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A Model for Spurring Organizational Change Based on Faculty Experiences Working Together to Implement Problem-based Learning

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Introduction

This research paper provides a case study of experiences of engineering faculty members at a large public university in Ireland working together to transform their teaching methods. We investigate eight teachers' experiences of a faculty-led learning community designed to help individuals transform their courses. This small collection of faculty met regularly to discuss ways to facilitate and assess students working in groups. Outside the group's meetings, participants brought important issues to the forefront of formal and informal discussion with colleagues. Participation in the learning group encouraged, supported, and helped sustain change. This case study seeks to provide insight and a conceptual model for implementing changes. In analyzing the mechanisms that fostered change in one particular program and then interpreting the findings, we draw conclusions that can help faculty members, program administrators, strategists, and policy makers facilitate change in their other educational settings.

To understand how key players experienced and achieved change, we conducted in-depth semi-structured interviews with individual faculty members. We used a grounded theory approach (Strauss & Corbin, 1994) along with template analysis (King, 2004) to study interview transcripts. All members described having an active champion, an experienced and informed advisor, various forms of institutional support, and a group of colleagues interested in discussing pedagogy and implementing new approaches. From this, we distilled a model for encouraging transformation that holds promise for use elsewhere.

Literature Review

A basic premise in this study is that a shift in epistemology on the part of the teacher (from teacher-centered lectures to more student-centered conceptions of teaching) creates a shift in the learning experience of students at the level of a course or module (Barrie, 2007). Where enough teachers make such a shift, the overall student experience at the level of the program can be transformed (Chase & Rowland, 2005). In studying approaches to teaching, Trigwell, Prosser, and Taylor (1994) came to believe reform could not come from workshops on learning and teaching alone. They found that transforming practice required changing the intentions and conceptualizations held by teachers—something that traditional workshops rarely achieve. Ho, Watkins, and Kelly (2001, p. 164) found that "*without a change in conceptions [of teaching], no change in practice is likely*." What teachers do in the classroom is guided by their ideas about teaching. Change their conceptions and they are much more likely to change their teaching practices. Motivation to reform the traditional approach often comes from a desire to: enhance learning through increased engagement of the students (see Astin, 1999); increase retention rates; pay greater attention to personal development of graduate attributes as well as intellectual or epistemological development (as defined by Perry, 1999; Schommer-Aikins, 2002); develop students' self-directed learning and group collaboration abilities; and also help students conceptualize technical and non-technical

content in more effective ways.

Peer learning groups or Faculty Learning Communities (FLC) can help motivate individuals to develop new competencies and empower them to enact change. In studying how small groups accomplished widespread change, Edintaite (2012) identified three desirable elements: (1) individual learning occurring by all teachers regarding subjects they teach, (2) collective learning occuring among small groups of teachers about their aims and curriculum, and (3) collective learning appearing across the entire academic department to create shared philosophy, vision, and mission. Cross-disciplinary Faculty Learning Communities can also be quite effective in spurring change, as the case where "six professors representing different disciplines came together to study, develop, and teach blended learning courses" (Wicks, Craft, Mason, Gritter, & Bolding, 2015, p. 53). These teachers found they benefitted most from FLC via "helpful advice on promising practices and encouragement when experiencing instructional or technical challenges" (p. 53).

Context

The School of Electrical and Electronic Engineering at Dublin Institute of Technology (DIT) is the largest of its kind in Ireland, with approximately 75 academic staff and 1000 students. The school offers education at several different levels ranging from electrical apprentice to PhD. The Bachelor of Electrical and Electronic Engineering program graduates 50-70 students each year. The program is accredited by Engineers Ireland (the national professional engineering body) and recognized under the Washington Accord. A 'ladder system' exists whereby students can take programs in sequential levels from electrical apprentice (level 6 on the National Framework of Qualifications in Ireland), to Bachelor of Engineering Technology (level 7), then Bachelor of Engineering (level 8), Masters (level 9) and finally, PhD (level 10). As a result, the school has a very broad student demographic. Many students who cannot gain direct entry to a university program join this technical institute at a lower point on the ladder, work their way up, and eventually sit beside those who entered directly from high school.

Academic staff members are employed to teach and typically have 18 hours of classroom activity per week. Although research is encouraged, and the School has several highly regarded research groups, the majority of staff members devote most of their time to teaching—both in the classroom and the laboratory. Laboratory groups of 16 students per staff member facilitate close contact and allow staff and students to become well acquainted. Teaching assistants are not provided.

A predominantly traditional approach to engineering education was the established pedagogy until the early 2000s. Group work was usually disconnected from technical engineering content and tended not to include engineering project work. Little formative assessment of the learning process existed and the predominant approach relied upon summative assessments (e.g., individual end-of-semester written examinations). During the mid-2000s, some transformation in engineering education occurred, with change manifested though the implementation of problem- or project-based learning (PBL) wherein the traditional curriculum began to include several 'islands' of PBL.

For the academic year 2009/10, a faculty member secured a funded teaching fellowship to enhance existing and grow new group-based, project-driven modules in the Bachelor of Electrical Engineering program. He had worked with his college's Head of Learning Development to create

his fellowship proposal. The awarding of this fellowship was aligned with Walker and Laurence's (2005) recommendation to support the activities of organizing, planning meetings, researching and publicizing issues, and educating stakeholders about "appropriate actions to take" (p. 268). It encouraged the fellow to take such a role.

During the teaching fellowship a group of seven (five staff members, one Fulbright scholar, and the Head of Learning Development) met once a month to discuss issues regarding implementation of group-based pedagogies. The group included advocates as well as skeptics of group-based learning. All participants, however, supported a project-driven approach (i.e., projects are merited but working on them as groups may not be). Meetings were held in a coffee area of a nearby building, rather than the staff canteen, to provide a small degree of separation from the daily routine. The agenda, although not tightly defined, was kept to issues associated with group-based learning such as delivering feedback, assessing individuals, using Socratic dialogue, understanding student motivation, and using groups to facilitate learning. The Head of Learning Development guided the group's lively conversations. He took an advisory role and brought his experience at this institution of converting a physics course to PBL (Bowe & Cohen, 2004), supervising education research PhD projects, and reading and writing about the topic (Bowe, 2007).

While this effort seems minor in comparison to institutions like as Aalborg (Moesby, 2002), it was a significant development for engineering education at DIT, and it has been sustained in the period of years since this case study was conducted. The shift is in line with recommendations by Eastman, McCracken, and Newstetter (2001), McKenna *et al*. (2011) and the National Science Board (2007). As such, the context for our study was this prevalent and sustained transformation—from a traditional teacher-centered pedagogy to student-centered learning—through the implementation of coherent and constructively aligned group-based, project-driven pedagogies across the electrical engineering programs.

The overall objective of this study was to understand the experiences of the people in the faculty learning community and analyze any transformation that occurred. We hoped to shed light on: (a) the operation of the group; (b) the group's role in the transformation process; and (c) the impact the group had on participants, the program, and the program's overarching pedagogy. In developing such a description, we examined the experiences of those most active in the learning group as well as those who contributed to the effort but resisted joining the formal learning group. We probed individuals' motivations, the issues and challenges they faced, and the affect the learning group had on them as engineering educators. From this, we distilled a model for encouraging transformation that holds promise for use elsewhere.

Although the authors had some preconceived ideas of what happened, no one had a full description of the learning group, or the role it played in the transformation. As the key issues had not yet been identified, and descriptions of the process had not been garnered, a model had not been developed that others could adapt or follow. We sought to contribute new perspectives on the change that was widely understood to have occurred.

Research questions

This study addressed one overarching question:

- *What is it like to experience membership of a learning group in a school where tangible change towards student-centered learning is occurring?*

The study also investigated several specific questions:

- *What was the role of the learning group within the transformation process?* (Was the group needed? Was it helpful? Would the change have been as successful without the group?)
- *What characteristics determined it success?* (What convinced group members to implement new techniques? How can the same approach be used in a different context?)
- *What implications, if any, does the learning group hold for practice?* (What factors supported this change? What lessons can be learned for other engineering educators?)
- *What implications does our study hold for research?* (Was this method useful? Does it hold promise for research on engineering education?)

Methodology

In this section, we discuss grounded theory and template analysis. We identify the techniques we used for sampling and data collection, and the methods of analysis we used.

Sample

Eight members of staff were interviewed (n = 8) for this study. This included six of the seven members who committed to the more formal operation of the group during the academic year 2009-10, representing all stages of the career ladder from new-entrants to near-retirement. We also included two more (mid-career) faculty members who are frequent and active participants in informal group discussions because they provided insight into the wider set of motivations held by teachers in the program. All participants were male, reflecting the demographics of the school at the time of the formal meetings.

Samples of this size are commonly accepted in qualitative studies investigating social and experiential phenomena. This size also seems appropriate because we were able to engage almost everyone who shared the experiences in question. Even in cases where the target population is larger, scholars of qualitative and phenomenological research recommend limiting the sample size. This is done to allow the researcher to delve deeply into the phenomenon and the data. For instance, Dukes (1984) recommended a sample size of 3-10 for phenomenology (cited in Creswell, 2007). A literature review by Guest, Bunce, and Johnson (2006) identified recommendations for phenomenological sample sizes of 5-25; others recommended including at least six participants in such a study (Mason, 2010).

Research Design

Interviews were conducted during the autumn of 2012 by the principle author, a visiting scholar (2012/13) who had not been a member of the learning group. Interviews lasted 60-90 minutes and were used to obtain a full description of each participant's experience of being a member of the learning group during this period of change. Interviews were audio recorded and transcribed. An example set of interview questions is included in Appendix A. Participation was voluntary, the project was explained along with the intention to publish findings. Informed consent was obtained before interviews began.

Data analysis

Using a grounded theory approach to study this phenomenon allowed findings to emerge from the data, rather than comparing data to an a priori theory or framework (Grbich, 2013; Strauss & Corbin, 1994). In Strauss's view, the purpose of grounded theory is to raise generative questions "in order to develop concepts and propositions and to explore their relationships" (Grbich, 2013, p. 82) and also to validate categories and findings through the on-going process of data analysis. Our work involved transcribing the interviews, reading them in their entirety, and then taking them one by one to conduct coding—using established methods for open, axial, and selective coding (Grbich, 2013). We used open coding to look at the meaning of each individual phrase and label it with a theme. In this process, themes emerged that had similarities, and we clustered common themes together—refining, consolidating, naming, and renaming the clusters for increasing accuracy as more and more interview data were analyzed—which constitutes axial coding.

Axial coding also involves "taking one core category that has emerged in open coding and linking it to all the subcategories that contribute to it" (Grbich, 2013, p. 86). During axial coding, we began to group the open codes by category using a table format, and started to identify relationships between these categories. This tabular format is typical of template analysis (King, 2004). It is appropriate for and frequently implemented in studies using grounded theory (Länsisalmi, Peiró, & Kivimäki, 2004). We developed the initial template while analyzing three interviews, selected to represent diverse perspectives on the phenomenon under investigation (i.e., the learning development officer, the fellow, and one of the newer members of staff). With the addition of each new interview transcript, we used axial coding to break the text into individual phrases and then assessed the phrase for fit with the template, modifying the template as needed to accurately fit the entirety of the data (King, 2004). Using this process, we were ultimately able to achieve selective coding in the Straussian tradition, wherein "you validate the relationships between a nominated central core category … by the drawing together of additional categories of context, conditions, actions, interactions and outcomes" (Grbich, 2013, p. 86) and generating new theory.

To re-cap, we conducted open and axial coding of the interviews provided by the administrator and two others to identify specific themes and group them into categories. We used these to create a template. Then we reviewed all transcripts coding them in relation to the template and adjusting the template as needed to reflect what we were hearing from the whole set of participants. In this process, the initial themes were grouped into clusters. They were also consolidated, eliminated, or expanded as needed to align with the entire pool of data.

Results

The template we created is provided in Appendix B. Topics of discussion ranged from perceived roles and characteristics of various participants to aims, concerns, and motivations cited by participants. We identified three overarching categories which related to: (1) attitudes to and feelings about having discussions, (2) interactions and roles within the group and (3) factors that influence the desire to participate in discussions. We provide a summary of the various components of each of these categories.

Attitudes to and feelings about having discussions

- Wanting to have conversations about Learning, Teaching and Assessment (LTA)

- Wanting to be part of group discussion; looking forward to meetings; fun and enjoyment
- Having interesting conversations about LTA
- Trusting other members of the group
- Friendships being deepened
- Being comfortable to discuss LTA in informal settings

Interactions and roles within the group

- Learning from others
- Barriers to discussing LTA with colleagues do not exist
- Input of those at a similar level of understanding of LTA is valued
- Sharing one's own ideas from practice, offering them for feedback, and receiving feedback
- There is a champion advocates change and evangelizes others to adopt PBL
- Different viewpoints on LTA are raised and considered
- Being persuaded by others to think a different way about LTA
- Being carried along by others
- Persuading others to see things differently; convincing others to change
- Hearing ideas overflow from formal sessions
- Formal capacity-building workshops and programs help develop a shared vocabulary
- Receiving knowledge from the literature on education through others
- Input from scientists and/or engineers who have practiced PBL is valued
- A sage whose input is valued signifies a more formal operation of meetings

Factors that influence the desire to participate in the discussion

- Wanting to work closely with students and really know what they are learning
- Intimate relationship with and caring attitude to students prompts reflection and discussion about LTA
- Student profile in at this institution (non-traditional background and low academic profile) prompts discussion about LTA
- Sharing modules with others prompts discussion about LTA and how to improve student experience
- Owning modules allows one to control LTA methods
- Lacking knowledge on education literature relative to others and holding back from joining conversation as a result
- Being skeptical of the literature on education
- Committee meetings prompt discussion about LTA

Discussion

Overall, participants were motivated by a sense of collegiality and curiosity that focused on teaching. They were able to maintain focus because they enjoyed discussing the topic and because they and the champion persistently introduced new ideas and posed LTA topics for discussion. The presence of a sage advisor helped raise confidence and momentum on LTA issues. This advisor provided examples of how literature had been used in physics education at this institution, what frustrations students and teachers expressed in physics, what expert consultants had advised over the years, and how the learning and teaching center had developed. Group members shared

interests and values, and their experience in professional development programs offered by the Institute, also supported this transition. Although they were asked to give an extra hour per month to the formal effort, they did not see this as an added burden. The work they did fit within the coffee and lunchtime discussion they would normally have. By examining their experiences closely, we were able to address a number of specific questions, identified below.

What was the role of the learning group within the transformation process?
Although this learning group was not the only driver behind the transformation that occurred, its members believed the formation and operation of the group epitomized and/or drove the changes that unfolded. Because the learning group was central to a range of key decisions, the group's role and function seemed to merit exploration. We studied this example in detail hoping that learning groups could be established and facilitated within other contexts where transformation is desired. The group provided an effective way of learning about and overcoming challenges associated with facilitating and assessing students' group work.

Participating in a group allowed the teachers to experience group work themselves and begin to regard it as an effective and enjoyable way to learn. Misgivings and doubts about group-based learning—such as issues of fairness associated with assessing individual performance and skills—were aired and dealt with in a satisfactory way. Through group discussions, faculty members realized there were universal challenges, ones common to all student-learning groups. Participants developed a greater awareness and confidence in managing groups. This opened the door for the inclusion of learning, design, and teamwork as assessment criteria for a number of modules offered by various teachers in the group. This, in turn, created the opportunity for sustained delivery of group-based, project-driven modules in the first, second, and third years of the electrical engineering program—wherein feedback on such skills is now routinely provided. Today, students are required to develop and demonstrate groupwork skills on a continuous basis—a situation that did not exist six years ago.

In referring back to the literature on leadership and change management, it is evident that this faculty learning group benefited from quality leadership that conveyed purpose, trust, and hope (Black & Gregersen, 2008; Fullan, 2001; Kouzes & Posner, 2007; Sergiovanni, 2007). Today, more than two years after formal meetings commenced, members of the group and their colleagues continue to identify and address issues that emerge related to the group's theme. They plan for discussions and instinctively follow-up.

The presence of the group crystallized participants' commitment to specific issues. By bringing individuals together into a formal discussion group, the champion of this effort brought a sense of focus and accountability to specific issues and he was able to exponentially amplify the effects of his literature review and research. The champion's work was supported by a teaching fellowship provided by the Institution and bestowed by the College. Although the champion could have conducted the teaching fellowship using other mechanisms (such as literature review and paper writing alone), such activities may not have generated such enthusiasm and buy-in from so many colleagues.

Having the formal group did emerge as an essential feature of transformation. It increased accountability by: (1) placing certain issues in the forefront; (2) encouraging development and

implementation of new practices; and (3) providing a public forum for the discussion of results. Formal meetings offered a structured time and place for participants to return to specific issues, discuss how various efforts had panned out in the classroom, and collectively explore avenues for further development. Quite importantly, it gave them confidence to try out new approaches—even ones that they felt tentative about. All members of the group were learning together. Even skeptical faculty members suspended disbelief long enough for the group to make strides implementing and refining innovative techniques. The criticism that did occur generally served to strengthening the group's overall approach, rather than undermine it. Over time, naysayers came to champion certain aspects of the pedagogies, but not the entire set of values associated with PBL.

What characteristics made it work?

Kolmos (2002) commented that teaching staff are rarely the drivers of change, yet participants in this study viewed this as a bottom-up effort. The process was initiated and grown from the ground level. Although top-down support helped enable this change, support from above would not have been adequate in and of itself. The transformation that occurred required the formation of a group with enough clout and determination to sustain focus and build momentum. Camaraderie helped individual participants overcome inherent challenges; the champion and sage provided crucial knowledge and leadership. Together, the participants, champion, and sage identified issues of importance, researched and discussed them, developed approaches, collected resources, and galvanized support for implementation.

One participant said that 2007 was a critical moment in changes to a project-based approach that happened in a design module in the first year of the B.Eng. because three new staff all completed the Post Graduate Certificate in Learning and Teaching at that time. As mentioned previously, these three became the core of the learning group.

"I would say that [their completion of the institution's capacity-building program] was roughly the tipping point for dramatic increase in emphasis on assessment of process rather than just product in [the robot-building module]."

A key to this effort has been cultivating morale. One participant (a program coordinator) stated that DIT's organizational system is poor at engaging individuals but that managing morale was not problematic in this particular effort. Participants effectively managed morale themselves. All told, this change would have been impossible without enthusiastic, engaged teachers who enjoy working together, exploring issues, and defining challenges for themselves. Once the teachers here found joy in discussing such topics (and reason to return to specific topics regularly) they found all sorts of ways to discuss them. According to the sage:

"Now you have early adopters… in terms of pedagogy, who have the justification, the rationale, thought through. Evidence that it works elsewhere, and so on and so forth. You have those people supported by management who are now trying to develop it through. So they establish their pedagogies, and then, like in the case here, you grow that pedagogy, you get more and more people involved and you start seeing the benefits of it."

Overall, the primary motivators for the people who implemented this change were intrinsic and social. The sage described them as '*reflective, enthusiastic*' teachers who analyzed the effectiveness of their job from the students' perspective. As like-minded teachers joined together,

they encouraged each other to continue to learn and reform teaching practice. Others could see the benefits in terms of enthusiasm on the part of staff and the high levels of engagement achieved—with students spending many hours working on their projects outside of formal class hours, working in the flexible lab/learning space throughout the day and into evening hours.

We now believe the approach of using faculty learning groups to facilitate change in engineering education holds promise because participation in a peer learning group can appeal to faculty members who would otherwise who resist formal change initiatives and/or interacting with administration. An interesting point is that, in this institution, fewer external rewards (promotion, tenure, raises, and the like) are tied directly to performance than typical in institutions in the USA (research- and teaching-intensive universities alike). The faculty here get to choose if they want to engage in research, if they want to seek external funding for research, and if their research will focus on technical or educational issues. The freedom they enjoy means some choose to spend their time researching and developing pedagogy.

Implications for transformation

In this section we discuss the implications for practice with particular focus on how leaders might use this example to foster and support similar change in their organizations. Our discussion involves the structure of the group at this institution. In the course of it, we intend to provide helpful strategies for achieving buy-in from individual faculty members.

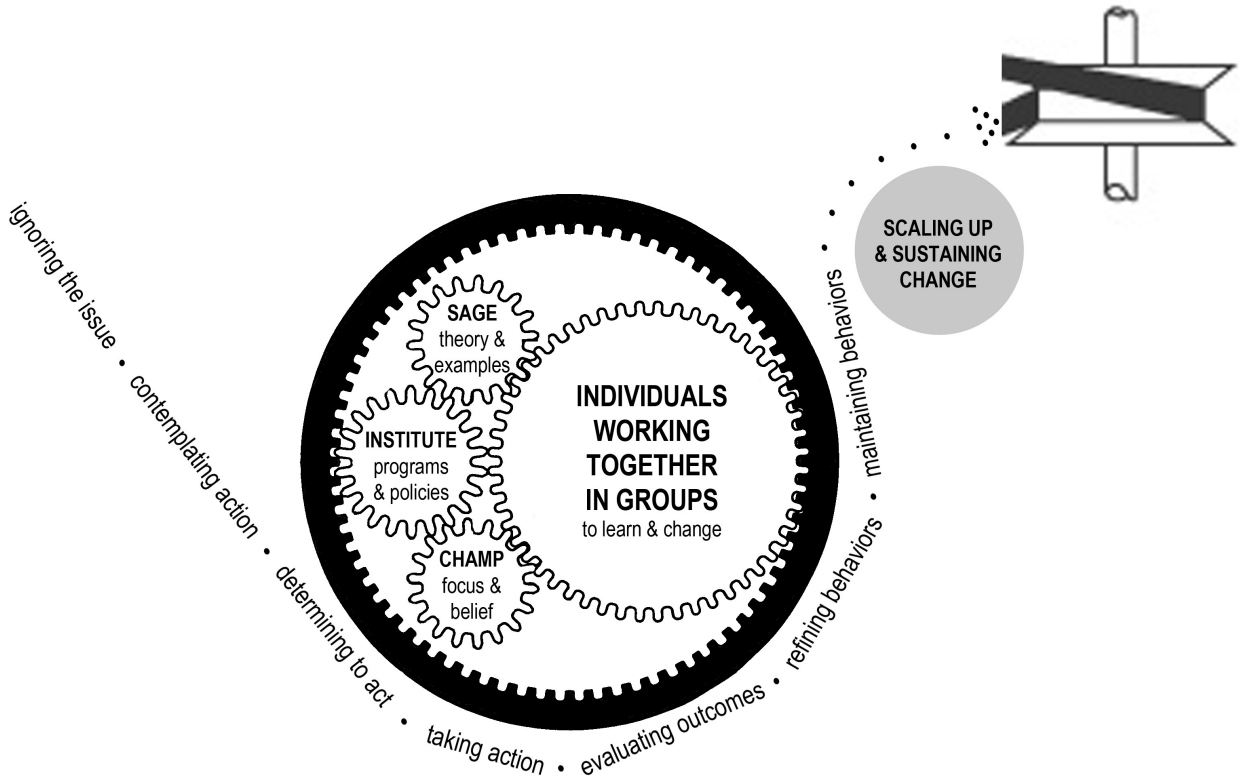
Throughout the analytical process, we created diagrams alongside our coding as well as an audit trail to enhance the reliability and validity of our findings. The diagrams we created identify aspects most crucial to this localized change process; they illustrate how various components worked together. In the diagrams, we represent key elements of the higher education organization as gears—inspired by Birnbaum's (1988) analogy of higher education systems as coffee grinders where the inner workings are shrouded in opaque covers and the causes of change are difficult to discern. Forward movement, in this case, is synonymous with change. The case illustrates that when energy is applied to key components in an education program *and* the system is properly aligned, small players can drive big changes.

In the carefully aligned system in Figure 1, institutional programs and policies are not able to move many individuals themselves. Their energy transfers to individuals via champion(s) and sage(s) who help groups of individuals work together to learn and to enact change. At DIT, this created a sense of movement that has encouraged more and more individuals to get involved and to implement changes. The process wherein individuals contemplate and adopt new behaviors is represented by the belt (which moves from left to right in this machine) as defined by Prochaska, Redding, and Evers (2002). With increasing personal involvement, the changes scaled-up and became more sustainable. This suggests triple loop learning, as described by Senge (1991), has at least begun to occur. Alignment of the central gears is crucial; in this diagram, as at DIT, there is almost no tolerance for error. The central change mechanism linking institute (i.e., organizational intention) to the group of individuals working together that drives action has only just the minimum amount of clearance needed to succeed.

This case illustrates how individual professors (who are relatively small gears in the engineering education system) can leverage the resources they're given and use it to cause visible change. It shows how individuals can elicit system-wide transformation. At this institution, teachers used

their own group-based learning to amplify their efforts by implementing student-centered pedagogies across the program. What emerged in the course of this study was a clear picture of the value of aligning *institutional support* behind a dedicated *champion* and providing *sage* advice from an experienced practitioner. The element of this system that actually enacted curricular change, however, was the *group of individual instructors* who—*working together* as a team—devised, tested, and refined new approaches in their classrooms.

Figure 1: Model for Multi-Level Learning (Source: primary author).



Conclusions

Lasting change in engineering education at this institution has been due to the perseverance of individuals who are steadfastly dedicated to reaching students in more effective ways. The existence of the institution's Learning, Teaching and Technology Centre (LTTC) that delivers Post Graduate programs in learning and teaching—and the LTTC's ability to infuse values and disseminate information on specific pedagogies—was instrumental in sowing the seeds of change. Calls for change coming from practitioners, researchers, and accrediting bodies encouraged people at this institution to change. Teachers there started changing one by one. The formation of a faculty peer-learning group helped equip educators at DIT to implement innovative (yet challenging) practices into their classrooms. The sense of camaraderie and support they found in this group convinced them to stick with their efforts even in difficult times. Nevertheless, the champion of this effort asserts that having even greater support—and a clearer "vision for a new curriculum" in place at the beginning—would have helped push success further. He and his peers are helping build such a vision for others.

In closing, we offer some thoughts on relative levels of formality and informality that facilitated successful transformation at this institution. This project began with the intention of studying the formal learning group that lasted for one academic year. However, what became clear during the course of the project was that a much less formal and less defined group of staff met (and continues to meet) on an ongoing basis in the staff cafeteria. We came to understand that this informal exchange of knowledge was at least as important as the formal group. This informal meeting arrangement became the main setting for participants to learn from others in the group. This informal meeting group is harder to define: its edges are blurred, membership is not completely clear, yet descriptions of these gatherings influenced many of the stories provided in the interviews.

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Appendix A – Sample Interview Questions

Questions used in the 20 November 2012 interview

I'd like to find out about your experience with Group- and Problem-Based Learning in EES. I understand that the focus of the formal learning group (organized by Gavin Duffy with discussion lead by Brian Bowe in 2009) was to talk about facilitating and assessing group-based learning. I'm trying to understand how you experienced the group.

- What was it like, attending these sessions and being part of this group?
- Where you met, in Auinger Street DIT, what was the place like?
- What was the vibe at the peer group meetings?
- Can you tell me about what went on at the meetings?

- Do you have any particularly vivid memories of these meetings?
- What feelings or emotions do you most associate with this group?

- Who came to meetings? How did you feel about them?
- How would you characterize each person's role in the group?

- What were your hopes for this group? Were they met?
- Do you have regrets about this topic?
- Things that happened that you are proud of?
- What did you enjoy about the group? What was frustrating?

I'd also like some background information:

- What prompted your interest in group- and Problem-Based Learning?
- How have you used it in the modules you teach?
  - What ideas or techniques did you use? How did you get them?
  - Was it hard to implement the ideas? What made this hard?
  - Do you have any particularly vivid memories of implementing the approaches?
  - What emotions do you associate with group-based PBL?
- Did it make a difference to you that other people were using the approach here, too? How did you know about what they were doing?
- Would you say that the way you think about teaching and learning has changed over time? How? What prompted the changes?
- Have you taken any programs from the LTTC?
- Is there anything else you want to share? What else do you think is important?

Appendix B - Template

Champion (Associated with belief, persever-ance, and focus)	**Sage** (Associated with theory, research, and examples)	**Institute** (Associated with ethos, programs, and policies)	**Individuals working together in groups** to learn and change
Advocacy	**Role of research**	**LTTC programs**	**Who gets involved**
▫ Evangelizing ▫ Convincing ▫ Gathering a small group ▫ Growing the group ▫ Seeing the benefits ▫ Group members become advocates ▫ Drawing people toward/ moving them along ▫ Organizer feeling empowered to ask ▫ Wanting project as a driver for the staff to join together ▫ Fellowship focused attention on group- and problem-based learning	▫ Seeing theory in action ▫ Publications ▫ Conference attendance ▫ Technical research ▫ Educational research ▫ Important to use discipline's words to convince others	▫ Staff members have taken LTTC courses voluntarily or as a requirement ▫ Lots is happening on the ground ▫ Shared vocabulary ▫ Those who participate in the formal group are seen to quote research, justify and defend ideas ▫ Policy requirement for Postgraduate Certificate in Learning and Teaching ▫ Teaching Fellowship ▫ Formal presentations from the college Head of Learning Development	▫ Group-based learning among staff ▫ Group-based learning among students ▫ Some naturally gravitate to student-centred learning (SCL) ▫ Many who do teacher-cantered learning make assumptions about learning outcomes. And, many who do teacher-cantered learning are very good lecturers. ▫ Staff learning styles ▫ Seeing improvement as part of the job ▫ Already doing group- PBL without plan ▫ Many staff look at things from the student perspective ▫ Industry experience ▫ People at the core of the change (and are also in this group) ▫ People at periphery of change group ▫ People who want to work closely with students and really know what they're learning ▫ Older staff open to change ▫ Younger staff advocate change ▫ Engaging and stimulating late-career faculty

Champion	**Sage**	**Institute**	**Individuals working together**
Ways to overcome resistance (at individual and department levels)	**Role of examples**	**Group-think**	**Benefits of peer group / Reasons for being involved**
▫ "Put the thought in their minds" and "Opened his eyes to the possibility" ▫ Offer suggestions ▫ Patience ▫ Start innovating in small ways and then integrate more	▫ Referencing the literature ▫ Physics ▫ Theory ▫ Head of Learning Development sharing tips from experience implementing PBL elsewhere in this institution	▫ Shared identity within this academic building ▫ Culture of chatting (coffee, lunch) ▫ Peer pressure to contribute positively ▫ People like being part of this faculty ▫ People want to get along ▫ "It seeps into you" ▫ Others seeing the benefits of SCL and trying to apply	▫ Good setting for chats ▫ Tailored advice ▫ Tips and strategies ▫ Enjoyable ▫ Sounding board and reigning in. ▫ Confidence ▫ On-going / constant discussion ▫ Sharing experiences and pooling knowledge ▫ Healthy debate / challenging each other ▫ Encouragement

difficult SCL approaches ▫ Advocate so it becomes something others "flow along" with ▫ Raising SCL topic in Program Meetings ▫ [Fellowship activities, position paper, Fulbright]	▫ Referencing other universities ▫ Critical mass of early adopters ▫ Desire for more experiential learning approaches in the Postgraduate Certificate modules in Learning and Teaching ▫ Teaching observations ▫ Problems with follow through	some of it in their own classes ▫ The teacher with the fellowship working to shift everyone's epistemology ▫ Socratic method ▫ This institution's overall ethos (SCL is an primary ethos and historically has been) ▫ This institution's ladder system ▫ This institution's student demographic	▫ Protection ▫ Supportive environment ▫ Positive outcomes or vibe ▫ Provided feedback to staff ▫ "Cohesiveness of the group" ▫ Receptiveness of others ▫ Learning from the process ▫ Learning from the group ▫ Learning about theories ▫ Testing ideas ▫ Balancing risk with sense of safety

Champion	**Sage**	**Institute**	**Individuals working together**
What they want students to do	**Encountering & understanding resistance**	**Communicating values**	**Specific topics they discussed**
▫ Think on their own ▫ Raise good questions ▫ Be reflective ▫ Make self-assessment ▫ Engage with the material ▫ Talk and share ideas even on independent projects	▫ Underlying tensions ▫ Defensiveness ("I know how it works") and countering/ arguing against suggestions ▫ Seeing people pretend they are interested or getting "uncomfortable and leaving" ▫ Partial buy-in ▫ Facing criticism from others	▫ This institution's low demand to research (good and bad) ▫ No requirement to bring in money ▫ This institution's efforts to raise rigor of research ▫ This institution's requirement to engage in research interpreted loosely ▫ Requirement to engage in educational development ▫ Reward system (often under-recognized) ▫ Engineers Ireland ▫ Shifting Program Meetings from content to pedagogy ▫ Using external reviews as opportunities to highlight LTA ▫ Seeking endorsements from External Evaluators ▫ Internal reviews ▫ Support from management ▫ Values vary by school ▫ Values vary by program ▫ Role of Heads of Learning Development ▫ Power in numbers ▫ Modeling behaviors	▫ PBL ▫ GBL facilitation and assessment ▫ Problems and what to do when things go wrong ▫ Providing feedback to students ▫ Building knowledge or know-how to facilitate ▫ Group interaction ▫ Clickers ▫ Room format ▫ Guidance to students ▫ Posting notes on Blackboard and then discussing rather than lecturing in class ▫ Letting students build stuff first year, un-assessed, for retention in this group (to get them engaged and keep them interested)

		▫ Rituals as way to grow culture ▫ This group's existence raised profile and provides visibility of SCL	
		Barriers within the system	**Frustrations**
		▫ Extreme decentralization of this institution ▫ Rituals as way to grow culture (which do not exist at the institutional level) ▫ Expressions that there wasn't enough support ▫ Ownership of modules ▫ Places that value research at the expense of SCL ▫ Few ways to communicate institutional messages	▫ Unpredictable and chaotic ▫ Normalization and familiarization process ▫ Difficulty of making criteria to assess success ▫ Dealing with uncertainty ▫ Wanting more feedback ▫ Not enjoying to give feedback ▫ SCL and PBL frustrating for students / love or hate ▫ Increasing the challenge over time for students as they begin to understand the format ▫ Educational literature all over the place—engineers seek evidence ▫ Issues surrounding the 40% to pass at this institution
		Scaling up and sustaining	**Time and Effort Needed**
		▫ Strategy for achieving excellence ▫ Focusing efforts ▫ College Education Seminar ▫ Examples of innovation outside engineering education ▫ Capacity building—workshops & seminars ▫ Lack of sustainability ▫ How to achieve sustainability ▫ Number involved in educational innovation ▫ "To keep the process going" ▫ Fear of structural changes	▫ Need for time to get familiar with format (ill-structured environment) ▫ High level of contact with students / Full timetables ▫ There's a need to be more prescriptive when students are ill-prepared or lack motivation ▫ Balancing open-ended and prescriptive problems ▫ Students come at all different levels (ability and epistemology) and SCL requires adapting whereas TCL doesn't ▫ Workload—spinning plates ▫ Balancing innovation with demands