionnaire and interviews was appreciated for revealing a feeling of recog-

nition. There were no objections shown to the plotting activity at any of the workshops. Instead, the academic leaders appreciated the visual advantage of the model. For instance, one could easily target a colleague with for instance a high formal power and ask about his/her surrounding organizational structure. Comments that were given in the written workshop evaluation from the education development day were as follows:

- Relevant and good discussions.
- Interesting to follow the discussion. How much power I have as a PD to make an influence. It could also be used on other functions.
- I got the impression that this led to aha-moments for several.
- I didn't really see the goal with this workshop. Maybe to make everybody reflect over their role and the influence you have. Would be good with discussion around the topic.
- Many interesting discussions and good inspiration.
- Good discussions.

Several ideas were brought forward from the academic leaders for future use of the IFP model. One idea that stood out was to turn the activity upside down by asking teachers and administrative staff to plot the leader of their program, department, school or institution. The academic leaders seemed to enjoy the feeling of being plotted on the graph by others.

Discussion

Leading engineering program development is like hunting in teams. The hunting mission is to design and maintain a program that bridges the gap between engineering science and engineering practice (Crawley et al., 2014) in order to educate reflective practitioners who will be ready for the 'swamp' of complexities in real life (Schön, 1987). Universities are under pressure of increased focus on quality, less resources, more students and managerialism (Becher & Trowler, 2001). Due to complex intended learning outcomes, the program directors will need to strive for a curriculum design that aims for progression, linking and long-term learning activities (Jessop et al., 2014). This design demands that teachers collaborate as key actors of the hunting team, even across departmental borders (Boud & Falchikov, 2006). The program will need specialists: experts who understand their fields and how students learn in the best ways in those fields. Furthermore, the specialists need to be able to see their links to other actions involved in the program, as well as understanding and striving for the fulfillment of the mission, the intended program learning outcomes.

But the hunters of today, or the teachers, are not always acting as if they were part of a team across departmental borders: 'teachers are very stressed and have no time', was the comment of one respondent to the NST questionnaire in 2012. The university organizations, including its funding system, are perhaps preventing the teachers from commitment and involvement in program development actions. Education development activities have also mainly been targeting faculty's individual competence development as well as students' learning within individual course units (Gibbs, 2013; Lee, 2010). The teachers tend to keep doing what they always have done unless a larger change happens (Roxå et al., 2011).

Program directors are supposed to lead the teacher teams. However, the actions they will take, and the results of those actions, depend heavily on the level of formal and

informal power this leader is in possession of at the moment and in the specific situation. High formal power is almost never invested in this type of cross-departmental leadership positions (Hellawell & Hancock, 2001). University C stands out among the N5T institutions, where the university management has supported the program directors with the complete educational program budget as well as the mandate to decide upon course syllabus documents. That the two interviewed program directors from University C showed dissatisfaction with their possibilities to make an influence does not necessarily mean that the management at University C has made a wrong decision. Firstly, the questionnaire revealed cases with strong informal power actions from University C members. Secondly, the feelings you have about your influence might even go down as your influence is increased, since you may start realizing what influence really means. This we have reason to believe, since two of the N5T universities who gave the lowest ratings in the questionnaire on influence still provided substantial and systematic answers on the open question concerning their strategies for the integration of innovation or sustainable development knowledge and skills training into their programs.

What this tells us, listening to Fullan (2005), is that in order to initiate change you might be helped by being provided with high formal power from top management. But in order to keep it sustainable, you will need other ways in order not to minimize the role of the several key actors within the program. This was supported in the interviews, where almost all of the program directors wished to have better strategies in order to, for instance, have more teachers attending program and educational development meetings, and having tools to carry out trouble shooting together with teachers in more inclusive forms. In the questionnaire it was shown that a program director who perceives him/herself as happy with the mission, rates more highly his/her perceived success with both formal tools for influence (clear task, mandate and time) as well as informal tools (change strategies, influence, support and networking).

A high level of informal power seems to overrun the impact of formal power, but it would be an unsustainable situation to demand of the program director to lead his/her own way there. Program directors with a high level of informal power describe themselves in the interviews as working with committed and involved teachers, sharing a common language and vision for the program students. But the program directors with the highest informal power had been working for over a decade (B2 for 11 years, and B1 for 18 years) when the interviews were carried out. What does this say to newly appointed program directors? B2, with relatively low formal power, though, wouldn't want it any other way, even though in their early career B2 considered resigning several times. We need to take this statement into serious consideration, since B2 was managing a program spanning several departments, including departments at another university. This tells us that, even if we realize that building our trust on the development of informal power only will not be sustainable, optimal or even possible, only pushing formal power into the system will not hold either. We will instead need to learn to deal with the balancing act, and counteract the yin and yang idea (Lumby, 2012). Furthermore, program directors are not a homogeneous group of higher education professionals. They range from junior teachers to professors, from leaders of one to five year programs, from educated/trained in engineering education development to no such training at all.

We fear a trend that will emphasize the personal development of the program directors as individuals, instead of looking at how the program team as a whole can develop its knowledge and commitment to build a strong program together. As Gronn argued, this is no longer one person's act. N5T engineering education programs should neither be managed by one person with an enormous amount of formal power. Nor should the

program be under the leadership of a person with an informal power developed through suffering for a decade before becoming the person you give a high five in the corridor. Universities should look for practices and structures that support the building of well-functioning teacher teams, and teams with staff and students.

Higher education engineering institutions need to make well-informed decisions. It is not by allocating forces on the program leadership only, but instead allocating forces onto all, as a team of hunters, and supporting them to appreciate being part of this team. In a way it is the realization among all faculties of having the mission to educate professional engineers.

Conclusion

The nature of program directors' leadership within the Nordic Five Tech (N5T) institutions has been explored through a mixed methods approach via a document review, a questionnaire, interviews and a pilot workshop study. Program directors are seen to be key actors for the fulfillment and development of the learning outcomes for the future N5T educated engineers. At the same time the program directors' relation to the academic teachers within the program has been identified as an overarching theme, due to the influence this relation has on the possibilities to lead the development of the N5T engineering programs.

Through this ongoing research it has been found that, in order for the N5T institutions to support the development of the engineering programs, careful attention must be paid to make sure the program directors have a sufficient balance of formal and informal power to lead the programs. Using the IFP model is a good starting point for discussions about the history, current state and future steps. Implementation of formal structures will need to walk hand in hand with strategies to supporting faculty to realize and become part of the program team. Strategies for a distributed program leadership, especially in larger and cross-departmental programs, should be explored further. Faculty and instructional development initiatives should not only emphasize individual development for teachers, nor only the students' learning within individual courses. Curriculum and program design as well as other organizational factors should be included. The main challenge which is to create a good flow between units, modules and courses within a program (Jessop et al., 2014). And the team can start its hunting season.

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References

- Angelo, T. A. (1999). Doing assessment as if learning matters most. *AAHE Bulletin*, 51, 3–6.
- Baume, D. (2006). Towards the end of the last non-professions? *International Journal for Academic Development*, 11, 57–60.
- Becher, T., & Trowler, P. R. (2001). *Academic tribes and territories*. Buckingham: Open University Press.
- Berglund, P., Högfeldt, A. K., Karlsson, S., Klasén, I., & Sandberg, T.. (2012, June). Utvärdering för utveckling-KTH:s samtliga utbildningar under belysning. In *3:e Utvecklingskonferensen för Sveriges ingenjörsutbildningar; 30 november-1 december; Campus Norrköping; Linköpings universitet* (No. 075, pp. 63–66). Linköping University Electronic Press.
- Bing-You, R., Wiltshire, W., & Skolfield, J. (2010). Leadership development for program directors. *Journal of Graduate Medical Education*, 2, 502–504.
- Boud, D., & Falchikov, N. (2006). Aligning assessment with long-term learning. *Assessment & Evaluation in Higher Education*, 31, 399–413.
- Chiu, C. Y. C., Balkundi, P., & Weinberg, F. J. (2017). When managers become leaders: The role of manager network centralities, social power, and followers' perception of leadership. *The Leadership Quarterly*, 28, 334–348.
- Crawley, E. F., Malmqvist, J., Östlund, S., Brodeur, D. R., & Edström, K. (2014). The CDIO approach. In *Rethinking engineering education* (pp. 11–45). Dordrecht: Springer International Publishing.
- Edström, K. (2011). Organizational gravity—on sustainability of educational development. In *Proceedings of the 1st Swedish SUHF (The Association of Swedish Higher Education) Conference on Leading Higher Education*. Stockholm: Karolinska Institutet.
- Ekman, M., Lindgren, M., & Packendorff, J. (2017). Universities need leadership, academics need management: Discursive tensions and voids in the deregulation of Swedish higher education legislation. *Higher Education*, 1–23.
- Fullan, M. (2005). *Leadership & sustainability: System thinkers in action*. Thousand Oaks, CA: Corwin Press.
- Furco, A., & Moely, B. E. (2012). Using learning communities to build faculty support for pedagogical innovation: A multi-campus study. *The Journal of Higher Education*, 83, 128–153.
- Gibbs, G. (2013). Reflections on the changing nature of educational development. *International Journal for Academic Development*, 18, 4–14.
- Gibbs, G., & Coffey, M. (2004). The impact of training of university teachers on their teaching skills, their approach to teaching and the approach to learning of their students. *Active Learning in Higher Education*, 5, 87–100.
- Gronn, P. (2000). Distributed properties: a new architecture for leadership. *Educational Management & Administration*, 28, 317–338.
- Hellawell, D., & Hancock, N. (2001). A case study of the changing role of the academic middle manager in higher education: Between hierarchical control and collegiality? *Research Papers in Education*, 16, 183–197.
- Henriksson, A.-S., Eriksson, S. B., Elmgren, M., Bolander Laksov, K., Mårtensson, K., Roxå, T., ... Ågren, P. O. (2011). *Educational leaders as key agents in developmental work*. Proceedings of the 1st Swedish SUHF (The Association of Swedish Higher Education) Conference on Leading Higher Education, Karolinska Institutet, Stockholm.
- Högfeldt, A. K., Cornell, A., Cronhjort, M., Jerbrant, A., Lyng, R., Kantola, R., ... Villadsen, J. (2012). *Program leadership from a Nordic perspective - Managing education development*. Proceedings of the 8th International CDIO Conference, Brisbane.
- Högfeldt, A. K., Lund Christiansen, B., & Bodsberg, R. (2016). *Experiences from 8 years of Nordic Five Tech Peer Evaluation*. Proceedings of the 12th International CDIO Conference, Turku.
- Högfeldt, A. K., Strömberg, E., Jerbrant, A., Hussmann, P. M., Villadsen, J., Kinnunen, P., & Baggerud, B. (2013). *Program leadership from a Nordic perspective-Program leaders' power*

- to influence their program. Proceedings of the 9th International CDIO Conference. Cambridge, MA.
- Hussmann, P. M., Bisi, A., Malmqvist, J., Carlsson, B., Lysne, H., & Högfeldt, A. K. (2012). Peer Evaluation of Master Programs: Closing the Quality Circle of the CDIO Approach? *International Journal of Quality Assurance in Engineering and Technology Education*, 2, 67–79.
- Jessop, T., El Hakim, Y., & Gibbs, G. (2014). The whole is greater than the sum of its parts: A large-scale study of students' learning in response to different programme assessment patterns. *Assessment & Evaluation in Higher Education*, 39, 73–88.
- Koeslag-Kreunen, M. G., Van der Klink, M. R., Van den Bossche, P., & Gijselaers, W. H. (2017). Leadership for team learning: The case of university teacher teams. *Higher Education*, 1–17.
- Ladyshewsky, R. K., & Flavell, H. (2011). Transfer of training in an academic leadership development program for program coordinators. *Educational Management Administration & Leadership*, 40, 127–147.
- Lee, V. S. (2010). Program types and prototypes. In K. J. Gillespie & D. L. Robertsson (Eds.), *A guide to faculty development* (pp. 21–34). San Francisco, CA: Wiley.
- Leont'ev, A. N. (1978). Activity, consciousness and personality. (M. J. Hall, Trans.). Englewood Cliffs, NJ: Prentice-Hall.
- Lindberg-Sand, Å., & Sonesson, A. (2008). Compulsory higher education teacher training in Sweden: Development of a national standards framework based on the Scholarship of Teaching and Learning. *Tertiary Education and Management*, 14, 123–139.
- Lumby, J. (2012). *What do we know about leadership in higher education?*. London: Leadership Foundation for Higher Education.
- Postareff, L., & Lindblom-Ylänne, S. (2008). Variation in teachers' descriptions of teaching: Broadening the understanding of teaching in higher education. *Learning and Instruction*, 18, 109–120.
- Roxå, T., Mårtensson, K., & Alveteg, M. (2011). Understanding and influencing teaching and learning cultures at university: A network approach. *Higher Education*, 62, 99–111.
- Schön, D. A. (1987). *Educating the reflective practitioner*. San Francisco, CA: Jossey-Bass.
- Van Waes, S., Van den Bossche, P., Moolenaar, N. M., Stes, A., & Van Petegem, P. (2015). Uncovering changes in university teachers' professional networks during an instructional development program. *Studies in Educational Evaluation*, 46, 11–28.
- Vilkinas, T., & Cartan, G. (2015). Navigating the turbulent waters of academia: The leadership role of programme managers. *Tertiary Education and Management*, 21, 306–315.
- Vilkinas, T., & Ladyshewsky, R. K. (2012). Leadership behaviour and effectiveness of academic program directors in Australian Universities. *Educational Management Administration & Leadership*, 40, 109–126.