Áine Hyland and Bettie Higgs

UCC and Carnegie: University College Cork's involvement with the Carnegie Academy for the Scholarship of Teaching and Learning (CASTL) – 2000 to 2009.

Abstract:
These papers describe and discuss University College Cork's involvement with the Carnegie Academy for the Scholarship of Teaching and Learning (CASTL) from 2000 to 2009. CASTL was launched in 1998 when Lee Shulman was appointed President of the Carnegie Foundation for the Advancement of Teaching. In 1999, when Áine Hyland was appointed (academic) vice-president of University College Cork, she visited the CASTL headquarters on the campus of Stanford University, California, and collaborated with researchers there. From then until Shulman's retirement in 2008, University College Cork was involved in networks of university leaders who encouraged and supported a scholarship of teaching approach in their institutions. The work and influence of two of the networks in particular, the Scholars Network (of which Bettie Higgs was a member) and the Graduate Education Network (chaired by Áine Hyland), are described in this collection. Their impact and influence on subsequent teaching and learning initiatives in University College Cork are also described.

Introduction:
This paper sets out the background to University College Cork's involvement with the Carnegie Academy for the Scholarship of Teaching and Learning (CASTL) from 2000 to 2009. CASTL was launched in 1998 when Lee Shulman was appointed President of the Carnegie Foundation for the Advancement of Teaching. His predecessor, Ernest Boyer, had published his famous book, *Scholarship Reconsidered: Priorities of the Professoriate* (New York: Jossey Bass) in 1990 and following his death in 1995, a subsequent appraisal, *Scholarship Assessed: A Special Report on Faculty Evaluation (New York: Jossey Bass, 1997) was* published by three Carnegie scholars - Charles Glassick, Mary Taylor Huber and Gene Maeroff. Both publications proposed that teaching in universities and institutions of higher education should be regarded as a form of scholarship and should be recognized as such for appointments and promotions up to and including professorships.

In 1999, Áine Hyland was appointed (academic) vice-president of University College Cork with a focus on supporting and enhancing teaching and learning. Influenced by the philosophy underpinning the work of Boyer and his colleagues in the Carnegie Foundation she visited the headquarters of the Carnegie Foundation which was at that time housed in temporary premises on Stanford University Campus. The Foundation had previously been housed in various locations depending on where its president lived. When Lee Shulman was appointed, he was instrumental in getting a permanent (and stunning) headquarters built on top of a hill on the Stanford campus with views across San Francisco Bay on one side and the Pacific coast on the other.
By the year 2000, Áine Hyland had developed a working relationship with some of the senior researchers in CASTL, including Mary Huber and Pat Hutchings. They were both very helpful in introducing her to senior faculty members who had begun to introduce the concept of teaching as a form of scholarship in their universities. The learnings from this network were subsequently

captured by Lee Shulman in his book *The Wisdom of Practice: Essays on Teaching, Learning and Learning to Teach* (San Francisco: Jossey Bass, 2004).

CASTL did not provide funding for the various networks which they encouraged and supported. Faculty from different higher education institutions, mostly in the U.S., participated at their own expense. University College Cork was pleased to be involved in the CASTL Leadership Program, and when the opportunity arose to participate in the Network of Scholars of SOTL and in the Graduate Education Network. Dr. Bettie Higgs, Dept. Of Geology, applied to join the network of SOTL Scholars in 2005-6 and Áine Hyland agreed to chair the Graduate Education Network from 2007-09.

The two reports which follow, describe and discuss the work, influence and impact of these two networks, and in particular the outputs and outcomes for UCC. Bettie Higgs's article "The Carnegie Catalyst: A Case Study in Internationalization of SoTL" was subsequently published in the *International Journal for the Scholarship of Teaching and Learning Vol.* 3: No. 2, ArtIcle 4. The *Final Report of the Graduate Education Network* was collated by Áine Hyland and circulated in September 2009. This report contains chapters by representatives of each of the associations/ institutions involved in the network –

- The Association of American Geographers (AAG)
- Central European University, Budapest, Hungary
- University College Cork
- Michigan State University
- Rutgers University.

In 2008, Lee Shulman completed his term of office as President of the Carnegie Foundation, and he was replaced by Professor Anthony S. Bryk. Under Bryk's leadership, research undertaken by the foundation was refocused on teaching and learning in elementary, middle and high schools, and the CASTL project and its team leaders were disbanded. However, the learnings from CASTL had a strong influence on subsequent developments in University College Cork and are evident to this day (2025).

Impact and Influence of the CASTL project in University College Cork:
The research carried out by senior scholars of the Carnegie Foundation for the Advancement of Teaching (CFAT), particularly Lee Shulman, Pat Hutchings and Mary Huber, had brought a clarity to the way forward for the Scholarship of Teaching and Learning (SOTL) in higher education, including policy and practice. Recognising the challenge individual teachers had in influencing policy in their own institutions, Aine Hyland and Bettie Higgs were challenged to consider 'How will you implement and grow this work on your own campus?'. How could isolated good practice initiatives in UCC be transformed into campus-wide practice? The authors recognised the vulnerability that academics felt at that time when trying to promote new ways of teaching within their own discipline.

Within UCC, collaboration with CASTL and the Graduate Education Network was seen as prestigious, providing important international networks to draw upon. The work struck a chord with senior academic managers, who previously saw teaching as something that their staff did with little need for professional support.

With institutional support, Mary Huber's *trading zone* seminars and the *teaching commons* became a reality in UCC. That is, staff from various disciplines shared their teaching practice as first steps towards a scholarship of teaching and learning. It was clear that participants were willing to name challenges in their teaching, try new approaches, and document the influence on student learning. Participants were encouraged to 'go public' with their findings and demonstrate scholarship of teaching. Small institutional grants were awarded to encourage this work, and institutional awards for excellence in teaching were initiated.

Courses were developed for academic staff and graduate students, where participants were required to undertake a small SoTL project. This influenced curriculum design and assessment approaches in the University.

These activities provided comfortable spaces for sharing ideas on scholarship of teaching and learning. Participants reported being better informed and more intentional about meeting challenges in their teaching. Outputs were achieved by individuals or groups in the form of reports, articles, seminars for colleagues, and conference presentations and publications. The CASTL scholars had initiated *The International Society for the Scholarship of Teaching and Learning* (ISSOTL) with an annual conference as its main activity. The annual conference provided an international platform for UCC staff to share and discuss the SoTL work they had engaged in, as well as bringing new ideas back to UCC.

Involvement in the Graduate Education Network (GEN) came at a time when the Irish HEA was discussing changes to Graduate Education. In UCC the GEN steering group included senior academics who were also managers and decision makers of the university: The Dean of Graduate Studies; the Chair of the Graduate Research Group; the Director of Quality Promotion; the current and former Vice Presidents for Teaching and Learning; and the Academic and Programme Coordinators of the Teaching and Learning Centre. This was a group that could influence policy within the institution.

By 2007 UCC had become a national leader in the scholarship of teaching and learning in Ireland. Collaboration with GEN member, Bob Mathieu, Director of the Centre for the Integration of Research, Teaching and Learning (CIRTL) in Michigan State, inspired UCC to request government funding to lead a National Academy for the Integration of Research, Teaching and Learning in Ireland (NAIRTL). This bid was successful in securing €3 million and began an unprecedented level of collaboration within Ireland. A main function was to encourage, support, recognise and reward scholarly teaching. Within its first two years, NAIRTL had awarded 102 grants for projects that encouraged scholarship in teaching and learning (Murphy, J., and Brennan, A. https://files.eric.ed.gov/fulltext/ED538010.pdf). It had published eight books, and numerous reports, which began to influence policy nationally. It reached staff who had not before considered their teaching as a scholarly activity. Teachers formulated research questions, conducted enquiries, and disseminated their findings. The impact on student learning was monitored and evaluated. An annual NAIRTL conference was held, with national and international collaborators, and gave a platform for dissemination of insights gained from implementation of these projects. Conference proceedings were published as a resource and shared nationally and internationally.

The National Academy was used by the Irish Higher Education Authority to showcase good practice in collaborative strategic initiatives. The work was built on through the development of the Irish National Forum for the Enhancement of Teaching and Learning. UCC contributed to the Board of the National Forum, and groups within UCC continue to be successful in bidding for funds to continue scholarship of teaching and learning.

Since 2004, teaching was given parity of esteem with research in the UCC Strategic Plan. A case was brought to senior management for greater recognition of teaching in promotion. The argument against recognition had been that evidence of good teaching was not visible. Portfolios demonstrating scholarship of teaching and learning were developed by staff and are now used as a significant part of the promotion criteria. Alongside these developments, support gradually grew for the Teaching and Learning Centre, for a fulltime Vice-President for Teaching and Learning, and for dedicated teaching and learning committees in the four UCC Colleges and their constituent Schools.

Only a small number of UCC staff could attend ISSOTL conferences, mostly held in N. America, and so in 2015 UCC initiated the EuroSOTL biennial Conference. This year (2025) saw the 10-year anniversary of EuroSoTL, with UCC staff continuing to present their SoTL work. In recent years, students have been invited into these collaborations as scholarship partners.

Conclusion:

Working with the CASTL Scholars and CASTL Campus Leadership programs has been the catalyst for many of the SoTL initiatives that currently take place in University College Cork. Teachers have been stimulated to enquire into their own teaching and learning, and to integrate their disciplinary research into teaching and learning in more innovative ways. The total impact on staff and students of these initiatives goes well beyond that reported here. UCC continues to be successful in obtaining grants from the HEA, and through international collaborations, to continue scholarship of teaching and learning practice.

It is time to ask that crucial question once again – 'what are the next steps?' All staff can engage and be scholarly in their approach to teaching and learning, but not all can dedicate their prime time to SoTL. Like Huber and Hutchings, we must catalyse and encourage teachers into the 'big tent' of SoTL, by valuing modest small-scale efforts aimed at reflecting on one's own classroom teaching and sharing what is learned. With this approach we can move to our own position along the spectrum of scholarship, in relation to teaching and learning.

With extracts from:
Higgs, Bettie (2009) "The Carnegie Catalyst: A Case Study in Internationalisation of SoTL," International Journal for the Scholarship of Teaching and Learning: Vol. 3: No. 2, Article 4.
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The Carnegie Catalyst: A Case Study in Internationalisation of SoTL

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International Journal for the Scholarship of Teaching and Learning:
https://digitalcommons.georgiasouthern.edu/ij-sotl/vol3/iss2/4

While the Carnegie Foundation for the Advancement of Teaching is heralding a new era which will see important advances in primary and secondary education, teachers in higher education are discussing how the inspired work that has marked the past decade will move forward. A golden era has seen the Foundation influence an incalculable number of people, turning the heads and changing the direction of many academic staff in higher education. Teachers have been stimulated to enquire into their own teaching and learning, and to integrate their own research into teaching and learning in more innovative ways. Students have enjoyed the benefits of more engaged and scholarly teachers. Teachers themselves have benefited from their association with the Carnegie Foundation within their own higher education institutions. Collaboration has been seen as prestigious, providing an important international network to draw upon. The name of the Carnegie Foundation for the Advancement of Teaching now strikes a chord with senior academic managers, who have previously seen teaching as something that their staff just did without the need for professional support. Matiru et al (1995) highlighted these attitudes which have lingered on into the 21st century when they noted the assumption that the possession of a Ph.D degree is all that an aspiring lecturer needs in order to be able to teach in a University – and that the rest can be imbibed through osmosis.

The CASTL Scholars Experience

The research carried out by senior scholars of the Carnegie Foundation for the Advancement of Teaching (CFAT), in particular Lee Shulman, Pat Hutchings and Mary Huber, together with their many collaborators, has brought a clarity to the way forward for the Scholarship of Teaching and Learning in higher education. One initiative, the visionary Carnegie Academy for the Scholarship of Teaching and Learning (CASTL) Scholars program saw 100 scholars supported in their SoTL work between 1998 and 2006. The crucial elements of this initiative were the inspiring residential experiences at the Carnegie Foundation at Stanford.

I had the good fortune to be one of the final cohort of scholars in 2005-2006. The theme of the Academy was Integrative Learning, and built on the work of the national Integrative Learning Project: Opportunities to Connect which had begun in 2003 led by CFAT and the American Association of Colleges and Universities (AAC&U). I worked with twenty other scholars, gaining insights from stimulating collaborations. We were supported in addressing the puzzles and challenges involved in building students' capacities for integrative learning, in what I came to call 'Puzzle-based Learning'.

The senior scholars in CASTL were tireless in addressing meetings and writing supportive documents, helping with policy and practice, and encouraging the scholars. They were both demanding and supportive in all facets of the program. They challenged and they guided. In this way they modelled good teaching. Just like our own students, we were inspired by the short master classes, seminars, and case studies, and by working with peers on issues we had ourselves identified as important. Just like our own students we burned the midnight oil writing our reports at the last minute – forgetting to stick to the guidelines – wondering how to work the on-line bit – getting it wrong and asking for help! Social and peer-learning resulted as we were inspired by working together. The Teaching Commons became a reality.

So what did the Carnegie Foundation catalyse? The CASTL scholars were supported to move from dependence to independence. Specifically, they were challenged with a final task that was crucial to the sustainability of SoTL. Scholars were asked 'How will you implement and grow this work on your own campus? 'What are your next steps when you return home?'. We made ambitious plans, cognisant of the reality of influencing policy on our home campuses. Then we fledged, like young birds carrying messages across North America. A small number made it across the Atlantic and beyond.

Internationalisation

The Senior Scholars at CASTL recognised the difficult task individual teachers had in influencing policy in their own institutions. They also recognised the growing interest in SoTL around the world. The CASTL Scholars program was followed by The CASTL Campus Leadership program (2007-2009). This was an attempt to bring together people who can facilitate change on individual campuses, and cluster them with other campuses around the world, thus creating networks for stimulus and support. This would help to grow the isolated initiatives into campus-wide practice. University College Cork Ireland (UCC), applied for, and was accepted into, the Graduate Studies strand of the CASTL Campus Leadership program in 2007. Locally the steering group includes senior academics who are also managers and decision makers of the university: The Dean of Graduate Studies; the Chair of the Graduate Research Group; the Director of Quality Promotion; the current and former Vice Presidents for Teaching and Learning; and the Academic and Programme Coordinators of the Teaching and Learning Centre. This is a group that can influence policy within the institution. There was no funding attached to this honour, but the status that this collaboration has given us, and the doors that have opened because of it are almost immeasurable. The benefits accrued during this CASTL Campus Leadership project will be the subject of a report at the ISSOTL Conference in Indiana in October 2009. In brief, the presence of Bob Mathieu, Director of the Centre for the Integration of Research, Teaching and Learning (CIRTL), in the Graduate Studies strand inspired UCC to request government funding for a National Academy for the Integration of Research, Teaching and Learning in Ireland (NAIRTL). This bid was successful in securing 3 million euro, and began an unprecedented level of collaboration within Ireland. This would not have happened unless we had looked beyond the bounds of our own country (Higgs, 2007).

NAIRTL, within its first 2 years, has awarded 102 grants for projects that are encouraging scholarship in teaching and learning. It has published eight books, and numerous reports, which are influencing policy nationally. It is reaching staff who had not before considered their teaching as a scholarly activity. These teachers are formulating research questions, conducting enquiries, and disseminating their findings. The impact on student learning is evident, and is being monitored and evaluated. The boundaries between administrative and academic interests are blurring, with the senior manager of NAIRTL attending the ISSOTL conferences in order to better understand and support academic staff and students. The National Academy is now being used by the Irish Higher Education Authority to showcase good practice in collaborative strategic initiatives.

A Case Study: The Irish Integrative Learning Project

Using the CASTL scholars program as a model, funding was sought from the new National Academy to run the Irish Integrative Learning Project. Involvement with the original CASTL program gave the proposers credibility within their institution. It gave them confidence to invite in colleagues from other institutions, and to give the project a national name. In short it gave the project status. The proposal was awarded funding by NAIRTL, and in 2008 the Irish Integrative Learning Project was born. The project aims to build on the findings of the ‘Integrative Learning Project: Opportunities to Connect’, and on the CASTL Scholars initiative on integrative learning. There are currently 18 participants, from 3 institutions, forming the core of the Irish Integrative Learning Project (IILP). The participants were chosen for their potential to promote and document integrative learning. The project has a strong staff development focus, and so it was thought important to get a mix of experience within the group. Half of the group have a qualification in teaching and learning in higher education, and the other half have none. This was an opportunity to bring on board staff who were new to the scholarship of teaching and learning.

Our projects are subject-centred, and authentic as advocated by Kreber (2007). Clusters have emerged in Science and Mathematics, Economics and Law, Medicine and Health, and Arts and Social Science. Fifteen courses are the subject of enquiry, and have the potential to impact on close to 1000 students. Sustainability is important, so that what is learned by staff will remain within the institution and benefit future students. To build students' capacity for integrative learning we aim to help them to develop certain attributes as advocated by Huber and Hutchings (2004). These include developing a sense of purpose that keeps them on track, fitting fragmentary information into a 'learning framework', understanding something of their own learning processes, and being self-directed learners with explicit learning goals. The integrative learner will ask probing questions to help achieve learning goals, will monitor and reflect on their own efforts, and make choices that promote learning. How will this be achieved? Huber and Hutchings (2004) suggest that teachers need to be integrative thinkers themselves, understand something of how students learn, feel comfortable with a range of teaching strategies from which they can draw, and design opportunities for students to connect up their learning. Integrative learning can be articulated as a goal or learning outcome, and assessment methods that encourage integrative thinking and learning can be devised. These attributes of teacher and learner are helpful in mapping out pathways to foster integrative learning. The IILP participants must be willing to take risks with their teaching, try new approaches, and where appropriate stand back and gift the learning to the learner (Malone, 2002, a former CASTL scholar).

Members of the CFAT have synthesised the findings of the 'Integrative Learning Project: Opportunities to Connect' in a public report published in late 2006 (Huber, 2006; Hutchings, 2006; Gale 2006; Miller, 2006). This report is providing a major resource for the Irish Integrative Learning Project. The authors have divided their findings into 4 strands that capture the depth and breadth of integrative learning, and have indicated clearly how they believe students' connection-making can be increased. They have concluded that fostering integrative learning needs attention to curriculum design, pedagogy, assessment and faculty development.

Our findings so far agree that curriculum design can help or hinder integrative learning. Huber (2006, p.2) says "getting everyone to think beyond the level of the course is a challenge" but we must "build links into the regular curriculum, and create opportunities for all students to integrate their learning at multiple points throughout their college careers". The report makes it clear that curriculum design, at the programme level, is important. Huber advocates starting early, as building capacities to integrate learning takes time. Even at this early stage in the IILP we have evidence that integrative initiatives can influence retention in the first year of undergraduate study.

The IILP participants are using pedagogies known to provide rich opportunities for integrative learning such as problem-based learning, seminars, learning communities, and building e-portfolios. Using one or more of these pedagogies to design a module, or a whole programme, that is integrating pedagogies, is advocated by Gale (2006) and Hutchings (2006).

Miller (2006) reports on innovative assessment practices which encourage students to connect-up their learning. In these examples learning outcomes, assessment and teaching strategies are aligned to promote integrative learning. Some participants in the IILP are simply asking their students to articulate their connection-making within or between disciplines, while others are seeking new holistic understandings, often via student reflective portfolios.

For students to engage in integrative learning, their teachers must model this form of learning themselves. To address the concerns of Hutchings (2006) that staff development is needed, the IILP places an emphasis on collaborative group work that assists participants to develop a toolkit of teaching strategies for integrative teaching. Hutchings (2006) reports that mechanisms for knowing how well students connect ideas within the discipline or across fields, between curriculum and co-curriculum, or between academic work and engagement with social and community issues are not well developed. Miller (2006) advocates making high quality examples of students' integrative work public, so that staff can be kept in touch with what is expected, and build understanding of how it can be developed. This documentation is a primary aim of the IILP. Hutchings draws a persuasive picture of 'developed' staff helping students to map out connections between cross-cutting literacies.

One aspect of the CASTL Scholars program that informed our work, and proved particularly powerful is the critical friends approach to staff development. This has helped participants to examine their work from another perspective, and to receive critique from a colleague who is an advocate for the success of their work. Participants were not only appreciative of the insights of their critical friend, but reported that being a critical friend was a useful learning experience.

The IILP participants are helping to move the theoretical debate forward. Carl Weimann, a nobel laureate, and Carnegie Foundation US University Professor of the Year in 2004, stressed the importance of advances in neuroscience to our understanding of how learning takes place, at his address to faculty in Dublin on May 18th 2009 (Weimann, 2009). If every act causes neuronal connections to be made (Greenfield, 2004), and learning is a physical process, it suggests that all learning is integrative. This challenges the IILP group to think about what it is we are striving for in our project. To help with this debate Brendan Hall from the Centre for Excellence in Active Learning, University of Gloucestershire, UK, was enlisted as an associate member of the IILP, and led a discussion on the idea that there are threshold concepts within each discipline. These concepts are integrative, in that once grasped they transform the learners' understanding, and help them to move from novice to expert (Meyer and Land, 2006a,b). Here we have help for the thinly stretched academic teacher. The idea of threshold concepts brings the discipline back into centre stage in the teaching and learning debate. It is the disciplinarian who is expert and can articulate these key concepts, and design assessment and teaching strategies to help students master them. These ideas are helping to focus the work of the IILP participants.

Participants report that this project provides a comfortable space for sharing ideas on scholarship and student learning that were central to their interests. They report being better informed and more intentional about helping to build student attributes that promote integrative learning. They are being encouraged to consider outputs and outcomes, and articulate potential short-term and long-term impacts on student and peer learning. Already several outputs have been achieved by individual or groups in the form of reports, articles, seminars for colleagues, and conference presentations and publications.

An important outcome is emerging from some participants involved in interdisciplinary programmes. After assessing students for connection-making they are surprised by the findings of their own research. They discovered that integrated programmes do not in themselves lead to integrative learning. That is, assumptions that students will make meaningful connections unaided may not be well-founded. Separately delivered and assessed modules may be seen by students as parallel and unconnected. Such realisations empower teachers to become more intentional in their teaching to help students connect-up their learning. They suggest that we are deepening our understanding of how students learn.

The work of the participants is beginning to influence the wider community. For example, integrative learning is being articulated in programme or module learning outcomes. Teachers are discussing the implications of integrative learning on their blogs. Postgraduate teaching assistants are reporting that their students require assistance to make connections between their courses.

Further international collaboration is crucial to enhance and sustain our SoTL endeavours. While in the Carnegie Foundation, in 2005, I googled 'Integrative Learning' only to find that a close neighbour, England, had just funded a Centre for Excellence in Integrative Learning at the University of Nottingham. Although only a short flight from Cork, it was not until the ISSOTL conference in Edmonton in Oct 2008, that I met the Co-Director of this Centre, Alan Booth. He was immediately enlisted as an associate member of the IILP. He visited UCC in 2009 to continue his own research into how disciplinarians perceive integrative learning. During this visit he assisted in evaluating the Irish Integrative Learning Project, and presented valuable critique. He uncovered the vulnerability that academics can feel when trying to promote new ways of teaching within their own discipline. He suggested practical pointers for staff development aimed at bringing evidence-based disciplinary projects to fruition. This collaboration is leading to an international conference on Integrative Learning, to be held in 2010, at which all participants will be invited to disseminate their research findings.

In Conclusion

An important message that is, I hope, coming across loud and clear in this invited essay is that working with the Carnegie Foundation for the Advancement of Teaching has been the catalyst for many of the SoTL initiatives that currently take place in University College Cork, Ireland. Without involvement in the CASTL Scholars and CASTL Campus Leadership programs, the NAIRTL initiative, and the Irish Integrative Learning Project would not have come into being. The total impact on staff and students of these initiatives goes well beyond that reported here. The IILP was only one of 102 projects funded by NAIRTL. The experience of this one campus has been repeated many times over. There are tens of thousands of projects around the world that have been inspired by, or helped in some way, by the work of the Carnegie Foundation. As a result, SoTL in Higher Education will continue to move forward, and benefit from internationalisation.

It is time to ask that crucial question once again – 'what are the next steps?' In the uncertain future, all staff can engage and be scholarly in their approach to teaching and learning, but not all can dedicate their prime time to SoTL. The Scholarship of Teaching and Learning will only continue if students have richer learning experiences, and teachers are enthused and excited, refreshed and renewed by their involvement in SoTL. So, like Huber and Hutchings, we must catalyse and encourage teachers into the 'big tent' of SoTL, by valuing modest small scale efforts aimed at reflecting on one's own classroom teaching, and sharing what is learned. In the more established disciplines, many broad theoretical underpinnings have often emerged from small-scale early 'field' work. With this approach we can respect our colleagues, and support each other in moving to our own positions along the spectrum of scholarship, in relation to teaching and learning.

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CASTL LEADERSHIP PROGRAM – GRADUATE EDUCATION NETWORK

Final Report of the Network

September 2009

Áine Hyland

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INTRODUCTION

Áine Hyland

This publication consists of six separate reports provided by the six institutions of The Graduate Education network. An associated publication includes appendices from a number of the institutions which expand on the main report and in some cases, provides examples of SoTL work by graduate students and faculty. The six institutions in the Graduate Education Network are:

- The Association of American Geographers (AAG)
- Central European University, Budapest, Hungary (CEU)
- Centre for the Integration of Research and Teaching and Learning (CIRTL)
- Michigan State University (MSU)
- Rutgers University
- University College Cork, Ireland (UCC)

The Key Research Question (and sub-questions) which were addressed by each institution in its final report were as follows:

What does it look like when the Scholarship of Teaching and Learning (SoTL*) becomes part of Graduate Education?

- Where and how does SoTL make a difference? How are Graduate Students different when they go through the SoTL learning process?
- How does SoTL involvement affect how faculty approach teaching?
- How does SoTL affect how graduate students approach learning?
- How does the institutional culture change because of SoTL ? How does Sotl affect institutional cultures?
- Are institutional initiatives advanced because of Sotl, and if so how?
- What is learned in SoTL / how is SoTL advanced because of these initiatives?.
- How does SoTL affect institutional leadership? /What kind of leadership has emerged? /
- How is the work of each individual institution affected by SoTL?
- How sustainable is the CASTL project?

*(Definition of SoTL: A systematic critique into student learning. Looking at questions of student learning. Making the results visible.)

Final Report of the Association of American Geographers

Prepared by Michael Solem, AAG Educational Affairs Director, June 23, 2009

1. *What does it look like when the Scholarship of Teaching and Learning (SoTL)* becomes part of Graduate Education?*

Academic geography now has a deep and extensive infrastructure for faculty development, a situation that was achieved thanks to numerous federally funded projects led by the AAG and geography educators over several years. The CASTL initiative also contributed to this status. Key components of this SoTL infrastructure include:

- The annual Geography Faculty Development workshops held at the University of Colorado;
- *Aspiring Academics* and *Teaching College Geography*, two new book and web publications for graduate students and early career faculty;
- The annual Departmental Leadership workshops, held at various locations, for academic chairpersons and geography program coordinators;
- SoTL-related workshops at AAG annual and regional meetings sponsored by the AAG's Enhancing Departments and Graduate Education (EDGE) project.

2. *Where and how does SotL make a difference?*
   How are Graduate Students different when they go through the SoTL learning process?

Although many graduate programs in geography provide some sort of teaching apprenticeship, a large proportion of faculty enter the academy with relatively little preparation in teaching and learning issues. As a result they rely on intuition and their own experiences when facing students for the first time. While this works well for some, other new instructors report an overwhelming feeling of helplessness as they scramble to prepare lectures, grade assignments, and learn the ins-and-outs of new classroom technologies, all the while fielding email from anxious students worried about upcoming exams or assignments. Other obligations can be just as pressing and it is no small wonder, then, that teaching is cited by so many early career faculty as one of the most difficult and worrisome aspects of their working lives. When introduced in graduate education, SoTL changes this experience because graduate students learn early on the practices that will enhance their classroom teaching during the early years of their professional lives.

3. *How does SoTL involvement affect how faculty approach teaching? and*
4. *How does SoTL affect how graduate students approach learning?*

Teaching should be a social, collegial pursuit, one valued and supported by colleagues and institutions. The AAG places significant emphasis on creating a departmental climate that values teaching quality and improves the professional development of graduate students and early career faculty. Becoming an effective college and university instructor should be seen as more than an individual responsibility. We should open up our classrooms to colleagues and peers, share ideas, and exchange strategies. Too often course preparation is seen as solitary work to be shared only with students when in a classroom. This is unfortunate because departments themselves play an important role in advancing or undermining the achievement and performance of young faculty in the college classroom. Research has shown repeatedly that when graduate students and early career faculty receive mentoring and professional development in teaching from a community of peers, advisors, and senior colleagues, they are better positioned for success and establishing themselves as confident, effective teachers when they enter an academic position. This, in turn, makes it easier for new teachers to manage all other aspects of their professional lives in the academy

5. How does the institutional culture change because of SoTL? How does SoTL affect institutional cultures?

AAG works to encourage a reflective dialogue within departments, a conversation about teaching that recognizes and celebrates the talents and perspectives of both new and experienced faculty. Because no department can survive without healthy undergraduate enrollments, we concur with the view of many colleagues that it is a collective responsibility for the faculty and departmental leadership to ensure that the courses and educational experiences offered in the undergraduate curriculum are of the highest academic quality. The secret to achieving this outcome lies in the professional development of the graduate teaching assistants, course instructors, and early career faculty teaching those courses.

Our vision of teaching also rests on the view that the many responsibilities of academic life must be considered together, in balance, and that it is important for us to understand how teaching, research, service, outreach, and our personal lives intersect and interconnect. We are attempting to take a broader view of professional life, one based on Robert Boice's vision of moderation, balance, and the seamless, positive integration of the diverse elements of life and work. This means issues of teaching should always be set in the context of the broader issues of academic life--work-life balance, career planning, and collegiality--which we believe are also keys to long-term success and career satisfaction. Achieving this balance involves adopting the conception of teaching as scholarly work, a view that lies at the heart of the international movement inspired by Boyer to promote the scholarship of teaching and learning.

6. Are institutional initiatives advanced because of Sotl, and if so how? and

7. What is learned in SoTL / how is SoTL advanced because of these initiatives?

SoTL stresses the importance--and provides the means—for any individual to become a critically reflective teacher who is always considering carefully the effectiveness of classroom practices, keeping abreast of research on teaching and learning, and contributing to this process of improvement in geography departments and the discipline as a whole. As the number of geography educators practicing SoTL rises, so too does the visibility of SoTL within the discipline.

8. How does SoTL affect institutional leadership? What kind of leadership has emerged? and 9) How is the work of each individual institution affected by SoTL?

Aspiring Academics (Solem, Foote, and Monk 2008) and *Teaching College Geography* (Solem and Foote 2009) are two major outcomes of "Enhancing Departments and Graduate Education (EDGE) in Geography", a project led since 2005 by the Association of American Geographers (AAG) with funding from the National Science Foundation (NSF grant REC-0439914). But the concern of geographers for issues of professional development and SoTL in geography goes back further to other NSF projects beginning with the Virtual Geography Department Project between 1996 and 1998 and the summer institutes organized annually since 2002 for the Geography Faculty Development Alliance at the University of Colorado at Boulder. Workshops were key components of both projects and were designed to provide faculty with the training needed to develop effective instructional materials and methods for teaching geography.

As workshop facilitators in these projects, we quickly realized that, despite their enthusiasm for engaging with teaching and learning issues, a great number of participants had never been exposed to the theoretical and practical expertise in pedagogy that would allow them to get the most out of their efforts. Certainly these participants were excellent, even award-winning professors with a good deal of practical experience in the classroom, but they had not had exposure to topics relating to instructional materials development, learning theories, principles of assessment, or methods of course evaluation. Many also had some exposure to issues of learning and teaching while in graduate school. But the topics they covered then, and the skills they mastered in the past, simply did not match what they wanted to do in the future. Reflecting on these observations, it seemed clear to us that for geographers to move forward to face future challenges and opportunities, the discipline needed to provide better professional support for graduate students and new faculty as early as possible.

The cumulative impact, then, of all of these initiatives can be seen in a cadre of faculty prepared to implement SoTL in their own practice and work with colleagues to disseminate effective teaching practices locally. In this sense the AAG as a professional association played a pivotal leadership role nationally by developing and disseminating the raw resources, national leadership, and programming that, in turn, has triggered local changes in academic departments by empowering early career scholars as well as senior faculty and department chairpersons.

10. How sustainable is the CASTL project?

The CASTL project is embedded within the AAG's EDGE, GFDA, and Healthy Departments initiatives, all of which are institutionalized within the AAG's governance and staff leadership.

Final Report of the Curriculum Resource Centre

Prepared by Joanna Renc-Roe, Central European University, Budapest

1. What does it look like when the Scholarship of Teaching and Learning (SoTL) becomes part of Graduate Education?*

CEU's institutional context and vision of SOTL

In this introductory section we outline: what is CEU as CASTL institution, what we have achieved at a glance over the past few years, and how we have integrated SOTL into our work.

1.1 Institutional Context of CEU and SEP (the CASTL team's home department)

CEU is an international, American-accredited and also an EU institution of graduate learning in social sciences and humanities located in Central Europe, in Budapest, Hungary. The CASTL leadership team of CEU consists of Special and Extension Programs, including two key units: Curriculum Resource Center (CRC) and Special Projects Office (SPO). The CRC has functioned for the past fourteen years as an outreach and capacity building center in curriculum related issues, for educators from a wide region of post-socialist and post-soviet educational space. The SPO office provides research, training and consultancy in higher education development, policy, and practice at individual, program, institutional level for the region and elsewhere, in collaboration with relevant institutional partners. Both units are funded by a variety of sources including external donors and CEU itself but the majority of our programmatic and staff funding comes from the Open Society Institute- Higher Education Support Program (HESP)

In the past three years the CRC in collaboration with partners in SPO has substantially upgraded and extended its leadership and programmatic potential, becoming a multi-faceted centre in curriculum building, teaching and learning, quality assurance and academic development. In several specific areas of our work we were able to capitalize on the CASTL initiative and link this to other policy developments and our own ongoing regional and institutional agendas to become a recognized leader in teaching and learning. It is notable that the recent (June 2009) CEU accreditation report of middle States Commission on Higher Education confirmed the SEP status as leaders in the field:

> *'CEU's Special and Extension Program's administers a rich array of high quality programs that range from access programs (...) to workshops for educators in Central Europe, Central Asia and the Middle East. (...) SEP's programs are carefully linked to CEU's mission and programs, engage CEU faculty, and are a model in the use of outcomes assessment and quality control'*[1]

The SEP provides a whole range of programs, which have increasingly integrated SOTL approaches and perspectives in the past three years. Below, we present in more detail how SOTL has related to some key programs at CEU.

1.2 Our understanding of SOTL and our participation in CASTL

Our vision of SOTL is broad and multi-layered. We are engaged in much more then one strand of work in SOTL or one way of understanding and applying the concept. The collaboration within CASTL institutional leadership program has allowed us to articulate better our own vision of 'scholar in the classroom', which

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CEU Report by the Evaluation Team of Middle States Commission on Higher Education, June 2009, p 40.

includes scholarly, research-based and professional approach to teaching and learning in higher education.

We now are able to apply SOTL directly as a research agenda (since 2007) in the narrow sense of the term (linking directly to Boyer's concept and the programmatic achievements of CASTL Individual Scholars Programs and similar programs elsewhere in US institutions). At the same time, our other programs go beyond that to provide the space for first contact with SOTL as an approach as well as create preliminary conditions for SOTL, through integrating still 'controversial' in many institutions notions of student-centrednes, the assessment of learning outcomes, teaching and learning alignment, academic autonomy in course design and teaching methods, the need for support structures in teaching and learning for academics, etc. For us to narrow our focus to some small area of work would be premature as SOTL needs to become more widespread in Europe first, and Eastern Europe in particular and to achieve this a narrow approach would not be timely. It is obvious that whilst we have used the CEU's unique status of graduate institution and we have implemented SOTL related-programs specifically for graduate students, our CASTL work is not only in the field of graduate education and SOTL, rather it spans two larger and interlinked areas: leadership in teaching and learning and SOTL and leadership in innovation, research and policy analysis in graduate education. Below we present our specific activities and a summary of their assessment processes, in both of these broad areas.

2. CRC's Leadership in Teaching and Learning and in Scholarship of Teaching and Learning

The report below shows how we have linked our participation in SOTL to various innovative and new programs and how we have integrated SOTL in some already existing programs in order to broaden and diversify our potential to influence other institutions and individual practitioners.

2.1 The *CRC One-Week Sessions* as 'first glance' introduction to SOTL

The oldest and biggest program of the CRC is to provide a one-week course revision and course innovation funded visit for lectures from Eastern Europe, former Soviet Union (non EU), Central Asia and the Caucasus. This program hosts over 150 lecturers a year in social sciences and humanities and related fields and provides opportunities for library work, buying key academic resources, receiving help from CEU lecturers in the design of a course or a curriculum. In the past four years all the CRC sessions have included a two-day training program in course design and teaching methods. Each teaching methods session has been transformed into an introduction to teaching and learning based on research and SOTL concepts. We therefore introduce key concepts in teaching and learning together with the SOTL perspective on studying them, aiming to foster recognition and acceptance of the scholarly approach to teaching and the creation of interest in further professional development in this area. This approach comes to a successful fruition in our course alignment workshops, the most recent third day training element (added in the last two academic years), in which faculty read and peer-evaluate each other's draft syllabi. We therefore begin the work with new faculty visitors through the concept of scholarship of teaching, and immediate peer evaluation of teaching in even a short-term training program. End-of-session evaluations carried out in the past 3 academic years indicate that the workshops offered by CRC trainers are considered to be one of the most beneficial aspects of the one-week CRC sessions.

2.2 The *Course Development Competition (CDC)* grant program and the Course Portfolios.

The CDC program is a well established grant program offering a ten months stipend, financial and training resources (workshops at CEU) to faculty from our outreach region who wish to design and implement new and innovative university courses in their home university. The CDC itself is by now a well-known model of curriculum support offering two week long (or longer) training programs (first in course design and student assessment, and then in teaching and learning and the evaluation of teaching). The program has innovated with linking SOTL to course development since 2004 when a pilot course portfolio program was integrated into the CDC. Following our work with selected grantees on the documentation and analysis of their teaching using course portfolios (as a format allowing them to begin SOTL inquiry into one's teaching), the course portfolio element has been fully integrated into the program since 2008. All our

grantees now write a reflective inquiry into their course, documenting its design, implementation and results in student learning. The course portfolios have allowed us to begin to move some faculty from the focus on innovation in content, to more self-aware focus on the teaching and learning approach, student assessment and scholarly analysis of such innovations in terms of student learning. Our very first SOTL Writing Residency which took place in September 2006 with the participation of course portfolio writers showed that see that some of the CDC grantees have become early adopters of SOTL in their teaching and were able to reach at least the 'big tent' (Huber and Hutchings 2005) categorization of the practice in their own work with their students and in their writing.
The program has been extensively assessed by us in 2003 and 2009 through internal and external evaluation (the latter to be completed in autumn), based on surveys, interviews, classroom observations, analysis of syllabi and portfolios.

2.3 Palestinian Faculty Development Program (AMIDEAST): CEU leading the Seminar in Excellence in Teaching (SET)

CEU has led SET for Palestinian Faculty for the past four years, running three cohorts of faculty participants through a series of linked workshops in Teaching and Learning, training Master Trainers for later take-over of the programme, and providing special add-ons for particular projects, such as on Quality Support. We take anywhere between 15 and 30 participants per annum, and provide training in Teaching and Learning, Assessment, Course Design, and Evaluation. The focus is on excellence in teaching, but scholarly teaching is also integrated as a concept. We have also attempted to lead sessions on SOTL.

SOTL training was developed first for an additional Palestinian programme funded by Amideast and USAID – sending short term fellows to US universities. Our idea was first to promote scholarly teaching during the visits to the US and help faculty to approach their mobility through self-reflective portfolios about their experiences and the materials they are able to gather. Then we wished to take them further to SOTL. Since this first experiment, we have successively provided final sessions at the end of the innovative teaching sessions on SOTL. Our aim in doing so is to show potential future directions for those who have become interested in scholarly teaching.

***2.4 Curriculum Research Fellowship Program*: research into a new area of teaching in higher education**

The Curriculum Research Fellowship invites scholars - higher education researchers and teaching faculty - from our target region, to investigate issues related to curriculum design and disciplinary teaching practices in former communist countries. The project consists of year-long grants, access to resource materials, as well as research development workshops offered to individuals or small groups of academics. The major aim of the fellowship is to create a new area of scholarly research in our target region, and raise individual academics' interest and potential to carry out research within their own disciplines. By adding an advanced research component to a topic that combines current understanding of a particular discipline with the methodology of researching curriculum- and teaching-related topics within the same discipline, we also aim to strengthen the ties between scholarly research and teaching. In the long run we hope to build a community of scholars whose research work would facilitate high quality curriculum building and teaching of social sciences. Outcomes of research projects help us formulate recommendations for future processes of curriculum design and implementation. A short description of projects supported by CRC, ranging from a study of the quality, scope, teaching methods and educational objectives of the new discipline of Anthropology in two Southeast-European countries to a research on the accomplishments and career opportunities of gender studies MA graduates from Romania can be found at http://web.ceu.hu/crc/crc_resfel.html.

2.5 *SOTL Fellowship Program*: nurturing the first generations of SOTL scholars for the region

The most direct and extensive application of SOTL principle has found its place among our programs in the recently established SOTL fellowship program (in place since 2007). This fellowship aims to provide deep 'epistemic access' to SOTL as a field of research for its participants, to foster their professional growth as inquiring university teachers, to facilitate their own leadership potential in updating teaching practices in their institutions and disciplines and it hopes to eventually begin to build new knowledge and a new community of SOTL scholars in our own region. The program is a ten-month small grant offering financial support to a select group of faculty. Two SOTL writing residencies are provided for each grantee in which research designs and research papers can be collaboratively improved, peer-evaluated and re-written. The SOTL fellows propose to carry out an inquiry into an aspect of their university teaching and are then encouraged to develop this inquiry into a full-fledged SOTL research project, incorporating research questions related to student learning, gathering evidence of student learning, performing a careful analysis of this evidence and writing a research article based on the process and outcome of this work. The program is new, and in some ways it functions as our equivalent to the CASTL Individual Scholars Program. The institutional memory and methodological know-how has largely been supplied through the CEU's collaboration with the former CASTL director and one of the CASTL scholars, dr. Richard Gale, who has been actively involved in helping to select grantees, facilitate writing residencies and advise on the program development. Our writing residencies have been particularly successful in providing a new, innovative and alternative model to training in teaching and learning as professional development. Richard Gale's knowledge of SOTL integration in many university contexts, most recently in several Canadian universities, has been of enormous help and the collaboration has allowed CRC to develop as a SOTL institution. Although only 5 scholars are supported each year, this grouping allows us to maintain a genuine small community for collaboration and peer-review and to offer support on an ongoing individual basis. There are nine projects supported in the first two years of the program, some of which are now ready to share findings through presentations and publication. The current and last year's fellows project are available on CRC website: http://web.ceu.hu/crc/crc_sotlfel.html#2008fellows

This program is small and very new therefore it is too early to say whether and when we may see significant impact on the whole region or on the institutions from which our fellows came, but based on our current program evaluation tools and our own research, we are achieving our program goals and we are moving in the direction of introducing SOTL into our region. A longer program assessment report based on document analysis, survey tools and numerous pieces of evidence from grantees is available from the CRC office. This program is of strategic importance as an example of direct adoption of SOTL principles in our own work and it is hoped that it will be renewed each year as part of our major grant application to our funders-HESP.

2.6 *HE management workshop in teaching and learning support:* Creating SOTL aware professionals in the field

The most recent addition to the CEU –offered programs for faculty which benefited directly from our involvement in CASTL leadership program has been a new workshop on higher education management (par of a series implemented by SPO) offered in June 2009, in which the CRC was able to address for the first time the notion of academic development as a field of university administration and professional practice. The leader of the CEU CASTL team (Joanna Renc-Roe) with the support of the dean of Special and Extension Programs (Sophie Howlett) and a guest form another European University (Torgny Roxa from Lund university) developed a workshop for senior and mid-level university administrators and faculty willing to become trainers or academic developers whose main topic was 'how to design and implement support structures in teaching and learning for your faculty'. Whilst the workshop was explicitly designed to share European and international experiences in order to build an understanding of how teaching and learning leadership can be implemented also in non Anglo-Saxon university contexts (using CEU and Lund as two specific and very different case studies), we were able to address a wide range of approaches to faculty development on individual, institutional and national level, considering the SOTL approach to faculty development in its many formats. The workshop was a success, and based on formal and qualitative feedback from the 18 participating practitioners (from Bulgaria, UK, Russia, Palestine, Ukraine, Belorus, Georgia, Armenia) we managed to create a new format in which to carry forward our own leadership work in teaching and learning and the scholarship of teaching and learning. We hope that this workshop will be offered each year in the series on university management and will allows us to engage many partner institutions which will in time implement structures, programs and centers dedicated to scholarly teaching and the improvement of student learning.

We will also research further the success of this first attempt of direct sharing of our own leadership experience in order to learn from this new development.

3. CRC's Leadership in innovation, research and policy analysis in graduate education

In this section, we show how we have been able to take a more active stance in helping to rethink, redesign and analyse approaches to teaching and learning in graduate education in our target region and at our own institution in the past three years. We present here various ways in which we have strived to integrate SOTL with graduate education and to rethink graduate education in general.

3.1 *Teaching in Higher Education training courses* for doctoral students: SOTL in our graduate education provision

The Training Program for CEU doctoral students is the most substantial and direct way in which we have entered our own institutional context and have attempted to acquaint our own graduate students as future educators with the principles and practices of scholarly teaching. The training program for CEU doctoral students was first piloted in 2004-2005 academic year. By designing this program we signalled to our university leadership that we are willing to take an active part in preparing the doctoral students as future faculty, in conditions were such a development was missing from most of their doctoral program experiences. We are still the main provider of practitioner training opportunities for the university's doctoral students and we are now accepted as part of the doctoral education's elective skill curriculm.

The program aims at improving the skills of CEU students as prospective academic teachers and also in much more broad terms, in showing the value of ongoing professional development, a scholarly and reflective approach to university teaching in order to ensure effective and deep student learning. In more specific terms the goals of the program are:

- Develop professional teaching skills and approaches,
- Develop the skill of reflective analysis of practice,
- Develop the potential for innovative or excellent practice
- Develop the potential for scholarly teaching

We started the program by focusing mainly on in-class training sessions or seminars designed essentially for beginner higher education teachers, but the program has been gaining in complexity every year. After a year of experimentation in intensive three day long workshops and several potential designs of the program, it has been divided into two 8-10 week long courses. In contrast to the first, workshop-intensive pilot year, in the last three years we have added teaching simulations, optional classroom observation, student-led final workshops, faculty-led roundtable discussions on teaching and professional development and most significantly, a set of individual written assignments, leading to writing a teaching portfolio.

The first of these courses address areas of teaching such as basic course design, student assessment and key teaching methods and issues (key concepts in teaching and learning, lecturing, leading seminars, lesson planning) and the second course also adds issues of higher education policy, student and faculty evaluation, further specific areas of teaching such as tutoring, supervision, teaching academic writing or critical thinking, various complex or advanced teaching methodologies, etc.

We have now several alumni reporting success at job or fellowship interviews as a result of this program or reporting that the program was helpful as part of their ongoing professional development at other universities, particularly in the Western European (most notably in the UK) systems. The course has by now engaged over 80 doctoral students (including a small number of visiting students from other universities).

A comprehensive evaluation of the program has been undertaken in 2009, using document analysis, a web-based anonymous survey of program alumni, analysis of recent course evaluation forms and two focus group interviews with the program alumni (of the two 2008-2009 courses). Based on these data, we can say that our program is achieving most of its goals to a satisfactory degree, though the goals of developing the potential for innovative, excellent, and scholarly teaching are hard to measure in any way at this early stage in the professional development of the academic, who is often a doctoral student not yet heavily engaged in the practice of teaching. Nevertheless, some views of our alumni are very encouraging as they suggest that these students have indeed managed to acquire a SOTL-based perspective on teaching and learning. Already in the first semester course this is suggested by some of the views of our students (from the focus group interview in December 2009):

> *And [teaching is] more serious. It's the whole responsibility. I can't just say I am saying some things to people and if they understand, Ok, if not, then it's their own fault. So it's not that easy anymore. Lecturers should be responsible for the success of their students. ... it was somehow [my thinking] before, but not I know much more what that means, how to realize this seriousness or how to make students perform better. By seriousness I meant that not only research is the most important thing for scholars, because normally, a well established scholar thinks "OK research is my most important business, teaching is OK, something that I can do just on the side but not really as important as my research so getting my research published, getting things publicly done, that's my aim. And teaching is just kind of a minor field of performance, just getting some salary there".[...][what is different for me] is that teaching is as serious as real research.*
>
> *I would like to emphasise the point that one of the most important things is to integrate teaching and research even in the sense that you make the students want to be researchers. I mean in political science, you know the kind of students we get, many of the students they have these illusions, they want to be 'Eurocrats' or politicians and actually to convince them that the science part is more important then the politics part. ..[I just wanted] to emphasise the point that the challenging part is to make the students want tot be researchers.*
>
> *They are connected. Its not that teaching is in one box and research is in another box and they are not transferable, so you can get sources from your teaching or ideas from your students.*
>
> *It's a different think to know this and its and it is a different thing to realize it because after some time you just distance yourself from your students .... So you think, they don't know what I know and I have to explain it to them, and that is wrong because you have to make them teach you also, you have to keep them coming into your level, but not really to distance yourself from them, and it's not very difficult to make that distance.*

The students taking the second level course, have managed to translate this perspective into distinct pieces of their own work on teaching, sometimes coming close to more public SOTL products in the shape of their teaching portfolios, which included course syllabi, reflections on teaching experiences, statements of teaching philosophy, annotated bibliographies and reading responses, and designs for innovative teaching methods and student assessment methods.

This program is now fully institutionalised at CEU, and last year has also been delivered to another local university based on a request from one of the faculties. The evaluation report on this program is available from the CRC office.

3.2 CRC as the *Quality Support Unit* at CEU- Facilitating of CEU's ongoing assessment of teaching and learning:

Under the leadership of CRC, CEU is presently making a significant turn towards outcomes-based assessment of student learning which is one of the important institutional policy agendas that may be positively related to the development of SOTL (though it may also be an obstacle in some cases). A set of quality assurance instruments has been designed and put in place by the CRC team to help assess and improve the learning outcomes assessment process. The turn involves re-conceptualization of the entire program structure, beginning with revisiting the University mission, and translating it into the University-level learning outcomes for all CEU graduates. Following that, each program has created a grid of learning outcomes, comprising generic graduate outcomes (i.e. graduate-level cognitive skills, research-skills, self-renewal skills, etc.), University-level outcomes of two types – mission-driven (e. g. inter/multi-disciplinarity, policy-relevance, innovation, etc.) and context-driven (e.g. academic writing and oral presentation in English as a foreign language, basic information literacy and critical thinking skills), and outcomes specific to the program. Individual courses then take responsibility for making sure each of those learning outcomes is achieved and measured to form a wholesome graduate. The importance of formative written feedback is stressed at this level alongside with continuous assessment.

The core of the CEU working group on the assessment of student learning which consisted of the CASTL leadership team has implement pioneering methods of studying individual courses and consulting academics and department heads on policy and implementation and the work done been applauded by the Middle States Accreditation team in May as professional, innovative, effective, sensitive and exemplary in introducing learning outcomes policy and related research of teaching and learning.[2]

As a result, the CRC team has been named the CEU's Quality Support Unit and will continue to provide leadership in the area of teaching and learning assessment and quality enhancement for the university from now on. This is an important development for the future of our SOTL work, as it has allowed us to link to an important and related policy agenda at the university level, resulting in further institutionalization of CRC as the leader in teaching and learning, now providing in-house as well as outreach consultancy and support. With new university rector and president taking his post in August 2009 and with the Middle States Accreditation now secured but requiring further ongoing efforts of research in the area of student learning, a unique platform for linking SOTL work with university day-to-day work may become possible.

3.3 Debating change in doctoral education: *Doctoral education workshop series*

In fall 2004 our center has started a series of 4 workshops on the reconstruction of doctoral education in East-Central Europe and the former Soviet Union, inviting academics, university leaders and policy-makers to debate the challenges of transition from the old German-type doctorate system to a more modern, British or American-type PhD degree. The first event in this series (Budapest, November 2004, http://web.ceu.hu/crc/rec_doct.html) was a more general discussion about doctoral education worldwide, and focused on the "academic basis" of what a doctorate program is and should be. After that philosophical underpinning we have taken the discussion into more practical terms, and started to consider the policy applications of some of the earlier academic considerations. Our St. Petersburg 2005, and Lviv 2007 events (whose transcripts are available at http://web.ceu.hu/crc/kandidatskaya.html and, http://web.ceu.hu/crc/worksh_lviv.html respectively) focused on practical solutions: policies and their possible implementation for the improvement of the Russian and post-soviet post-graduate degree system, as well as on quality assurance in doctoral education. The workshop that most directly connected

[2] CEU Report by the Evaluation Team of Middle States Commission on Higher Education, June 2009, p 27.

to SOTL was the final 2008 Belgrade workshop entitled "Reconstructing the doctorate: new trends in teaching" (http://web.ceu.hu/crc/worksh_belg.html) that focused on the role and content of coursework and teaching skills in doctoral education. Participants in this workshop discussed a variety of questions related to the role of coursework in doctoral education, and have challenged each other to think about the vision of the "products" or "outcomes" that universities and countries wish to have as a result of doctoral studies. A major part of the workshop was dedicated to the issue of doctoral students acting as teachers and the need to build skills through training and professional development into the structure of doctoral programs.

3.4 *Research project: a Study of the Doctorate: advocating meaningful reform in our region*

To compliment our activities on the doctorate and continue the development of our growing profile in policy analysis, we have produced a study on the contemporary state of the doctorate. This has been presented to the Higher Education Sub Board and will inform our next step in driving the policy conversation forward. At the heart of the discussion of the doctorate is whether the new European doctorate is a bureaucratic superficial re-organisation of a process to produce simply more advanced knowledge workers, or whether there is any opportunity for teaching excellence that can act to unlock exciting and innovative researchers and teachers for the future.

3.5 *Central Asian Access Program and CEU Modular Doctoral Program: Conceptualizing access to graduate education for current non-researching teachers*

Central Asian Access Program (new program to start from 2010) aims to facilitate the entry of promising Central Asian university teachers in social sciences and humanities into international modular or part-time doctoral programs. It is a 6-month-long intensive program designed to increase the competitiveness of Central Asian university teachers at the selection stage. The access program is built around two pillars – English-level competence and academic competence, both driven by the requirements of acceptance for international doctoral programs. The access program consists of a summer school at the American University-Central Asia in Bishkek, Kyrgyzstan and one semester at CEU. Following the access program, the teachers are given the opportunity to apply for the modular doctoral program at CEU, which is a flexible program without a strict residency requirement. The modular doctoral program allows the students to continue teaching at their home universities while doing their doctorate. It thus does not uproot teachers from their home institutions like other doctoral programs do, while their teaching continuously benefits as a result of their working on their doctorate. It is expected that part of the residence at CEU for the doctoral students will include participation in the CRC SOTL oriented professional development program: Teaching in Higher Education which will ensure that they will leave with the knowledge of SOTL principles and the capacity to become scholarly teachers upon return to their home university.

In the long-run, the two programs will build an elite core of university teachers with international doctoral degrees, who will act as the catalysts for the future centres of excellence in research and teaching in Central Asia.

4. ASSESSMENT OF OUR WORK AND LOOKING TOWARDS THE FUTURE

The year 2009 has been marked by intensive self-scrutiny of our work in graduate education, faculty development and SOTL leadership for several reasons. Obviously, the CASTL Leadership Program is coming to a close and we are preparing to enter into a new phase of our leadership work, with close collaboration with some of our CASTL partners whom are now important institutional allies and collaborators. We have met our CASTL group every year for the past four years and we have shared many conversations, papers and presentations. Our achievements in institutionalising SOTL and rethinking graduate education have been significantly enhanced by being able to draw on the experiences of our other CASTL team members who lead similar programs in very different locations. Looking at the achievements at Rutgers for example has been particularly encouraging in our own efforts as we were able to recognise the same tensions and challenges in our work, even though the university contexts are very different. It was also informative to look at the STEM model developed by CELT and the efforts of AAG and Michigan University's residential program. Our ongoing conversations with our European partner, the UCC, have been particularly beneficial in sorting through the difficulties and opportunities that this educational space provides. It seems that we have actually learnt more from understanding our different circumstances and comparing very different programs then by an explicit focus on producing something comparable or similar.

Participating in CASTL gave us a very much needed international network of advanced institutional leaders. This has encouraged us to research and present our own work internationally, and has given us more confidence and a clearer vision of what we are aiming to do as a department, both for our own university and for our region. We have felt privileged to be the only continental European university in this network and we hope to carry on engaging other institutions here in Central and Eastern Europe, and in the Former Soviet Union in our efforts to develop and recognize scholarly teaching. We are sure that the positive impact of this three year association with CASTL will continue to be visible in the years to come as we carry on our work in other venues, through ISSoTL and other SOTL or related networks.

Based on this experience we are ready to continue collaborating further. At the moment we are looking to present a panel together with UCC and Rutgers at Bloomington ISSoTL conference to summarise our learning on graduate education and SOTL.

CEU has also become very close collaborator of NAIRTL (the CEU's CASTL coordinator serves on NAIRTL's International Advisory Board) and we will continue to help each other in our respective programs or to meet on a more regular basis, considering our relative proximity and the numerous common interests that stem from being European CASTL participants and SOTL promoters.

In addition, our contribution to CEU's American accreditation process has been completed, and our work on teaching and learning assessment received quite direct praise from the accrediting team (which included the CASTL leadership team coordinator from Rutgers assessing another area of the self-evaluation). This has provided us with an additional and helpful external recognition and approval that we hope to be able to utilize as we prepare to engage the new incoming rector and president in our work. Taking into account our current status as a CASTL network member, we are going to innovate and research our work further, hoping to be able to become a fully integrated, professional teaching and learning and quality support center at our own university, as a new dimension to our current outreach and consultancy work with regional faculty, institutions and systems which we will also continue to develop.

Finally, in relation to our existing programs funded by Open Society Institute's Higher Education Support Program, we have also undertaken a systematic self-evaluation process in order to prepare materials and evidence of program goal achievement for an external evaluation which will take place in November. This means that we now have some more direct or indirect evidence of our successes and our current problems which we hope to share with our peers and our CATL networks when appropriate, most notably at the CASTL Colloquium and ISSoTL conference in Bloomington.

The Impact of Future Faculty Professional Development in Teaching on STEM Undergraduate Education: A Case Study about the Delta Program in Research, Teaching and Learning at the University of Wisconsin-Madison

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(This is a transcript of a white paper for the National Academies: Linking Evidence and Promising Practices in STEM Undergraduate Education Workshop: October 13-14, 2008).

The Delta Program brought together an intergenerational, interdisciplinary team that consisted of a Computer Science graduate student, a post-doc, who is now an assistant professor at a major research university, and an assistant professor in Civil and Environmental Engineering. Through a course about creating instructional materials, the Program provided them with the capacity to accomplish the design of an interactive web tutorial to improve students' problem solving abilities.

As a result of their experience in the classroom, this team found that undergraduate students were having trouble translating word problems into the conceptual framework of disciplinary models, and then manipulating equations to solve the problems. The web tutorial that this team designed guided students through step-by-step solutions of problems, and then required them to solve similar practice problems on their own.

The team analyzed student solutions of a sample problem across two semesters to compare student performance both without and with the learning module. To do this, they classified the types of mistakes students made in their answers into categories. Setting up and solving equations, initially observed as one of the worst areas in student performance before use of the tutorial, saw the most improvement among the six types of student solutions analyzed. From their data, these researchers concluded that the web tutorial approach was effective in reducing students' misunderstandings about solving this type of problem. The data also indicated additional areas where students needed support, which gave the team clearer insight into the next round of revisions.

The story of this intergenerational, interdisciplinary graduate student, post-doc and faculty team provides some insight into the broad value of Future Faculty Professional Development (FFPD) programs. First, these programs can have profound benefits for future faculty by providing them with the training that they need to (a) be better prepared for entering the job market, and (b) for their roles once in a new position. Second, FFPD also have an enormous potential to improve undergraduate education at both the training institution (e.g. by way of implemented projects as well as through Teaching Assistants (TAs) who are more fully trained), and the undergraduate institutions that employ these future faculty. In this white paper, I will address both aspects of this issue. After providing background information on the landscape of recent FFPD programs and initiatives in higher education, I will focus on a specific FFPD program, the Delta Program in Research, Teaching and Learning (hereafter referred to as the Delta Program or Delta; www.delta.wisc.edu) at the University of Wisconsin-Madison (UW-Madison). In addition to describing the format and structure of this program as well as some of its offerings, I willprovide evidence of the impact of the Delta Program on both future faculty professional development in teaching as well as on undergraduate student learning. I will also discuss the assessment instruments and approaches being used. I conclude by discussing gaps in the research, areas where evidence is missing, as well as next steps for developing and demonstrating effectiveness of this type of professional development program for future Science, Technology, Engineering and Math (STEM) faculty.

The preparation of future faculty for their roles

There are roughly 4000 institutions of higher learning in the United States, a challenging number for any national faculty development initiative. However, approximately 80% of all United States Ph.D.'s are graduated from only 100 research universities (Walker, G.E., et al. (2008); Hoffer, T.B., et al., (2007)). Thus graduate schools represent a 40-to-1 leverage point for the preparation of the national faculty and the enhancement of undergraduate education.

Often, whether it is overt or not, the institutional philosophy of research universities values research above teaching. Therefore, while graduate students and post-docs receive excellent disciplinary research training, many receive minimal, if any formal training to teach (Boyer Commission, 2002). For example, teaching assistants (TAs) or gradate student instructors (GSIs) are likely to receive variable amounts of training before entering the classroom. For many, this training is not uniform, and may fluctuate from several hours to several days depending upon the student's college and department in the institution. Once they enter the classroom, there may be no follow-up training or discussion available. This is obviously not the case at all institution, but its prevalence impacts the preparation of these students for their roles as TAs or GSIs and beyond.

In the same way, the amount of training and preparation that graduate students and postdocs receive, beyond research training, for their future responsibilities as faculty (e.g. how to manage a research group, how to mentor their own graduate or undergraduate students, how to do outreach/service, how to teach, etc.) varies by institution. This lack of alignment between training received and the skills and knowledge that future faculty will need to be successful (Austin and McDaniels (2006)) is problematic. Fortunately, exceptions exist. For example, Michigan State University's PREP program (http://grad.msu.edu/stages/index.htm) provides future faculty with range of workshops covering early, mid and late graduate career issues on topics ranging from "Choosing an Academic Advisor/Mentor" to "Preparing for the Job Search". Other colleges and universities have institutionally-supported versions of their Preparing Future Faculty Programming. Colleges and universities may also offer some form of career day programming, in which potential career options beyond the faculty position at a Research 1 university are showcased. However, extensive professional preparation is the exception, rather than the rule.

Golde and Dore (2001) concluded that there is a three-way misalignment among (a) doctoral students' *goals* to be good educators, (b) their actual *training*, and (c) their subsequent *careers*. However, the situation is changing. With multiple reports identifying the need to improve STEM education and increase the number of STEM graduates (Committee on Science Engineering, and Public Policy, 2006; U.S. Office of Science and Technology Policy, 2006) the national focus has shifted toward addressing this misalignment. For example, some programs have examined the graduate school experience with an eye to changing the pervasive research culture. Prior to 2003, the Reenvisioning the PhD initiative (http://www.grad.washington.edu/envision/index.html) set out to develop strategies to effect change based on a new vision of the Ph.D., and support discussions at a local and national level about innovative practices in doctoral education.

In addition, over the last decade, there have been a number of "training" efforts to address this issue of mis-alignment. Importantly, an underlying assumption in these efforts is that *better training of future faculty will directly result in improved undergraduate STEM education*. In this white paper I will focus on the Delta Program in Research, Teaching and Learning at the UW-Madison as an example of a program that provides future faculty with formal training to teach, through the professional development activities it offers. Other examples of programs that provide professional development in teaching, or professional development more broadly, include the following: (a) the Center for the Integration of Research, Teaching, and Learning (CIRTL; www.cirtl.net), (b) the Wisconsin Program for Scientific Teaching (WPST; Handelsman, 2004), (c) the Graduate Students in K–12 Fellowship Program (GK–12; Trautmann & Krasny 2006)), (d) the Preparing Future Faculty program (PFF; Gaff, Pruitt-Logan, Sims, & Denecke, 2003), (e) the Carnegie Initiative on the Doctorate (Golde & Walker, 2006), (f) and the Responsive Ph.D. Program (Woodrow Wilson National Fellowship Foundation, 2005).

Importantly, there is only limited longitudinal research available that documents the success of teaching professional development programs on graduate students and post-docs as they assume new faculty roles. One such study identified 129 alumni of PFF programs who were subsequently hired in faculty positions. PFF participation was found to help these alumni negotiate challenging academic job markets and balance their teaching and research responsibilities (DeNeef, 2002). CIRTL has also undertaken a longitudinal study of participants in the Delta Program (Bouwma- Gearhart (2007)). Findings from this study, as well as proposed research in a recently funded NSF proposal to extend the CIRTL longitudinal study of Delta will be discussed later in this paper.

Building off of this landscape of FFPD programs and efforts, in the next section I will discuss the Delta Program as one example of a program that is providing professional development in teaching for future faculty, with the potential to impact not only their careers, but also undergraduate student learning.

The Delta Program in Research, Teaching and Learning at the UW-Madison

Because research universities such as UW-Madison provide all types of colleges and universities with Ph.D.-trained faculty, changing how UW-Madison graduate students and postdocs are prepared for their teaching role has the potential to improve undergraduate instruction not only at UW-Madison, but also at all of the institutions of higher education that hire these doctoral students and post-doctoral researchers. Delta participants are taught to engage in ongoing enhancement of student learning; this parallels and complements the world class research skills they develop at UW-Madison. This broad training prepares these individuals to better meet the challenges of new faculty positions. Undergraduate learning at UW Madison, as well as at the hiring institution, stands to benefit greatly. The Delta Program is a model program of the National Science Foundation-funded Center for the Integration of Research, Teaching, and Learning. Delta was created with the strategic vision that better training of postsecondary educators will directly result in improved undergraduate STEM education. The Program mission is *to enhance undergraduate education by promoting the development of a future national faculty in the natural and social sciences, engineering and mathematics that is committed to implementing and advancing effective teaching practices for diverse student audiences as part of their professional careers.* To achieve this goal, the Delta Program has worked to create, support, and sustain a vibrant interdisciplinary, intergenerational learning community of current and future faculty. The program strives to help each member of the community experience the support of diverse colleagues and develop ways to engage in meaningful inquiry about their teaching and their students' learning. 4 Delta's approach to providing professional development opportunities in teaching is based on three tenets (referred to as the "Delta Pillars"; http://www.delta.wisc.edu/delta_pillars/about_d elta.html):

1. Helping graduate students, post-doctoral researchers, academic staff, and faculty (i.e., graduates-through-faculty) use their disciplinary approach to research as a model to explore whether their students are learning what they are teaching ("***Teaching-As-Research***"; TAR);
2. Cultivating communities of learners who generate new knowledge together about teaching and learning though mutual support ("***Learning Community***"; LC);
3. Discerning and valuing the diverse ways of knowing that have the potential to enrich every classroom and laboratory ("***Learning-Through-Diversity***"; LTD)

These three foundational concepts, which inform and support every aspect of the Delta Program, are the defining traits of Delta as a future faculty professional development program. The Program hypothesizes that these three core ideas, teaching-as-research, learning communities and learning-through-diversity, are essential ingredients for creating a successful FFPD program that not only trains excellent educators, but also results in improved undergraduate education both at the training institution as well as at the institution employing these future faculty. These three foundational concepts have proven to be a powerful approach to engaging future STEM faculty. Of equal importance, these concepts are engaging for current STEM faculty as well (Mathieu et al. (2008)).

The Delta Program offers numerous opportunities for participants to learn how to effectively integrate academic research, teaching, and student learning. Currently, Delta's core programming includes six courses, three small-group facilitated programs, internships, Roundtable Dinners, and a Certificate program; Delta also offers a small number of targeted workshops and informal discussion groups. As a program, Delta is deliberately structured to provide a combination of low- and high- commitment activities that attract a broad range of participants from all STEM and Social, Behavioral and Economic Sciences (SBE) departments. We attempt to have each Delta course and program taught by a research-active STEM faculty member often in partnership with someone from the social sciences (Pfund et al. (2006)).

Delta courses target graduate students and post-doc participants in the STEM and SBE disciplines. The *Instructional Materials Development* course is unique in requiring that graduate students and post-docs team up with a faculty or instructional staff member to address a teaching-as-research issue through development of new instructional materials. Likewise, Delta internships, which are in reality teaching-as research assistantships that are akin to disciplinary research assistantships, pair graduate students and post-docs with a faculty or instructional staff partner and mentor. While Delta courses focus primarily on graduate students and post-docs, programs like Creating a Collaborative Learning Environment (Sanders, et al. (1997)) and Expeditions in Learning (Carlson-Dakes & Pawley (2005)) are designed to address the needs of graduates-through faculty. In some instances, faculty-only sections of these programs are offered. Delta workshops have specific target audiences as well; there are versions of a workshop for both graduate students and faculty about addressing NSF broader impact requirements in grant proposals (Mathieu et al. (2008)). Finally, Delta's Round Table dinners are open to all graduates through- faculty on campus and are a learning community-building activity. The dinners create an opportunity for attendees to listen to a guest speaker introduce a teaching and learning topic of general interest or a provocative issue for discussion. These dinners are viewed as a low effort entry point into the Program learning community.

Delta courses range from in-class instruction to a blend of classroom activities with a strong experiential component. Each course or program incorporates the three Delta pillars into the material presented. As an example, Delta's *Diversity in the College Classroom* course encourages graduate student and post-doc participants to look critically at how they define "diversity" and for what purposes, and discuss the ways different definitions of diversity might influence what is included in a course's content as well as how the course is taught. In the second half of the course, students apply what they have learned in developing an action plan (Pawley et al. (2006)), which they are encouraged to turn into a teaching-as-research internship project.

In contrast, Expeditions in Learning follows an experiential learning model that is grounded in adult learning theory. In this program, new questions about teaching and learning are developed, methods of exploring them are created, and the discovery of new answers by individuals and groups is supported. Every other week, participants head out on campus on an "expedition" to experience a learning activity or environment that helps to stretch their understanding of diverse approaches to learning and teaching. In the weeks between the expeditions, the small groups come together to engage in a facilitated discussion of what they experienced the previous week, what they learned, and the implications it may have on their teaching.

Last, Delta courses and programs are open to all students, regardless of their background experiences in teaching and learning. Only Delta internships expect that a student take a semester-long Delta course as a pre-requisite. For some students the internship serves as the capstone in their Delta experience; other students continue to take Delta courses following completion of their internship. Building on this description of the Delta Program, in the next section, I will focus on evidence of impact of the approaches used by the Program. I will further sub-divide this section to first address evidence of impact on future or current faculty, and follow this with a discussion of the evidence of impact on undergraduate learning. A variety of examples will be drawn from Delta courses and internship projects.

Evidence of impact

Evidence of impact on participants in the Delta Program, and on the undergraduate students that these participants in turn teach, is being gathered at multiple levels. For example, participant learning (e.g. knowledge and skills) is assessed in the individual Delta courses and programs. Participants reflect on their practice and measure undergraduate student learning in internship projects. They create a teaching and learning portfolio for the Delta Certificate Program. Their teaching practice is captured in participant presentations and publications about their work (e.g. Walz & Kerr (2007); D'Amato, et al. (2007)). In addition, between 2004-2007, a longitudinal study was conducted by CIRTL researchers; this study explored the impact of Delta professional development programming on Delta participants.

Evidence from a wide variety of these sources, as well as the implications for understanding the value of FFPD programs like Delta for the preparation of future faculty, will be discussed next.

Evidence of impact on future or current faculty

As described in the following table, in this section I will present four examples of the impact of Delta programming on current and future faculty, as realized through a variety of Program activities.

Table 1: Impacts of the Delta Program on current or future faculty

Type of impact	**Intervention**	**Description**	**Individual(s) impacted**
Mastery of broad content or concept/s (e.g., increased understanding of principles of how students learn	Delta's College Classroom course	Students learn pedagogical approaches, write a teaching philosophy, design a syllabus and learning plans, and complete a microteaching experience	Graduate student and post-doc participants (i.e. future faculty)
Development of teaching skills and techniques	Delta Internship Teaching-As-Research project	Students learn about both extracellular matrix engineering and active learning as a pedagogical approach	Graduate student participants in the course (i.e. future faculty)
Development of interpersonal skills (e.g. collaborative or cooperative work)	Delta Internship Teaching-As-Research project	Workshop materials for teaching assistants that provide an active introduction to cooperative learning	Graduate student participants in the Workshop (i.e. future faculty)
Affective outcomes—evidence of changes in faculty/student motivations to learn, in values and attitudes about science, other attitudinal changes	Delta Diversity in the College Classroom course and Delta Internship Teaching-As- Research project	Development of resources on ways to address diversity in the classroom and grading practices	Astronomy instructors and teaching assistants (i.e. current & future faculty)

Example 1: Mastery of broad content or concept/s
(e.g., increased understanding of principles of how students learn)

Courses like Delta's *College Classroom* play an important role in preparing future STEM faculty to teach effectively. In this venue, students learn about various pedagogical theories and approaches, write a teaching philosophy, design a syllabus and learning plans, and complete a micro-teaching experience. The *College Classroom* course is a core offering in the Delta Program. To analyze student learning, Delta instructors in this course used summative assessment measures, which included pre- and post-surveys, observations, a focus group discussion with outside facilitators, and the on-line Student Assessment of Learning Gains survey (SALG; www.salgsite.org; Courter *et al.* (2006)). Their results are summarized in the following table.

Table 2: Gains in student learning in Delta's College Classroom course

Evaluation questions	Findings
What activities were significant in contributing to student learning and growth, specifically as a professional in the academic community?	Students reported in the SALG survey that the group discussions, peer reviews, teaching and learning philosophy examples and workshop, and the microteaching experience were important contributors.
In what areas did the students demonstrate Significant understanding of STEM teaching and learning issues? How do we know this?	Assessment and teaching-as-research. This was evident in their learning plans, and in the improvements they made from one draft to another and from their peers' comments in the micro-teaching experience.
What learning experiences were most significant?	The microteaching experience was identified by most students as the most significant learning experience; this is important to know since the time commitment to this experience is considerable.

The data presented speaks to the value of this type of immersion experience for increasing the understanding of future faculty both about how students learn, and how to use this knowledge to teach more effectively. The next example describes a course for graduate students, which was designed to cover content *and* model active learning as a teaching approach, as a way of teaching the participants to use the pedagogical approach.

Example 2: Faculty skill development
Teaching skills and techniques among current or future faculty

Engineering education cannot be successful by focusing on teaching content alone. Future engineering leaders require both a broad knowledge base and effective communication skills. This Teaching-As-Research Internship project examined the attitudes engineering graduate students have about effective teaching and learning practices. 7 In addition, teaching was used as a tool to both engage students in active learning and teach them about the approach (McNeil, E. and Ogle, B. (2008)).

To accomplish this, a new disciplinary course was developed to enhance student understanding of extracellular matrix engineering (ECM) and introduce students to active learning as a pedagogical approach. Student attitudes were assessed quantitatively through pre and post course surveys, and qualitatively through discussion about pedagogical approaches following each lecture. Surveys were used to gauge a range of topics including: students' teaching experience, confidence level in teaching, and opinions about teaching practices, including active learning techniques

In both the pre- and post-course surveys, students rated their confidence about various aspects of the course. As demonstrated in the following figure, students reported being more confident leading a discussion after completing the class. An improved confidence level of course content knowledge was also observed. A slight increase in confidence toward presenting a lecture or using new teaching techniques was observed (not statistically significant).

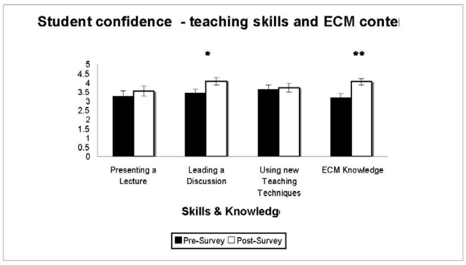


*Figure 1. Student confidence increases for both teaching skills and ECM content knowledge. Students ranked their confidence on a scale of apprehensive (1) to very confident (5). Paired students' t test was used to compare pre- and post-survey results. *Indicates significant at .05 and ** indicates significant at .01.*

In addition, in the pre- and post-survey, students were asked to list the steps that they would take if they were planning a lecture. After preparing a lecture and leading a class discussion in the EMC course, and talking about teaching throughout the semester, students' approaches to planning a lecture became more developed and specific. For example, six out of eleven students increased the number of steps that they would go through to prepare a lecture. Additional steps that were added included the following: (a) planning an active learning component (added by 27% of students in the class), (b) practice (added by 18%) and (c) development of learning goals around which to organize a lecture (added by 45% of students in the class).

These results demonstrate the efficacy of using teaching as a tool to both engage students in active learning and to teach them about the approach. The results also speak to the value of providing future faculty with an opportunity to experience effective teaching techniques, and the importance of providing them an opportunity to develop relevant skills.

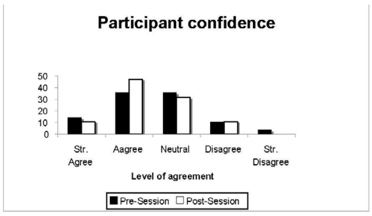
The example that follows explores the value of the guided workshop approach for teaching graduate student teaching assistants (TAs) to use cooperative group work with their undergraduate students.

Example 3: Future faculty skill development
Interpersonal skills (e.g. collaborative or cooperative work) of students

An ongoing effort to reform the introductory physics sequence at UW-Madison includes development of class materials that engage students as active learners. For example, in discussion sections, there is now a greater emphasis on the use of context rich problems in conjunction with cooperative learning groups. While exercise sets of this type are widely available, there is little in the way of supplemental materials that provide the instructors and/or teaching assistants with: (a) guidelines to effectively administer these problems, (b) experience using active and cooperative learning, or (c) motivation to move away from more traditional discussion and lecture styles

To address these needs, this Teaching- As-Research Internship project developed, implemented and assessed workshop materials that provide an active introduction to cooperative learning (Klukas, J. (2007)). This project aimed to generate a measurable difference in the following: (a) participants' motivation to employ active learning techniques, (b) their confidence in their ability to lead cooperative learning sessions, and (c) their effectiveness in increasing student learning.

Using pre- and post-session surveys, that serve as both formative and summative assessment tools, the intern observed moderate gains in the participants' feelings of confidence and competence in their ability to facilitate group work (Figures 2A and B). The data also show an increase in participant awareness of education research (as applied to teaching), and evidence of the community-building potential of such workshops and conversations among these new teachers in the Physics Department.



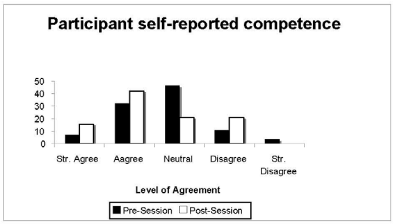


Figure 2: Distributions of answers for two baselinequestions used to evaluate the effectiveness of TA training session materials. Participants were asked to rate their level of agreement with the following statements: (A) Participant confidence: I feel confident in my ability to run a discussion section focused on group work; (B) Participant self-reported competence: I feel competent in being able to help a group run smoothly and to encourage interaction between members of a group. The total numbers of participants responding are 28 for the pre-session and 19 for the post-session surveys.

The results of this project address the value of providing future faculty with an opportunity to experience effective teaching techniques, collaborative and cooperative group work in this case. A workshop format with relevant resources also provided these future faculty with a solid experiential foundation for changing their practice of teaching.

The final example in this section highlights a project that is in progress. This project aims to address attitudinal change in an introductory Astronomy course by first raising awareness of issues of diversity and inclusiveness, and second creating instructorfriendly resources.

Example 4: Affective outcomes—evidence of changes in faculty/student motivations to learn, in values and attitudes about science, other attitudinal changes

The following Teaching-As-Research Internship project is in progress. It began as an action plan in Delta's *Diversity in the College Classroom* course. The description that follows is derived from the project proposal (Devine, K. (2008)).

Student diversity and how it may impact learning is currently not discussed or considered in Introductory Astronomy at UW-Madison. However, when reviewing final grade breakdowns for the course, the Delta intern noticed that white males received a disproportionate number of 'A' grades. The student went on to question whether ignoring diversity is negatively impacting *all* students, and if there are ways to improve teaching so that individuals typically underrepresented in the sciences—women and minority students—are provided equal opportunities to succeed.

This project is designed to do the following: (a) look for a correlation between Astronomy course grades and student gender and race, (b) examine Introductory Astronomy instructors' attitudes regarding diversity and their current teaching styles, (c) explore any influence instruction may have on any relationship between grades, gender, and race. The student's ultimate goal is to use the findings to create ongoing discussion of teaching and 9 diversity in the Introductory Astronomy classroom as well as discipline specific resources for instructors to use to develop a more inclusive classroom environment.

To explore grade trends, students will be surveyed at the end of the fall 2008 semester; department faculty, staff lecturers, and graduate student instructors will be surveyed as well. The survey will ask about teaching experience, attitudes regarding teaching style, attitudes regarding diversity's role in the science classroom, and willingness to adopt new teaching techniques. Results from the survey of instructors will be incorporated into a write-up that also cites research regarding diversity and astronomy education; resources for instructors will be provided along with the write-up.

This project gets to the heart of the issue and explores the attitudes that faculty, instructors and teaching assistants hold about the relevance of diversity to teaching about the discipline. In time it will produce evidence of these attitudes, and provide tools intended to change these attitudes in a positive direction.

In the next section I will turn my focus to the impact future faculty professional development in teaching can have on undergraduate learning. Before exploring this through examples of projects developed by Delta participants, I will discuss how continued use of the product of a project (e.g. new instructional materials) has the potential to to impact undergraduate student learning across multiple semesters.

The true impact on undergraduate student learning, of any one project, is amplified

Participants in the Delta Program learn more effective approaches to enhancing learning through both their involvement in courses and their application of the knowledge that they gain in these courses. Delta courses, like *Instructional Materials Development,* for instance, require the application of participants' acquired knowledge in the form of a course project. Similarly, as evidenced by the examples given in the preceding section, the Internship Program requires this type of application and implementation of learning directly through the internship project. One of the *hypotheses* of the Delta Program is that if participants apply the pillars of teaching-as-research, learning communities and learning-through-diversity to their teaching, then their students will learn better. It is important to note that in the table that follows, the number of undergraduate students listed represents the number of individuals participating in the course or outreach activity at the time of the project. Many of these learning activities continue to be used in these classes and outreach projects. Thus, the *true impact* of any one project on undergraduate student learning is amplified by its continued use from semester to semester.

Table 3: Impact Data from Delta interns (Fall 2004 – September 2008) – Undergraduate students impacted

Discipline & location (if not UWMadison)	Number of undergraduate students impacted
Bacteriology	50
Biology	120
Botany	231
Center for Limnology	14
Chemistry	550
Chemistry (Madison Area Technical College)	70
Engineering	100

Engineering (Biomedical)	155
Engineering (Electrical & Computer)	50
Engineering (Environmental)	50
Engineering Physics	4
Environmental Studies	92
Genetics	60
Geology	176
Materials Science & Engineering	4
Mathematics	100
Medical Microbiology & Immunology	24
Physiology	9
Zoology (Edgewood College)	15
TOTAL number undergraduate students impacted:	**1874**

Data in Table 3 were gathered from Delta interns. The discipline of the department in which the internship project was conducted, as well as location of off-campus internships is noted. Each intern did some form of evaluation of student learning in association with their project. Undergraduate students were the primary audience for these intern projects. Approximately 1874 undergraduate students were impacted by the instruction and new 10 materials created by these interns between Fall 2004 and Summer 2008 (n= 47 interns/projects; Note: data from f'06 and sp'07 interns is not included). Similar data is available from participants in the *Instructional Materials Development* course (not shown).

A number of methods of evaluating undergraduate student learning were employed in the internship projects in Table 3. The pedagogical approaches and assessment designs students develop generally derive from things that participants learn in Delta courses and through the internship. Examples include the following:

- Surveys, test scores, interviews
- Student Assessment of Learning Gains on-line survey
- Multiple-choice assessment
- Pre- and post-questionnaire, student presentations, group projects.
- Midterm exam
- Pre- and post survey, pre- and post-experience essay, job shadow
- Concept tests; targeted exam questions, laboratory report

The data in Table 3 speak to the enormous potential for impact that a graduate student intern, working with a faculty or instructional academic staff member, can have on undergraduate student learning at UW-Madison and beyond.

In the section that follows, I explore this impact on undergraduate student learning; multiple Delta Internship Teaching-As-Research projects serve as illustrative examples.

Evidence of impact on undergraduate learning

As described in the following table, in this section I will present five examples of the impact of Delta programming on undergraduate student learning. These effects are indirect, in that Delta programming is designed for graduate students and post-docs, and these impacts are on *their* students.

Table 4: Impacts of the Delta Program on undergraduate student learning

			Individual(s) impacted

Type of impact	Intervention	Description	
Increased student understanding of specific STEM topics due to improved faculty teaching.	Delta Internship Teaching- As-Research project	The effectiveness of podcasts in achieving course learning objectives was evaluated	Undergraduate students in an introductory environmental studies course
Development of student scientific skills (e.g. measurements, observations, etc.)	Delta Internship Teaching- As-Research project	New course materials were designed to teach the experimental design process; a statistics tutorial was created	Undergraduate students in advanced Biology core curriculum
Development of student higher-order thinking skills	Delta Internship Teaching-As-Research project	Materials were created to help non-science majors apply concepts learned in lab to novel situations	Undergraduate students in Integrated Liberal Studies class
Development of student lifelong learning skills (communication - writing, speaking, graphical presentations; quantification skills)	Delta Internship Teaching- As-Research project	Development of a new scientific writing curriculum designed to teach scientific reading and writing skills in a content integrated manner	Undergraduate students in an upper level geology course
Behavioral outcomes advancing curricular or institutional goals, such as increasing STEM retention; preparing students to engage learning in larger contexts of a discipline	Delta Internship Teaching- As-Research Project	Real-life engineering design projects were incorporated into a curriculum of five integrated component courses	High school students in the Engineering Summer Program (ESP; a pre-college bridge program)

The first example Delta Internship Teaching-As-Research project I will present explores the effectiveness of podcasts in achieving course learning objectives. It provides an example of how improved faculty instruction can lead to increased undergraduate student understanding of topics in environmental studies.

Example 1: Increased student understanding of specific STEM topics due to improved faculty teaching

Technological tools have increasingly become a part of the college classroom. One of the intrinsic appeals is the potential of these tools to increase student engagement with course materials. Podcasts have gained popularity as tools to better inform students by providing access to lectures outside of the classroom. This Teaching-As-Research Internship project evaluated student preferences for using podcasts in an introductory environmental studies course assignment, as well as the effectiveness of podcasts in achieving course learning objectives (Vatovec, C. and Balser, T. (2008)).

When surveyed, students reported that podcasts were useful tools for learning, they were easy to use, and increased their understanding of course topics. Podcasts were also shown to be valuable tools for enhancing learning objectives. Regarding the course information that students found most helpful in improving their understanding of global climate change, they ranked a scientific video podcast highest (48%), followed by a scientific article (23%), an article from the popular press (17%), and a popular press podcast (12%). In a postassignment survey, 62% of students who reported that podcasts were a useful tool for learning also responded that the assigned podcasts had given them a better understanding of global climate change (p=.0005).

The intern and their partner argue that as educators we should expand our course materials to include pre-published podcasts to both engage students with course topics and help them develop a broader skill set for evaluating readily available media.

The Delta Internship Teaching-As- Research project highlighted next provides an example wherein the creation and use of new instructional materials fostered undergraduate student scientific skill development .

Example 2: Student skill development: Student scientific skills (e.g. measurements, observations, etc.)

Experimental design can be a challenge for undergraduate students to learn. In this Teaching-As-Research Internship project, a multidisciplinary team of intern (Zoology), instructional staff (Zoology) and faculty (Statistics) collaborated to create new course materials to reinforce the most challenging aspects of the experimental design process (Remsburg, A. (2007)). A series of survey and homework questions were developed to collect evidence about how well students achieved the stated learning objectives. In addition, openended questions were evaluated using a grading rubric that was based on the learning objectives. Many less formal assessments of student understanding were used, including the following: (a) worksheets, (b) calling on groups to answer aloud, (c) anonymous multiple choice questions using stickers, (d) research proposal presentations, and (e) asking students to explain concepts to each other.

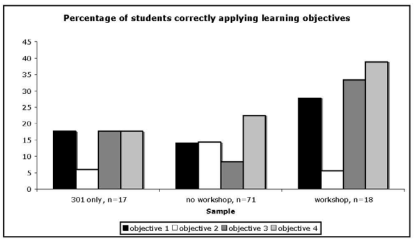


Figure. 3. Percentages of introductory biology students applying the four experimental design learning objectives in an un-graded critique of a flawed experiment. 17 students did not complete the course that included an experimental design unit ("301 only"), while 18 students completed both the course and an optional workshop focusing on experimental design ("workshop"). A significant learning gain for objective iii was observed (Fisher's exact test p <0.05).

The percentage of students correctly applying learning objectives without and with exposure to the experimental design workshop was measured. As Figure 3 demonstrates, 12 students who participated in the workshop applied the various learning objectives more correctly than students not participating in the workshop.

In addition, to being exposed to a workshop on experimental design, students in Spring 2007 were given the opportunity to use a new statistics tutorial developed as part of the Delta Internship. Student confidence in—and appreciation of—experimental design and data analysis, as a result of participation in courses in the standard sequence, and exposure to the Delta Internship project instructional intervention, was measured. Permutation tests (paired by student) were used to compare self-reported skills and student plans to take a statistics course that were derived from surveys given prior to the Fall 2006 course (n = 101) and again after the Spring 2007 course (n = 103). Students exposed to the statistics materials showed increased confidence in their abilities to determine statistical significance, conduct independent and paired ttests, conduct ANOVAs, interpret statistical results, and draw conclusions. Significant differences (with p < 0.005, including Bonferroni-corrections for multiple tests) based on permutation tests paired by individual student, were observed for all applications, except determining statistical significance.

These results speak clearly to the value of this new instructional approach, a workshop on experimental design, and a statistics tutorial, for undergraduate student learning.

In the example Teaching-As-Research Internship project that follows, new instructional materials were used to foster the development of student higher-order thinking skills.

Example 3: Student skill development: Student higher-order thinking skills

A disconnect exists for students between the focus of fundamental science labs (e.g. chemistry, physics, biology, geology) and the 'real world'. As a result, non-science majors are not fully scientifically literate. This Teaching- As-Research internship project asked whether a series of labs could be created to help nonscience majors apply science concepts to novel situations outside the science realm (Riley, P. (2007)).

The labs were designed for an Integrated Liberal Studies class, Ways of Knowing in Science. The labs focused on implementing pedagogic tools such as hands-on learning, recreating historic experiments, and critical thinking questions. An overarching theme, heliocentrism, allowed the labs to be focused into a single module spanning three weeks. Course lectures supported concepts covered in lab by providing science background. To assess the students' learning, non-graded quizzes, which required higher order thinking skills (e.g. asking students to apply the learned concepts to situations not covered in lab), were conducted at the end of each lab. Assessment results indicated that the majority of students were able to correctly recognize how to apply the concepts covered in lab, but that they lacked a complete understanding of the definition of the concept. Results further indicated that the third lab, based on error and uncertainty, succeeded in getting the students to not only understand the concept, but also was effective at helping them learn to apply the concept to a novel situation (Figure 4).

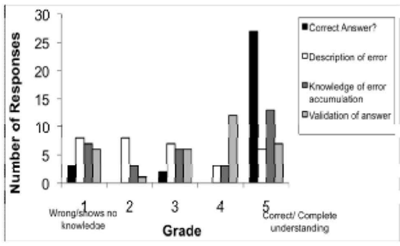


Figure 4: Student quiz results – Error and Uncertainty lab. Nearly all students were able to correctly answer the main question of the assessment, which was "What is the best way to construct a baseball diamond?" Most students were also able to both validate their answer, and provide a detailed description about how error accumulates.

This experiential approach resulted in deeper student learning, as evidenced by their ability to apply their understanding more broadly.

The Teaching-As-Research Internship project that follows takes a further look at skill development, focusing on the life-long skill, written communication.

Example 4: Student skill development: Student life-long learning skills (communication-- writing, speaking, graphical presentations; quantification skills)

Strong written communication skills are traditionally an important quality both inside and outside academia; however, many students leave their undergraduate education with poor scientific writing skills. This Teaching-As- Research Internship project evaluates the implementation of a new scientific writing curriculum in an upper level geology course at UW-Madison (Gage, J.A. (2008)). The specific goals of project included the following: (a) teaching scientific reading and writing skills in a content integrated manner, (b) developing a reusable writing curriculum for the course, and (c) creating a learning community where students feel comfortable, supported, and empowered to learn how to write.

To meet these goals, the Delta intern, in conjunction with their faculty partner, developed a writing curriculum to enhance the course content curriculum. Biweekly readings, chosen to complement course content being taught at that time, and short writing assignments were introduced. Students were also provided with guidelines for how to write each part of a scientific paper. Last, a two-part assessment of student learning was employed. This consisted of the following: (a) coding and ranking writing assignments, based on writing style/mechanics, form, and content, and (b) requiring students to self assess their learning gains.

The intern found that student writing improved in all three elements, style, form and content, over the course of the semester. Figure 5 demonstrates the decline in student errors in style/mechanics as the course, and implementation of the content-integrated writing curriculum progresses.

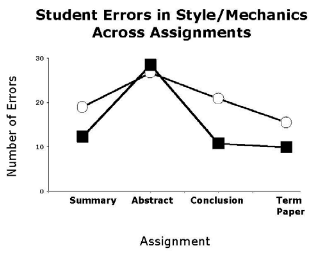


Figure. 5. Improvement in student performance across assignments.
The number of errors in style and mechanics was lowest at the end of the semester, and was found to decreases between drafts for all assignments, except the abstract. In addition, the spread in the number of errors for any single assignment decreased throughout the semester. n - first draft; m - second draft of the same assignment.

These data demonstrate that implementation of a curriculum that is designed to teach scientific writing resulted in improved student writing. As the final example Teaching-As- Research Internship project illustrates, integration of real-life engineering design projects into a pre-college bridge program curriculum resulted in both enhanced student understanding of the discipline as well as increased interest in a career in the discipline.

Example 5: Behavioral outcomes advancing curricular or institutional goals, such as increasing STEM retention; preparing students to engage learning in larger contexts of a discipline, department or institution.

The Engineering Summer Program (ESP), a bridge program for high school students interested in engineering, has existed since 1977 at UW–Madison. During the summer of 2005, as part of a Delta Internship project, emphasis was placed on introducing real-life engineering design projects and integrating five component courses (Nimunkar, A., et al. (2006)). The goal was to encourage students to better appreciate: (a) why their math, chemistry, physics, technical communication and introduction to engineering courses are important in engineering studies, and 14 (b) how these courses work together to help students develop engineering skills. Assessment instruments in this Teaching-As-Research project included beginning, middle, and end-ofdesign experience questionnaires, as well as videotapes of student presentations, and a reflective letter that students wrote to their parents about their experiences.

Table 5: Enhanced student understanding of, and interest in, engineering as a result of a design project experience.

Questions	Findings
Are real-life student design projects an effective means of integrating different courses?	As students' work on the projects progressed, almost all of the students surveyed agreed that the group projects helped them learn more about the applications of physics, chemistry and mathematics in day-to-day life.
Did the real-life student design projects provide better student understanding of engineering in general?	The number of students enjoying group work increased during the course. In addition, all of the students recognized the importance of group work in design decisions. The design process involved in the project provided students with a very detailed idea regarding the steps involved in commercial product design. The hands-on experience reinforced the concepts regarding product design students had learned in classroom sessions.
Did the exercise of designing and presenting projects, stimulate student interest in science and engineering careers?	Students were better informed about potential career paths. In some cases the students were exposed to a greater number of engineering 'areas', which they might have not have considered before. Other students were able to narrow down and emphasize a particular engineering path of interest to them.

This experiential learning approach, with a focus on conveying the relevance of the topic to pre-college students, resulted in improved student understanding of engineering in a real world context. Similar to the other Teaching-As-Research Internship projects discussed in this section, this project illustrates clear benefits for student learning as a result of future faculty professional development activities in teaching. In the next section, I will briefly discuss the impact of such FFPD programming on the broader career preparation of these graduate students and post-docs.

Impact on future faculty career preparation

A 3-year qualitative longitudinal study was initiated by the CIRTL Research and Evaluation team to document the progression of STEM graduate students from their experiences in programs like Delta into their early faculty careers (Bouwma-Gearhart *et al.* (2007)). This evaluation team was established in the original NSF-funded CIRTL proposal as a project group external to the development and administration of the Delta Program; it was responsible for overall evaluation of the development of Delta and the CIRTL Network. The longitudinal study was designed to address the research question: *What effect does teaching-related professional development during doctoral and postdoctoral training have on the attitudes, knowledge, teaching practices, and career trajectories of aspiring college/university educators in the STEM fields as they prepare for and move into their early careers.*

Table 6: Longitudinal data demonstrating the impact of teaching-related professional development on future faculty

Type of impact	Summary of findings
cognitive impact (knowledge and skills)	participants with a high level of involvement in programs like Delta said that their participation enabled them to gain useable knowledge and skills related to teaching
affective impact	interviewees stated that their experiences in

	programs like Delta resulted in an increase in their sense of preparation, their confidence and/or excitement with respect to teaching; the more time they spent in involved in this type of activity, the higher their motivation and confidence
impact on practice and application (including material outcomes)	participants with a high level of involvement in programs like Delta said that their participation enabled them to gain useable knowledge and skills related to teaching; this helped them adjust to the teaching-related demands of their new positions
impact of participation in networks	interviewees felt valued by the teaching professional development communities in which they participated
impact on career trajectories	Future faculty developed a broader view of the types of academic roles they could fulfill and the types of institutions that interested them as a result of participation in teaching professional development activities; about half claimed that participation in these activities had affected their career aspirations.

Fifty-one STEM future faculty (39 doctoral students and 12 postdoctoral 15 researchers) who participated in at least one professional development program in teaching (e.g. Delta) at UW-Madison were followed in the study. Participants were interview in the spring each year, for three years beginning in 2005. The impact of programs, such as Delta was categorized into five types: (a) *cognitive* impact (knowledge and skills), (b) *affective* impact, (c) impact on *practice and application,* (d) impact of participation in *networks*, and (e) impact on *career trajectories*. Broad findings are included in Table 6.

As these data demonstrate, the impact on individuals, of participation in future faculty professional development programs in teaching, are broad. Studies like this are invaluable because they shine a light of analysis on graduate students and post-docs as they transition into their careers as faculty. This transition point is key because it is here, in these new positions, that these individuals will be called on to use the knowledge and skills gained as a result of participation in programs like Delta.

The impact of such experiences on career choices is further illustrated in the vignette that follows.

Vignette:

Lois[3] was a doctoral student at UWMadison. Earlier in her graduate studies, Lois was very uncertain about her career aspirations, but an opportunity to work with her research colleagues to plan and teach an on-line course, changed that. Student feedback from the previous semester suggested that its curriculum and instructional materials needed a major overhaul. Lois had a strong interest in teaching, but she lacked any formal classroom teaching experience. Fortunately for Lois, as part of the Delta program she had taken two Delta courses and in so doing had some ideas about 'best practices' and teaching pedagogy. Moreover, Lois's on-line course redevelopment plan was a good match for the scope and requirements of Delta's Internship program, so Lois jumped into this Teaching-As-Research assistantship with both feet.

During one semester, Lois developed instructional materials for one unit of the course that was closely related to her own dissertation research. She and her co-instructors met regularly to review the existing literature to find best practices in on-line education and to revise the course. Bi-weekly meetings with her

[3] he participant's name has been changed .

Delta colleagues in the facilitated internship seminar gave Lois the chance to explore what it means to put the core concepts of teaching-as-research, learning community and learning-throughdiversity into practice. She ended that semester well prepared for the on-line course to "go live".

Lois's internship experience reinforced her interest in teaching, and the effects of this were widespread. The semester following her Delta internship, Lois and her co-instructors implemented the on-line course, and she continued meeting informally with her peers from the internship seminar to share their progress. Lois then took her personal exploration of the Delta concept of Learning-through- Diversity back to her graduate program, where she organized and facilitated a discussion and working group about the topic. Working with Delta staff, Lois infused the Delta pillars into the departmental group (and incidentally satisfied the Learning Community requirement for the Delta Certificate in Research, Teaching and Learning). Lois subsequently 'defended' her teaching and learning portfolio. As a product of her experiences in the program, her Delta portfolio documents for others her scholarly approach to teaching, the same way a thesis documents one's accomplishments in disciplinary research.

Lois's participation in the program was a transformative experience. She is now a tenure-track faculty member at a liberal arts college, because her experiences gave her the confidence to teach and conduct research equally well. Had she not been involved in Delta, Lois might have abandoned her plans for a faculty career.

> *"I was having a severe crisis and questioning continuing on in an academic track. I felt I could sort of handle research, but I wanted to be a professor, and the thought of teaching and putting together courses on top of research 16 completely panicked me.... Delta, through its courses and internship, was a very key factor in making the professor track happen. I decided that if I was going to be a professor, I needed to do what it would take to make me feel comfortable with teaching, because if I didn't feel comfortable, I didn't want to continue on."*
>
> *Lois Delta Program Certificate recipient & alumna*

While providing compelling examples of impact, the Teaching-As-Research projects, longitudinal study and vignette are but one facet of data collection in, or about, the Delta Program. In the sections that follow, I will first discuss more generally the assessment instruments and approach used by the Program. Next, I will explore assessments that are not available, but should exist, in the broader national context.

Assessment instruments and metrics

Evaluation of the Delta Program occurs at multiple levels, but has two real focal points: learning gains made by future faculty participants in Delta activities, and learning gains made by the undergraduate students of said Delta participants. Because measuring undergraduate student learning is an enormous undertaking, the Program made an intentional effort to focus the bulk of its evaluation efforts on measuring learning gains made by its participants. Measures of undergraduate student learning, as has been discussed, come as a result of deep engagement of graduate students and post-docs in Delta programming, and are evident in the reports they write summarizing their internship experiences, or in their teaching and learning portfolios.

The first level of Program evaluation is conducted by the instructors and facilitators of each course, program, workshop, etc. As part of the Program, these faculty and instructional staff members are responsible for designing and administering their own evaluation of learning gains made by Delta participants in their offering; they are also responsible for interpreting the data. This de-centralized approach is designed to encourage Teaching-As- Research among instructors and facilitators. In turn, data gathered from these efforts is collected and used by the Program primarily to inform changes to future offerings of the individual courses, programs, workshops, etc.

The second level of evaluation occurs at the program level. The Program evaluation plan is based on five “levels” of evaluation data (Kirkpatrick (1998); Colbeck (2003)): (1) Participation: Who attended? (2) Satisfaction: Were participants satisfied with the program? Did they get from participation what they expected? (3) Learning: What did participants learn? What attitudes or beliefs were acquired or changed? What skills were developed? (4) Application: Did participants apply and refine knowledge, attitudes, and skills in subsequent situations? (5) Overall Impact: What role, if any, did participation in the program play in improving undergraduate STEM education (Pfund, C. *et al.* (2006))? In addition to Kirkpatrick’s model, development of this plan, and the assessment approaches used programmatically, were influenced by the 2002 User-Friendly Handbook for Project Evaluation (NSF 02-057).

To specifically address learning, application and knowledge, part of the Program evaluation plan involves the use of a limited number of common items or questions that are added to all individual Delta course and program end-of-semester evaluations. Open-ended questions, such as, *“Suppose that you were preparing to teach some concept from your discipline (e.g., the nitrogen cycle, amplitude, redox reactions, class, gender and racial inequality in education). Describe the steps that you would take to do so.”* and *“What major concepts are you taking away from this course that will affect your future practice as an educator? If possible, please give 2-3 specific examples.”* are used. The core concepts of Delta, teaching-as research, learning communities and learning through- diversity, are touched upon in every program offering. Therefore, the open format of these and other questions allows Program staff to evaluate participant understanding of the concepts across the program in an effort to 17 address the hypothesis that *these three core ideas are essential ingredients for creating a successful FFPD that not only trains excellent educators, but also ultimately results in improved undergraduate education.*

The third level of evaluation involves efforts of individuals external to Delta, like the CIRTL Evaluation and Research team. This team conducted a multi-year Longitudinal Study between 2004-2007 (described previously; Bouwma-Gearhart *et al.* (2007)). A new NSF funded project at UW-Madison (Connolly, M. et al. (2008)) will continue the work of the original CIRTL Evaluation and Research Team. This new study will use a longitudinal, mixed methods design that will follow two groups of STEM doctoral students from three research universities over 5 years. The study will address six research questions that range from “What are the general characteristics of FFPD programs, and which characteristics are most strongly correlated with positive and negative participant outcomes?” to “What degree of investment in FFPD must a doctoral student make, and for what length of time, to receive modest but significant benefits?”

The fourth and final level of evaluation takes the form of peer-reviewed publications, conference abstracts and presentations. It is important to note that while Delta participants engage in teaching-as-research, the focus is on measuring undergraduate student learning to improve teaching. Unlike the Scholarship of Teaching and Learning movement (Cross, K.P. (2006)) the bar is not set at peer-review publication of the research. When publications (e.g. Walz & Kerr (2007); D’Amato, et al. (2007)) and presentations at disciplinary society meetings (e.g. McNeil, E. and Ogle, B. (2008)) do occur they have value both for the faculty or staff internship partner, and as a professional development exercise and *curriculum vitae* ‘builder’ for the graduate student or post-doc intern.

In the next section, I turn my focus to lessons learned from evaluation of the Delta Program, and their implications for assessments that are not available, but should exist, broadly speaking.

Assessments that are not available, but should exist

While Delta presents a clear case for the impact of the Program on future faculty professional development, as well as on undergraduate student learning, limitations of our original approach are worth mentioning here in the larger context of *assessments that are not available, but should exist.*

As mentioned in the previous section, part of the Program evaluation plan involves the use of a limited number of common items or questions that are added to all individual Delta course and program end-of-semester evaluations. Prior to the use of these common items, instructors were responsible for designing and administering their own evaluations and interpreting the data. Although these approaches produced valuable data that led to improvements in subsequent offerings of these courses, the lack of any common evaluation items made it difficult to draw inferences about how Delta as a whole was performing, across all of the courses and programs (Pfund, C. *et al.* (2006)).

There is a national need for common instruments that look broadly at the impact of professional development programs in teaching, like Delta. Programs and funded projects can report out on the successes of individual efforts, but in the end, without common metrics, we will not know the core elements of successful future faculty training efforts. Once the key programmatic features and outcomes have been defined, and common items identified, programs will need to use these common items to evaluate their efforts. Then the effect of program variables like institutional priorities, amount of time spent doing professional development activities (e.g. dosage or engagement), the format of program activities (e.g. project-based courses or workshops), etc., can be considered.

As one example of using common items broadly to compare different FFPD programs, there is a collaborative evaluation effort underway across the CIRTL Network. The study involves the Delta Internship Program (http://www.delta.wisc.edu/programs/internship/ internship.html) at UW-Madison, the FAST Fellowship Program (Future Academic Scholars 18 in Teaching; http://grad.msu.edu/fast/) at Michigan State University and the Lead Graduate Teacher Network (http://www.colorado.edu/gtp/lead/index.htm) at the University of Colorado-Boulder. This collaborative effort arose because these CIRTL Network programs have similar aims for future faculty professional development in teaching. The goal of this collaboration is to conduct a multi-institutional study that addresses the question: *What are characteristics of programs that effectively prepare our graduate students for careers as 21st century faculty?* This effort has produced common items to be used across these three Network campuses in pre- and postsurveys of participants in these specific programs (Gillian-Daniel, Connolly, Border and Campa (2008)).

In addition to the need for common evaluation questions, there is also the need for a place to compare data from across program types. This need could be met with, for example, a database containing both common evaluation questions and data.

In the next section I will turn my focus to the broader landscape of FFPD programming and discuss gaps in the research and areas where evidence is missing.

Gaps in the research and areas where evidence is missing

Similar to CIRTL, other national reform efforts (e.g. the Wisconsin Program for Scientific Teaching (WPST; Handelsman, 2004), (c) the Graduate Students in K–12 Fellowship Program (GK–12; Trautmann & Krasny 2006)), (d) the Preparing Future Faculty program (PFF; Gaff, Pruitt-Logan, Sims, & Denecke, 2003), (e) the Carnegie Initiative on the Doctorate (Golde & Walker, 2006), (f) and the Responsive Ph.D. Program (Woodrow Wilson National Fellowship Foundation, 2005) have reported on measurements of learning or skill, or measures of changes in attitudes or behaviors, specific to their efforts. There are only two studies to date, that the author is aware of, that longitudinally document the true success of these teaching professional development programs on graduate students and post-docs as they assume their new faculty roles and put into practice what they have learned (DeNeef, (2002); Bouwma-Gearhart *et al.* (2007)). This limited scope of work makes the newly-funded CIRTL longitudinal study (Connolly et al. (2008)) and others future studies like it even more important for documenting the long-term value of professional development programs in teaching for future faculty.

In parallel, the reports that exist document moments in time of undergraduate student learning in various disciplines. For example, the work of Uri Triesman (1992) and John Wright et al. (1998) are true exemplars of this type of research on educational innovation and student learning. What is missing is a systematic way to answer whether student learning is sustained *across* the curriculum, beyond the moment in time that we read about. Longitudinal studies of this type would add greatly to our understanding of the value of these educational innovations, and to the value of training current and future faculty to use them.

In the final section of this white paper, I will explore some of the next steps for demonstrating the effectiveness of FFPD programs.

Next steps for developing/demonstrating effectiveness of professional development for future STEM faculty

If improved undergraduate student learning is also a true measure of success, then more needs to be done at both an institutional and a national funding level to develop and support the capacity of programs like Delta to document and report on the invaluable contributions to undergraduate student learning made by their participants. Making available these training opportunities, and diverse professional development in teaching activities, will also ensure that the faculty of tomorrow are well prepared to continue on in this scholarly approach to their teaching, both for the improvement of student learning in their classrooms, as well as for the contributions they 19 will make as faculty to the larger conversation about teaching.

Specifically, there is a need to address the following: (a) determine the scope of current *and* past innovations and identify who the innovators are, and what their innovation is (e.g. process or products), (b) identify what is to be learned from these efforts, (c) create a mechanism for categorizing and archiving these innovations both in terms of products as well as people who have an expertise, (d) from these innovations, develop a national set of guidelines/recommendations for the desired change and more importantly, how to realize such change on diverse campuses, (e) create a way to broadly disseminate findings about what works (and doesn't) such that it is independent of a particular approach and is more generalized, (f) find funding sources to address limited campus budgets, (g) generate an approach for adaptation, rather than adoption of change, being sensitive to different campus philosophies and missions, existing programs, etc., (h) find support, beyond funding, for said adaptation, (i) develop nationally agreed upon benchmarks and evidenced-based outcomes for successful adaptation and implementation of such FFPD programs, and finally, (j) create a national forum for dialogue about the process and products of such an effort, so that it does not occur in disciplinary or institutional isolation.

A key feature to this plan is supporting this adaptation. Budgets are tight, and although it is an outdated model, it is pervasive—new funding effects campus change. NSF's broader impact requirement for research funding is a step in the right direction. If there is a requirement for educational innovation that is attached to research funding, then faculty, departments and institutions will take note, and the value of FFPD programs will increase (Mathieu et al. (2008)).

It will be important to draw on past, current and future longitudinal studies to help define the characteristics of FFPD programs that are most closely correlated with both positive and negative outcomes for participants. These evidence-based outcomes could be used to facilitate the development of cross-institutional measures of success. It will be imperative also to distinguish between the perception of value and value as measured by better job performance of future faculty as well as improved undergraduate student learning.

Evidence-based outcomes might include the following: (a) hiring of new faculty, (b) increased perception of preparedness for their new job, (c) ongoing engagement of new faculty in professional development in teaching activities, (d) buy-in by disciplinary societies, as evidenced by increase in the number of education-based sessions, and (e) clear evidence of improved undergraduate student learning. A clear articulation of what such a national initiative hopes to achieve as well as examples of the myriad of ways that an individual campus could get there will be needed.

Last, the issue of future faculty motivation to (learn how to) teach will need to be addressed. Some future faculty will just want to do research. Is such a reform a requirement of all future faculty? If not, how will faculty interested in research and faculty interested in teaching be seen as equitable without having the latter faculty viewed as 2nd class citizens?

We will succeed in our efforts to improve undergraduate education when future faculty enter their new positions believing and knowing that they are already a vital part of a larger reform movement in postsecondary education:

> *"The biggest and most long-lasting reforms of undergraduate education will come when individual faculty or small groups of instructors adopt the view of themselves as reformers within their immediate sphere of influence: the classes they teach every day."*
>
> *K. Patricia Cross (quoted in Tobias (1990) and thanks to M. Connolly)*

Acknowledgements

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FINAL REPORT FROM MICHIGAN STATE UNIVERSITY – JUNE 2009

Stephen L. Esquith, Hiram Fitzgerald, Karen Klomparens, Judith Stoddart, Mark Sullivan, Colleen Tremonte, and Suzanne Wilson

1. Overview

We began the year by discussing the fellows' expectations and the goals of the CASTL program. We scheduled weekly meetings, alternating between full group with faculty present and discussion meetings with no faculty presence.

Initial discussions focused on the interests of each fellow in relationship to the scholarship of teaching and learning, as well as how their specific research interests would be involved in their CASTL projects. We discussed the history of the CASTL program within the residential college, as well as the strengths and weaknesses perceived by the first year candidates. We also discussed ways of pairing up RCAH faculty with CASTL fellows to collaborate on SOTL projects.

In considering the need for a final product, either in the form of a publishable paper or a conference type presentation, there was some discussion of having a web site or possibly a publication. One idea involved issuing working papers that would provide an overview of the questions asked, and the kinds of answers formulated and examined, by the CASTL fellows in their discussion groups, and in their interaction with faculty in the course of their SOTL projects. Fellows concluded that a journal or monograph would be too ambitious and not practical within the timeframe available. The idea of a dedicated website was also abandoned, and the intent instead was to post material to the section on the CASTL fellows on the RCAH website. It was decided that meeting discussions should be grounded in the examination of actual SOTL issues in relation to the residential college, drawing on relevant readings and handouts in the course of these discussions. Each fellow gave an initial presentation of their research interest, the tentative researchable question (from a SOTL point of view), and its emerging connections to RCAH curriculum, faculty, and programs.

The fellows were given an overview of the processes that led to the formation of the Residential College, and what distinguishes it from the other residential colleges. There was extensive discussion of the dynamics related to having graduate students teaching, how this related to the concerns of other colleges, and the resources related to teaching assistantships. There were a range of questions about how the scholarship of teaching and learning relates to the four cornerstones of the RCAH (world history, art and culture, ethics, and engaged learning). The fellows discussed ways to tie the four areas to their own SOTL projects and expressed a desire, beyond their individual contact with faculty, for a forum in which to discuss with faculty how SOTL relates to the curricular goals of the RCAH faculty and to the college in general, and how their own projects might contribute to that. There were also extensive discussions of the contexts of teaching for faculty and graduate students, how they are similar and different, and how they tie into the reward structures of the institution, as well as the politics of innovation and resistance to institutional change. Most fellows agreed that there was little opportunity for any form of SOTL project as teaching assistants in their own departments.

There were also extensive discussions of how the SOTL projects could be carried out apart from, or without being constrained by, departmentally conceived courses in which fellows lacked the autonomy to explore innovative or creative approaches to the scholarship of teaching and learning. Several propositions were considered relating to the perceived need to be actually teaching, and not just discuss teaching, either theoretically or practically.
One proposition was to create a class to be taught by the fellows. Each fellow would teach several sessions on a subject related to their research interests and receive feedback from the other fellows. There was concern, however, that this would still not allow for more feedback than that provided by individual contact between fellows and faculty. Another proposition involved pairing up small groups of

fellows with faculty in a class and allowing each fellow to teach a number of courses. Some fellows felt that their pairing with a faculty member and teaching of one or two sessions, together with extensive observation of the class and the teacher, had provided a productive and sufficient experience to make real learning and research of a SOTL nature possible. A "workshop" series also was proposed but was rejected as impractical due to the already intense demands on student and faculty time in both curricular and extracurricular activities. A consensus evolved for a forum for dialogue on SOTL issues and strategies involving both RCAH faculty and CASTL fellows It would be desirable to develop Ways for CASTL fellows to interact in real teaching situations and to receive feedback about SOTL practices from as wide a range of peers and faculty as possible also should be sought.

Interspersed with discussion of the above issues was consideration of ways to incorporate video technology into teaching, developing, and extending forms of assessment. The fellows expressed an interest in meeting with faculty interested in assessment, especially forms of assessment relevant to SOTL work in the arts and humanities; there were a range of discussions of how to utilize web-based technology and multimedia technology to enhance SOTL work. There was also a great deal of interest in finding faculty who could offer workshops or tutorials relating to these subjects.

In discussions with faculty who will be coordinating the fellows program in 09-10 about the focus for next year's fellows, one problem that emerged in regard to fellows teaching a course was the increased demands that would be placed on faculty to design courses specifically tethered to the fellows' research interests and competencies. Even if faculty were willing, the additional time spent in course development likely would be prohibitive. After further discussion among fellows and faculty, it was decided to continue pairing fellows with faculty but to emphasize the preparation of a joint paper or conference presentation related to both the faculty member and the fellow's research and SOTL interests, and at the same time to develop a recurring "brown bag" series involving both RCAH faculty and fellows in discussions with a focus on SOTL and interrelated teaching issues.

The year culminated in a symposium in May in which fellows publicly presented their projects in thematically connected sessions and then led discussion and response sessions. (The projects are included in Appendix 1). These sessions were highly successful, allowing for meaningful and productive response to the fellows' projects and a significant degree of intellectual engagement, thereby contributing to their development as teachers and as scholars of teaching and learning. Faculty also felt the format gave them an opportunity to engage with the fellows and respond in a meaningful way.

2. *What does it look like when the Scholarship of Teaching and Learning (SoTL)* becomes part of Graduate Education?*

One thing that emerges quickly is the difference between educational situations in which it is possible to do actual research on SOTL questions due to the teacher having control over significant aspects of the design of the curricular context, and the methods and concepts used, and situations in which that design process is severely constrained, by factors, however real and pressing, that have nothing to do with SOTL or the context of learning.

Most of the fellows found introducing concerns of SOTL into curricular design, into research, into discussions about "researchable questions" in relation to SOTL created a challenging, and welcome productive orientation to their teaching, and opened up areas of collaboration and discussion with some faculty. Again, there were a number of institutional and departmental impediments to these things in many of their actual teaching contexts.

Where and how does SotL make a difference? How are Graduate Students different when they go through the SoTL learning process?

Most of the fellows reported that being involved in projects and research relating to SOTL raised their awareness of teaching in their own courses, and in all of their research, and in general had a highly productive impact. Some cited the relative increase in complexity of thought and reflection as a daunting, and possibly problematic matter.

3 How does SoTL involvement affect how faculty approach teaching?

The faculty involved, and committed to SOTL in some form, seemed to find the involvement of fellows with SOTL projects prodded them to become more aware of their own teaching practices, and to formulate ways of describing their approaches, and their best practices.

4 How does SoTL affect how graduate students approach learning?

(answered above)

5. How does the institutional culture change because of SoTL ? How does Sotl affect institutional cultures?

In general, there was a great deal of apprehension related to this matter. Many of the fellows felt the reward structure, and the tenure process, would make any extensive research in SOTL questions professionally risky, even in relatively heavy “teaching oriented” units within most universities and colleges. There was extensive discussion of what kinds of changes would need to occur so the SOTL explorations and research could be adequately rewarded, and become integrated into the fabric of our educational institutions.

6. Are institutional initiatives advanced because of Sotl, and if so how?

To the extent that initiatives related to SOTL improve the climate for investigating effective and creative teaching, and expose impediments and institutional obstacles to such initiatives bearing fruit.

7. What is learned in SoTL /how is SoTL advanced because of these initiatives?

Improving the climate, and ensuring that SOTL research and scholarship is rewarded, help ensure that more effective, complex, and nuanced forms of research can be carried out, and that in turn, provides a persistent source of productiveness and creativity for teaching

8. How does SoTL affect institutional leadership? /What kind of leadership has emerged?

It requires that administrative and faculty members take significant percentages of their time to foster and organize meaningful programs that promote the aims of SOTL at all institutional levels.

NAIRTL

FINAL REPORT FROM RUTGERS UNIVERSITY

Barbara E. Bender, Monica Devanas

Background

Rutgers University's participation in the graduate education-focused CASTL group could not have come at a better time for our institution and the numerous individuals involved with the project. At the same juncture when we were submitting our proposal for the CASTL Project, Rutgers University in New Brunswick was conducting extensive research into how it could best enhance and codify its many academic unit-based assessment programs into a more coordinated university-wide effort. Concomitantly, a new organization of undergraduate education was being implemented which focused great attention on the instructional needs of the 28,000 undergraduates in New Brunswick.

We indicated that our goal for participation in the CASTL Leadership Program was to expand our institutional commitment to the scholarship of teaching and learning by strengthening the bridges between all participants in the University community who are involved in and committed to the advancement of teaching: faculty, undergraduate and graduate students, postdoctoral fellows, part-time (adjunct) lecturers, and administrators. We sought to participate in and contribute to the CASTL Leadership Program to create new initiatives to advance Teaching Assistants' (TAs) understanding of teaching methodologies and, specifically, the principles and best practices related to the scholarship of teaching and learning. To this end, our leadership team, with Presidential Graduate Student and Faculty CASTL Fellows and administrators, developed a cadre of leaders dedicated to advancing this project. These leaders are now better prepared to address SoTL issues both here at Rutgers and, for graduate students, at the colleges and universities where they will become faculty members.

SoTL as a Concept

Recognizing the delicate balance between research and teaching at a multipurpose comprehensive university and the various forces that exist within and between disciplines, we focused in an intensive fashion on developing student learning goals, student learning outcomes, creating and utilizing assessment instruments, and syllabi development in a fashion that would meet the specific academic needs of disciplinary units. In other words, all of our efforts recognized that there would be differences in SoTL practices depending on a unit's academic home. Our team worked on these issues in a vigorous fashion, but, with full disclosure, we must admit that we did not use the term "SoTL" widely. Our CASTL colleagues were well-versed in the concept of SoTL, but given our institutional culture, we decided to "do SoTL," rather than attach that appellation to our myriad SoTL tasks and programs.

Advancing our SoTL mission occurred in various settings. First and foremost, SoTL was the focus of our monthly CASTL meetings with the graduate and faculty fellows and CASTL leadership team. Rather than focusing strictly on pedagogical style and classroom management, we always included and explored ways to consider and measure learning outcomes. This was particularly evident in our creation and implementation of Introduction to College Teaching I and II, two courses designed to prepare graduate students to enter the professoriate. Learning goals were specified on the syllabi, and it was clear to the students exactly what we expected the learning outcomes to be if one participated fully in the course(s).

Similarly, in programs directed by the Center for Teaching Advancement and Assessment Research, the SoTL philosophy has taken center-stage as the office transformed from the Teaching Excellence Center to our centralized assessment office. The Center's new mission, providing coordination and oversight of assessment issues university-wide (Rutgers is located on three campuses in New Jersey, U.S.A., enrolling more than 53,000 students), has shone a spotlight on SoTL as the academic units seek to codify and articulate learning outcomes.

SoTL has also been embraced by the Rutgers professional schools that have specialized accreditation. In engineering and pharmacy, for example, there are specific accreditation standards requiring data that demonstrate the extent to which students benefit from the curricular offerings. The importance of student learning outcomes has become a part of our institutional culture and they are now considered and reviewed when any new course, curriculum, or major is being developed.

The Impact of SoTL

Participation in SoTL activities, specifically our CASTL project, has made a real difference in the two cohorts of graduate student CASTL Fellows with whom we have worked. We know this both anecdotally and as a result of our assessment(s) of the project. The SoTL experience has not been overly time-consuming for the graduate students, one meeting per month and they also lead four to five presentations throughout the year, but their awareness of, and dedication to, issues related to the scholarship of teaching has been transformative. These graduate students have made a difference in their disciplines at Rutgers, and we are convinced that they will be SoTL leaders wherever they are employed in academe. In their own departments they lead sessions on SoTL, serve as mentors to other graduate students, and, literally, encourage their faculty to devote more time to discussing issues related to instruction, undergraduate teaching, and assessment. Our CASTL fellows, both faculty and students, represent a broad range of disciplines so we have seen an impact in approximately twenty departments including the humanities, social sciences, physical sciences, and biological sciences.

The difference in the graduate student members is evident even after just one semester of participation (as our program evolved, each student has served for two-year periods). In fact, the lines between professors, students, and administrators in our group have become completely blurred. The graduate students participate in our group as seasoned veterans when considering SoTL issues and their very strong instructional rating surveys in their own courses underscore their strength as teachers.

Given the current economy and the multiple challenges to finding a faculty position for new Ph.D.s, we would be remiss if we did not mention the fact that several of our graduate student fellows have indicated that they were told they were selected for a job interview because of their work with the CASTL project and, specifically, their background in SoTL. Two students can vouch that they got tenure track positions as assistant professors as a direct result of their work with CASTL.

The CASTL Faculty Fellows have indicated that participation in our project has been a positive experience for them, but these faculty have a long history of being committed to SoTL. While we would like to think our project has made a difference in considering issues related to teaching and learning, it would be hard to quantify such a result. Still, after our monthly meetings it is clear they share the SoTL issues which we examine with their departmental colleagues (we hear about our meetings from those who were not in attendance) and these efforts are helping to institutionalize a SoTL culture at the university.

While the CASTL project cannot claim responsibility, it is important to comment that syllabi development has been a major focus across the university in the past year. Discussed in the university senate and in all academic units, faculty are now expected to focus more attention on their syllabi and post them in advance of an upcoming semester. Especially important, the syllabus will, most likely, become a part of the promotion and tenure packet for all faculty. Such an expectation indicates a renewed dedication to considering issues related to teaching as evidenced by the student learning outcomes that will be reviewed on the syllabi.

Assessment of SoTL Initiatives

The activities and interactions that the CASTL grant has supported have permitted both the faculty fellows and the graduate fellows to share their teaching experiences as colleagues in collaboration for improving undergraduate education at Rutgers. Discussions of assessment, curriculum design, and teaching strategies have been effective methods for both faculty and graduate fellows to consider their teaching as areas for active research in the SoTL model.

As a result of our CASTL activities and SoTL initiatives the faculty fellows and their departmental colleagues are more conscious of assessment design and data collection. These new SoTL perspectives provide the framework for them to conduct research on their teaching methods and learning outcomes. The rich discussions between the faculty and graduate fellows have been successful means for all the participants to be more reflective in their practice.

All the graduate fellows who have been through our CASTL program have come to understand the value of SoTL in their own teaching and in their own career development. They have been making changes in the courses they are teaching currently, will be teaching, or have been conveying their ideas and strategies with colleagues in their own departments both informally and through various disciplinary programs that focus on pedagogy.

The graduate fellows, who are newer to the challenges of teaching, are catalysts in the discussions of pedagogy. They can resonate better with the demands placed on the undergraduate student and frequently relate or interpret attitudes and behaviors of undergraduates for the more senior faculty members.

Owing to this increased awareness of the need for assessment of learning outcomes and the SoTL movement, there are discussions regarding the promotion and tenure systems. In light of the current information on SoTL and on the availability of assessment results and due to the data collection for the assessment of learning outcomes, there are new ideas and attitudes developing in research-intensive institutions such as Rutgers. The materials being presented and used in reappointment, tenure, and promotion processes now include studies and publications on the new questions being asked about teaching and learning. Additionally, there are new rewards for innovative faculty who are involved in SoTL, including consideration of SoTL-based publications and research agendas.

At Rutgers, one of the major impacts of the concepts imbedded in SoTL is the design and development of assessments of learning outcomes. The activities of the CASTL grant have fostered the dissemination of the SoTL principles among both the faculty and graduate student populations. The SoTL goal, to encourage the systematic reflection on teaching and learning and to move these reflections into the public domain, have made significant impact on the university's efforts to improve undergraduate education. Both faculty and gradate fellows are working toward the eventual outcome of publishable research about learning and learning outcomes assessment.

The major initiatives at Rutgers deal with improving undergraduate education through the development and commitment to systemic assessment of learning outcomes. The feedback from the faculty using SoTL approaches in their teaching is positive and an important step in engaging more faculty in the process. We believe that it has been effective, as we see more faculty and instructors considering assessment practices that begin to develop a learning outcomes orientation from a research perspective and create publishable results in their discipline. Gradually this will encourage more faculty to engage in assessment and build a culture of SoTL in the institution.

The multiple lessons we have learned through a SoTL focus are, of course, specifically related to the extent to which we engage faculty in these initiatives. Faculty have sophisticated research programs in their disciplines and dedicate much of their energies to those priorities. To engage faculty in using those same research practices in their teaching requires faculty to think differently about their scholarly work and their teaching. As with any adaptation process it is useful to have incentives for faculty to consider new approaches to their teaching practices. Historically, institutions that focus on teaching and learning outcomes have an advantage over those whose mission is more research driven. In research intensive institutions, there has been some shift in faculty attention to teaching when teaching and learning outcomes are featured in discussions of enhancing the quality of the educational experience and the assessment of programs and when effective teaching is rewarded.

With the evolution of SoTL within our CASTL grant activities we have emphasized learning outcome assessment and, as a result, we believe that we are building future leaders among our graduate fellows. Our SoTL-focused seminars have enriched the perspectives of our faculty fellows as well so that they are active advocates for SoTL among their colleagues here at Rutgers and within their disciplines in national and international contexts.

New administrative and leadership positions have also been created to expand the focus on teaching and learning and assessment of learning outcomes. Additionally, new projects examining and measuring learning have been initiated in various programs that contribute to building the culture of SoTL; the CASTL fellows have been the catalysts for these initiatives.

What Have We Learned?

Across the institution, faculty and graduate students have mentioned the effect of the opportunities to engage in conversations about teaching and learning. Especially important, their interest in improving their teaching has increased when they have been guided to use the same rigorous critical analysis and reflection of their teaching that they use in their research.

The possibility of producing scholarly and systematic assessment of their teaching is an attractive publication option, especially for graduate students and new faculty. Interestingly, during the period of the CASTL grant, there has been an increase in participation in teaching portfolio workshops. This application of the teaching portfolio and its focus on the collection of information of oneself is now being translated into the use of eportfolios for student learning as meaningful and authentic assessment of learning outcomes. The CASTL fellows have been initiating discussions in their respective departments on SoTL issues and have engaged in many programs on campus for teaching improvement. The faculty fellows are reconsidering course design and assessment methods for teaching that have now expanded into curriculum reforms and projects on learning outcomes.

SoTL as an Institutional Value and Norm

Institutions need to constantly work to improve teaching and learning, usually through assessment and resources dedicated to assessment. SoTL provides a framework and forum for these discussions as well as a structure for developing scholarly projects on teaching and learning in higher education.

Whether or not the work of the CASTL project continues at any of the participating universities will depend not only on the ethos of the institution, but on their resources as well. At Rutgers, where offices for the support of teaching and learning, faculty development, graduate student teaching assistant training, curriculum design, and instructional technology have the critical mass of interested academic leaders and resources, we believe we can sustain the project beyond the initial phase of the formal CASTL commitment. Our academic culture is at the point of embracing this endeavour and with the concomitant call for enhanced accountability in public higher education, we anticipate the continuation of a vibrant Rutgers Academy for the Scholarship of Teaching and Learning (RASTL) for years to come.

The CASTL-related activities as currently defined will, most likely, be easier to sustain among graduate students because they can see the immediate benefits for their academic careers and employment in embracing the SoTL perspective in their research and teaching. The graduate fellows know that they are more likely to be teaching in a comprehensive liberal arts institution than a research-intensive university, so they fully recognize the value of the programs and participate enthusiastically.

The sustainability of the CASTL project among the faculty depends more directly on an institutional reward structure and the availability of resources devoted to related activities such as assessment and data gathering on teaching and learning. We have seen that faculty development programs like CASTL are more likely to engage faculty who are experienced instructors and personally see the need for improving teaching, integrating new technologies, developing curricula that reflect the changes in their disciplines, and/or assessment of student learning outcomes.

Future Considerations

Generally, involvement in the CASTL project has been enormously successful and very positive. All of us have learned from our participation and making new colleagues, indeed friends, from various institutions has made the CASTL experience a wonderful professional opportunity. At this time we plan to continue our CASTL program and transition within a few years to RASTL, budget permitting. As we do so, our hope would be to try and expand the project to involve additional faculty and students. While this will benefit more individuals and departments, expansion will also present new challenges. The size of our current group is such that if someone misses a session, they are missed—it is noticed since each individual is an integral part of the group's success. In other words, our participation rate is almost 100% at every meeting and session—an extraordinary feat at an institution of our size.

In the future we would also hope to focus more attention on the nature of graduate instruction in the graduate class. Thus far we have concentrated on issues of faculty and graduate students teaching undergraduates. How we teach graduate students and foster learning in the graduate environment, in the disciplines, is an important topic that we will need to consider.

We also hope that in some fashion we will be able to keep our connections and collaborations with the institutions and people with whom we worked during the "CASTL years." These partnerships have been enormously beneficial for all of us.

FINAL REPORT OF UNIVERSITY COLLEGE CORK - SEPTEMBER 2009

Áine Hyland, Bettie Higgs, Marian McCarthy, Jennifer Murphy, Norma Ryan, Grace Neville, John O'Halloran, Alan Kelly.

PART 1. Background and Context:

Institutional, National and European Context:

For University College Cork (UCC), participation in the CASTL Leadership program's network on Graduate Education between 2006 and 2009 coincided with a renewed institutional, national and European emphasis on graduate education, and in particular, on doctoral education. In 2005, the Irish Government announced its commitment to what was referred to as "Fourth Level Ireland" and set a target of doubling the number of doctoral students graduating from Irish Universities by the year 2013. It emphasised the contribution that graduates would make to strengthening Ireland's role as a "knowledge economy" and challenged universities to review and re-invent their doctoral programmes to give greater emphasis to generic skills relevant to graduate employability[4].

This emphasis by the Irish government on graduate education was influenced by the "Bergen Communiqué" issued by the European Ministers for Education following their meeting in Bergen (Norway) in May 2005. While recognising that the core component of doctoral training is the advancement of knowledge through original research, the Ministers urged universities "to ensure that their doctoral programmes promoted interdisciplinary training and the development of transferable skills, thus meeting the needs of the wider employment market". The communiqué emphasised that Europe "needs to achieve an overall increase in the numbers of doctoral candidates taking up research careers within the European Higher Education area".[5]

Doctoral education in Ireland has traditionally been based on a one-to-one apprenticeship model – as is the norm across Europe. The emphasis has been on the creation of new disciplinary knowledge – with relatively little focus on generic skills or interdisciplinary training. The review and re-invention of graduate education in Ireland would draw to some extent on the U.S. model, where doctoral education includes taught components, especially in the early years of the doctoral programme. UCC's involvement in the CASTL network on graduate education provided an opportunity for management and faculty of the university to engage with collaborating faculty from U.S. institutions about innovations and practices in graduate education in the U.S. in recent years. The UCC team also drew on the work of Carnegie's project on the Doctorate and the two key publications of that project helped to inform thinking during the process of graduate education reform[6].

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[4] *Building Ireland's Knowledge Economy – The Irish Action Plan for Increasing Research and Development to 2010* Dublin: Department of Enterprise, Trade and Employment, 2004. http://www.entemp.ie/press/2004/20040809.htm; and *Reform of 3rd Level and Creation of 4th Level Ireland – Securing Competitive Advantage in the 21st Century*, Dublin: Irish Universities Association 2005 http://www.iua.ie/news_events/reviews_publications.htm

[5] European Universities Association *Doctoral Programmes in Europe's Universities: Achievements and Challenges* Brussels: EUA, 2007.

[6] Golde, Chris M. and Walker, George E. *Envisioning the Future of Doctoral Education: Preparing Stewards of the Discipline* Jossey-Bass and the Carnegie Foundation for the Advancement of Teaching 2006, and George E. Walker et al *The Formation of Scholars: Rethinking Doctoral Education for the Twenty-First Century Jossey*-Bass and the Carnegie Foundation 2008

The UCC submission for inclusion in the CASTL Leadership program 2006

In its application in March 2006 for inclusion in the CASTL Leadership program, UCC referred to the challenge facing Irish universities in re-inventing doctoral education. It adverted to the framing question put by the editors of *Envisioning the Future of Doctoral Education*[7] to the essayists who were invited to reconceive or reinvent the forms and structures of doctoral education in their particular discipline - ***"If you could start de novo, what would be the best way to structure doctoral education in your field?"*** It pointed out that Ireland, and specifically UCC, was effectively starting *de novo* to re-invent doctoral education and stated that a unique opportunity was available to learn from the experience of the Carnegie project on the Doctorate, to maintain ongoing communication and links with the other universities in the network and to draw on their ongoing support and advice. In turn, UCC committed to disseminating its experiences throughout other universities in Ireland and in Europe through the IUA and the EUA and through publications[8].

The influence of SoTL on Teaching and Learning in UCC

The influence of the Carnegie Foundation and its scholars, and particularly of CASTL, on teaching and learning in UCC has recently been documented by Bettie Higgs in an article *The Carnegie Catalyst: A Case Study in Internationalisation of SoTL,* published in the *International Journal for the Scholarship of Teaching and Learning* July 2009[9]. As Higgs points out,

> *A golden era has seen the Foundation influence an incalculable number of people, turning the heads and changing the direction of many academic staff in higher education. Teachers have been stimulated to enquire into their own teaching and learning, and to integrate their own research into teaching and learning in more innovative ways. Students have enjoyed the benefits of more engaged and scholarly teachers.*

During the past decade, a number of developments occurred in UCC which emphasised the university's commitment to teaching as a form of scholarship. The university's commitment to parity of esteem between research and teaching and learning was articulated in its Strategic Plan in 2000[10] and re-iterated in its later Strategic Framework[11], and the appointment, establishment[12] and promotions schemes were revised to ensure that research into the teaching and learning process should be recognised and rewarded in the same way as other forms of scholarship.

Faculty from different disciplinary areas of the university became increasingly engaged in reflecting on and documenting their teaching and student learning, and in sharing their reflections and experiences with their fellow academics. Their work drew on publications such as Edgerton, R. et al (1995) *The Teaching Portfolio: Capturing the Scholarship in Teaching;* Hutchings, P. *The Course Portfolio* (1998); Huber, M. and Morreale, S. (2002) *Disciplinary Styles in the Scholarship of Teaching and Learning;* Huber, M. & Hutchings, P. (2005). *The advancement of learning: building the teaching commons*; Shulman, L. (2004). *Teaching as Community Property: Essays on Higher Education*; Bernstein, D. J., Nelson et al. (2006) *Making teaching and learning visible: Course portfolios and the peer review of teaching.*

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[7] Golde et al, op cit.

[8] See UCC Application on CASTL website

[9] International Journal for the Scholarship of Teaching and Learning July 2009 on Website http://www.georgiasouthern.edu/ijsotl

[10] UCC Strategic Plan 2000

[11] http://www.ucc.ie/en/PresidentsOffice/UCCsStrategicPlan/DocumentFile,1005,en.pdf

[12] The term "Establishment" is used in Irish universities to denote the granting of tenure to academics.

Extracts from teaching and course portfolios drawn up by faculty were disseminated through the university website and through print publication[13]. Regular lunchtime and weekend sessions were organised to enable faculty to share and discuss their work.

Certificated Courses in Teaching and Learning for Faculty

Since 2004, the university has provided certificated courses for faculty members, leading to a Postgraduate Certificate, Diploma and Masters degree in Teaching and Learning in Higher Education. These courses are offered on a part-time basis with lectures, seminars and workshops timetabled at lunchtime and Saturdays. As well as attending formal timetabled sessions, staff who register for these courses are also required to undertake assignments which include maintaining and submitting a course portfolio and engaging in peer review of teaching. As these courses are designed for practising faculty currently engaged in teaching in the university, the participants have almost all completed a Doctorate in their own disciplinary area. Involvement in these courses has been impressive with over 140 academic staff (ranging from newly appointed lecturers to senior Professors) completing a Postgraduate certificate in the past four years. 95 staff have also completed a Postgraduate Diploma and 12 have completed a Masters course. Staff taking these courses come from a wide range of disciplinary areas and one of the strengths of the courses is the sharing of inter-disciplinary experience. Many of the assignments and dissertations completed as part of these courses provide new insights on graduate education.

A SoTL approach is embedded in the courses through the assignments which participants have to complete to pass the course, as well as through collegial discussion and peer review at seminar sessions. In the second semester of the Certificate programme, for example, each participant submits a Course Portfolio, based on Pat Hutchings' (1998) model of critiquing a course in relation to its design, its enactment (teaching) and its student learning. Likewise, on the Diploma programme, each faculty member presents an inquiry course portfolio, based on the Bernstein (2006) model, which requires faculty to identify a research question/issue concerning one of their courses and to collect data and document how they dealt with this question with a view to promoting student learning. These course portfolio models introduce faculty to the concept of teaching as an integral part of their research and prepare them for the more in-depth research required by the Master's programme. Faculty are encouraged to make their research public by presenting their course portfolios at conferences in the form of papers or posters.

The portfolios represent the full spectrum of disciplines in the university and focus on undergraduate and postgraduate courses. Since students of the certificated programme are themselves members of faculty, each portfolio can be related to a graduate education context. As part of the reflective process, faculty are asked to consider questions such as

"What have you learned as researchers of teaching and learning from documenting your chosen course?"
"What have you learned about SoTL, and how does that impact on your teaching of the course?"

The Master's programme is also informed by a SoTL philosophy. Masters students use a broader palette of research approaches in scaffolding their research, though some continue to use the course portfolio process as a way of representing their research. Examples of the titles of some Masters' dissertations are as follows:

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[13] Lyons, N., Hyland, A. and Ryan, N. (eds), *Advancing the Scholarship of Teaching and Learning Through a Reflective Portfolio Process: The University College Cork Experience*, Cork: UCC, 2002; Hyland, A. *University College Cork as a Learning Organisation* Cork: UCC 2004; Ryan, N. (2008) *International Perspectives on Teaching and Learning in Higher Education,* NAIRTL Conference Proceedings University College Cork: NAIRTL, November 2007

- *Balancing Challenges and Skills in Doctoral Education: An Exploratory Study of Csikszentmihalyi's Flow Theory.*
- *Mirroring Practice? An Exploration of the use of Reflection during the transition from Classroom to Clinic in Third Year Medical Students.*
- *Signature Pedagogies and Legal Education: Epistemological and Pedagogical Concerns with Langdellian Case Method.*
- *Investigating the Scholarship of Teaching Through Teaching Teachers: A Journey Towards Reflective Practice.*
- *Learning and Teaching Styles in Engineering Education.*
- *A National Study on the Perceived Educational Needs of the Irish Dental Faculty.*
- *A Study of Learning Outcomes in Process and Chemical Engineering.*

Awards and Recognition of Teaching

A President's Award scheme for Excellence in Teaching has been in place for almost a decade and Teaching Portfolios form a central plank of the assessment for these awards. Awards for Research on Innovative Forms of Teaching have also been introduced and award winners present and discuss their findings to and with faculty colleagues. Applicants for promotion to Senior Lecturer and Associate Professor are required to present evidence of effective teaching in the form of a teaching portfolio. These inter-related activities gradually changed the culture of the university, and research into teaching and learning is now recognised and respected as a valid form of scholarship.

The National Academy for the Integration of Research and Teaching and Learning (NAIRTL)

Shortly after the CASTL network was initiated in 2006, UCC was successful in attracting a grant of €3 million (over $4 million) from Ireland's Higher Education Authority[14] in a competitive bid to set up a National Centre for the Integration of Research and Teaching and Learning (NAIRTL). UCC is the lead institution for NAIRTL, which also involves the National University of Ireland, Galway, Trinity College Dublin, Waterford Institute of Technology and Cork Institute of Technology. The grant application for NAIRTL was inspired by the (U.S.) Centre for the Integration of Research and Teaching and Learning (CIRTL), led by Bob Mathieu of the University of Wisconsin at Madison – a member of the CASTL Graduate Education network.

Since its inception, NAIRTL has played an important role in encouraging a SoTL approach to research-led and research-informed teaching in the Irish university sector[15]. In its first two years, it introduced a National Awards scheme for Excellence in Teaching; it awarded 102 grants for projects that encourage scholarship in teaching and learning. It published eight books, and numerous reports, which are influencing national policy. It is reaching faculty who had not before considered their teaching as a scholarly activity. These teachers are formulating research questions, conducting enquiries, and disseminating their findings. The impact on student learning is evident, and is being monitored and evaluated[16].

In addition, NAIRTL has provided funding for a number of conferences, workshops and seminars. In spring 2009, for example, it funded a Public Lecture series in UCC on Research-Led Teaching which included the following speakers and topics:

- Angela Brew (University of Sydney, Australia): Enhancing undergraduate engagement through research and inquiry.

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[14] The Higher Education Authority is the funding body for higher education in Ireland.
[15] See NAIRTL website http://www.nairtl.ie
[16] See also Higgs, B. (2007) Strengthening SoTL in Ireland: The Establishment of the National Academy for the Integration of Research and Teaching and Learning, T*he International Commons, ISSOTL,* Vol. 2, Issue 2, May 2007. http://www.issotl.org/newsletter.html

- Barbara Cambridge (National Council of Teachers of English, U.S.) : E portfolio Learning and Research: Building Strong Links.
- Bettie Higgs (UCC): What Are the Threshold Concepts in Your Discipline?
- Iain Mac Labhrainn (National University of Ireland, Galway): Towards Evidence Based Policy in Higher Education – large scale staff surveys of teaching, professional interests and the role of higher education.
- Robert Mathieu (Director, CIRTL, U.S.): Preparation of Future Faculty Based on Research Led Teaching.
- David Boud University of Technology, Sydney): Research-led assessment; bringing together teaching and avoiding the contradictions of certification;
- Andrea Nolan (University of Glasgow): Developing research-minded enhancing attributes in our graduates.

CASTL Scholar 2005-6

Bettie Higgs's selection as a CASTL scholar in 2005 contributed further to the high profile of teaching and learning in UCC. Dr. Higgs is academic co-ordinator of the Support programme for Teaching and Learning and is widely respected by her colleagues in UCC. Her involvement in the CASTL Integrative Learning project brought new insights into the teaching and learning support programme in UCC, and led to the setting up in 2008/9 of a national project on Integrative learning in Irish higher education institutions. UCC's involvement in the CASTL Leadership program further enhanced the support for SoTL within the university.

Developments in Graduate Education since 2006

During its years of involvement in the CASTL Graduate Education network (2006-2009) significant changes have been introduced in Graduate Education in UCC and in other Irish universities. These include the introduction of taught modules for graduate students and the development of training courses for faculty involved in supervising graduate students – based on research which identified faculty and student needs and wishes in regard to such courses. Much of the training for graduate students and for faculty is informed by the principles of SoTL.

The following section lists some developments that have occurred at national level in relation to graduate education since 2006[17]:

- all seven Irish universities now have Deans of Graduate Studies
- a Fourth Level network has been established under the Irish Universities Association and this network has undertaken a number of collaborative projects
- There have been two major national reviews of graduate education.
- UCC and a number of other universities have joined the EUA Council for Doctoral Education (EUA-CDE). [see http://www.eua.be/events/eua-council-for-doctoral-education/
- All universities now provide some taught components for doctoral students
- A Publication entitled "*Good Practice in the Organisation of PhD programmes in Irish Higher Education*" (2nd edition) was produced by the Irish Universities Quality Board in 2009 (see http://www.iuqb.ie). This publication is an update of an earlier Guide that was published in 2005 and reflects the developments that have occurred in PhD education in Ireland in the intervening years.
- A number of inter-institutional Graduate Research Education Programmes (GREPs) have been set up with financial support from government. These include an inter-institutional GREP in micro- and nano-engineering and a Food Science GREP, both led by UCC.

[17] I am indebted to the Dean of Graduate Studies, Professor Alan Kelly and to the Chair of the Academic Council's Graduate Studies Committee, Professor John O'Halloran, for the information in this section.

- Inter-institutional alliances have been set up under the government-funded Programme for Research in Third Level Institutions (PRTLI)
- Many of the collaborations have an international dimension.

Within UCC, a **number of developments have occurred:**

- A Dean of Graduate Studies, Professor Alan Kelly, was appointed in 2006. Shortly after his appointment, Professor Kelly joined UCC's CASTL team.
- A Graduate Studies Committee of the Academic Council was formed – this committee is chaired by Professor John O'Halloran, who is a member of the UCC CASTL team.
- A Graduate Studies Office was established, involving the provision of a one-stop-shop administrative centre, facilitating greater coordination of postgraduate recruitment and supporting the ongoing significant expansion in the number of postgraduate students at UCC. This office also provides an administrative framework for the introduction of structured PhD programmes, including inter-institutional programmes.
- Graduate School have been or are in the process of being set up in the College of Arts, Celtic Studies and Social Sciences; the College of Science, Engineering and Food Science and in the College of Medicine and Health. Since 2003 there has been an increase of 65% in the number of PhD students registered in UCC. There are currently 930 registered PhD students in the university.
- New procedures have been put in place for PhD supervision and examination, including new procedures for Viva Voce examinations. Supervisors will be present at the viva but will no longer be examiners. Procedures for dispute resolution, joint PhDs were recently approved by Academic Council (May 2009).
- Training courses are being put in place for PhD supervisors, and supervisor training and PhD supervision is now part of the promotions and establishment (i.e. tenure) criteria.
- Additional Student Supports have been put in place to cater for the increased number of doctoral students. A Vice President for Student Experience and a Vice-President for Teaching and Learning have been appointed and a Graduate Students' Forum has been established.

Strategy for Graduate Education in UCC

A one-day strategy workshop took place on June 11th 2008, to address key issues relating to Graduate Education in UCC. The purpose of this workshop was to provide an opportunity for staff involved in graduate education at UCC to contribute to discussions on ways to progress in a number of key areas, including:

- Increasing Capacity for Graduate Education
- The Postgraduate Student Experience
- Support for Supervisors
- Policies and Processes for Managing Graduate Education

The workshop participants included members of the Academic Council Graduate Studies Committee, members of the University Management Team, Chairs of Departmental Graduate Studies Committee, Heads of Research Institutes and key administrative personnel. The output of the workshop included a 'business plan' for all the stakeholders to advance and prioritise Graduate education at UCC over the coming five year period.

Structured Doctorates

In response to the call for a more structured approach to doctoral education, three distinct models of doctoral education in UCC are being developed:

- The "Programme" model – sometimes referred to as a "cohort PhD". This model includes some taught elements or modules, which are taken by all students of that programme and recognised for credit (this model is already in place in the Education Department).
- The Practitioner Doctorate – doctorate programmes which are usually provided on a part-time basis for practising professionals (this model is in place in the Department of Applied Social Studies).
- Individual Doctorate (PDP based); Personal Development Plan where each student chooses taught modules relevant to their course of study (this model is already in place in a number of Departments).

Training of Supervisors

- Training in supervision and student support is being provided and faculty have co-operated positively with this training.
- Consideration is being given to providing some of this training online and/or electronically
- NAIRTL is working on a national framework for training of supervisors; a survey has been carried out and draft framework has been drawn up. The findings of the survey (May 2009) indicated that the majority of respondents agreed that there should be defined criteria for supervisor suitability; that a mentoring programme should be provided for new supervisors and that training should be provided for both inexperienced and experienced supervisors.

Generic Skills Training for Students

A 5 credit module, PG 6003 - *Learning to Teach in Higher Education* -was offered on a pilot basis for graduate students in 2006/7 and 2007/8. In 2008, funding was provided by NAIRTL to design a module in collaboration with two partner universities – National University of Ireland, Galway and Trinity College Dublin. In UCC, the module is a combination of practical advice and initiation into theoretical work, inquiry and the scholarship of teaching and learning. A key feature is the integration of research, teaching and learning. Postgraduate students were asked "What does the integration of research, teaching and learning mean to you? They identified the following strands:

- Teaching undergraduates about their own research specialism
- Supervising new postgraduates in their own research area
- Helping undergraduates to carry out research
- Learning from undergraduate student questions and their work,

In 2008, a Handbook for Graduate Students – *"In at the Deep End: Learning to Teach in Higher Education"* edited by Bettie Higgs and Jacqueline Potter was published by NAIRTL, and acted as a textbook for the course. The book was adapted from an earlier text by Phil Race and contains advice and support for graduate students who are "thrown in at the deep end" and find themselves having to provide tutorial and/or laboratory support to undergraduates – often with little or no advice or preparation.

A postgraduate Symposium of the same title was held in February 2009 at which thirteen postgraduate students presented papers. Abstracts of these papers are available on the Ionad Bairre website[18]. The following papers presented by postgraduate student indicate the range of issues and concerns faced by them in their capacity as teaching assistants or tutors:

"Why Do Students seem to be more interested in passing the exam rather than understanding the subject?"
"How Can I use Assessment more Effectively as a Teaching and Learning Tool?"
"How Do I overcome the Challenge of Age Difference in the Classroom?"
"What are the Challenges of one-to-one tutoring?"
"How Can I provide Opportunities for Active Learning during the Lectures?"

"How Can I maintain Students' Attention in Class?"
"How Do I ensure that Students Achieve Intended Learning Outcomes?".
"How do I encourage Attendance and Participation within the Classroom?"

In addressing these issues, the postgraduate students were encouraged to apply a SoTL approach and to answer the following questions:

- How does this concern relate to student learning?
- What did you try to do about it?
- What evidence addressed this concern and was helpful when reflecting on this issue?
- In the light of the evidence what are the implications for your future practice?

PART 2 : KEY QUESTION:

What does it look like when the Scholarship of Teaching and Learning (SoTL) becomes part of Graduate Education?

In addressing this question, the term Graduate Education is interpreted in UCC to include:

1. certificated courses (at Postgraduate Certificate, Diploma and Masters levels) for faculty in all disciplines and teaching at all levels of the university;
2. PG6003 - a 5 credit module *"In At the Deep End: Learning to Teach in Higher Education"* for graduate students involved in teaching and tutoring;
3. continuing professional development and support for faculty who are involved in the education of graduate students (including doctoral supervision).

Where and how does SoTL make a difference?

From the point of view of faculty, one of the major contributions of SoTL is that it recognises teaching and student learning as a form of research. SoTL makes a difference firstly at the conceptual level, as faculty gradually move beyond the "tired old teaching versus research debate"[19]. SoTL also impacts at the curriculum planning level, as faculty become aware of the necessity to focus on student learning as well as on course content.

Within the classroom context, SoTL requires faculty to focus on the question: "*How do I know what my students know and understand?"* Hence, teachers begin to prioritise the student more than the text, and to appreciate the importance of ongoing assessment and feedback to students. The work of Cross and Steadman [20] has been influential in providing faculty with classroom research and assessment techniques to begin their journey.

From the point of view of graduate students, SoTL helps them to think of tutoring and teaching within a broader research context. They begin to understand the linkage between teaching, learning and research. Thinking of teaching as a form of scholarship is a conceptual shift for most graduate students.

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[19] Boyer, E. *Scholarship Reconsidered: Priorities of the Professoriate.* The Carnegie Foundation for the Advancement of Teaching. San Francisco: Jossey – Bass, 1990.
[20] Cross, K. P and Steadman, M. H *Classroom Research: Implementing the Scholarship of Teaching. San* Francisco: Jossey – Bass, 1996.

How are Faculty and Graduate Students different when they go through the SoTL learning process?

Through the SoTL learning process, faculty and students learn not to be defensive about the challenges they meet in their teaching lives. They realise that their concerns about their teaching can be shared and addressed – that they are interesting to reflect on and can be informed by theory.
They learn to investigate their teaching and their students' learning and to disseminate their findings. The inquiry process is new for both graduate students and faculty.

How does SoTL involvement affect how faculty approach teaching?

SoTL transforms the approach taken by faculty to teaching at every level, from its theoretical and conceptual foundation, to the planning and teaching of a student centred curriculum, to the sharing and critiquing of emerging data about student learning. In UCC, the single most important transformation brought about by SoTL has been the "movement from terminal remediation to ongoing investigation"[21]. Initially, faculty focus on tips and strategies, on technical and remedial remedies to "fix" the problems of the classroom and the students. Gradually, through the SoTL process of opening up their practice, through documentation and reflection, they come to realise that teaching is embedded in learning and that, like all research, it is an ongoing process, where problems are framed through ongoing investigation, rather than quickly solved in a linear way.

Faculty are also motivated to carry out research on their teaching and realise that publishing about teaching adds to their research profile. For example, at the conference organised by NAIRTL in 2007, *International Perspectives on Teaching and Learning in Higher Education*, twenty eight faculty, representing all disciplines, published posters emerging from their course portfolios on promoting the Harvard Teaching for Understanding model[22] with their students. Four of those who presented a poster at the conference in 2007 went on to publish papers internationally on the teaching and learning of their disciplines.

How does SoTL affect how graduate students approach learning?

Some of the same messages emerge: postgraduate students who are tutors and demonstrators begin to see their teaching in terms of an investigation, rather than a technical solution. Through presentations and discussions they come to realise that they are not alone and that there is a body of literature and expertise to help them to frame their questions in a systematic way. Other lessons also emerge: the graduate student begins to get a new perspective on the learning process itself, as one of inquiry and collaboration. In the process of engaging in discussion about teaching, they learn about their own learning as well as their students' learning. They begin to see that their discipline can be enriched through teaching it and that their research can also have a pedagogical dimension which, in turn, informs their research.

For example, the Accountancy graduate student who posed the research question : *"Why do students seem to be more interested in passing the exam rather than understanding the subject?"* concluded that he must *"try and interest the students in the subject, its utility and use in real life".* He has learned that "*he must prepare case studies to explain how and why people play with accounting numbers".* Above all, *"he must introduce the student to the beauty of accounting and what there is behind a number".*

A postgraduate student of Microbiology asks the disarming question "*Can I teach?"* She realises that "*by learning you will teach and by teaching you will learn"* - an interesting juxtaposition of the UCC College Motto: "*Where Finbarr taught, Let Munster Learn".* This student talks about the patience one must have as a teacher, about developing the capacity to listen and about "*looking the student in the eye"* – communicating with, rather than "talking at" the student.

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[21] Bass, R. "The Scholarship of teaching: What's the problem?" *Inventio, Creative Thinking about Learning and Teaching*, 1 (1) 1- 10, 1999.
[22] Wiske, M. S. *Teaching for Understanding: Linking Research with Practice*. San Francisco: Jossey Bass, 1998.

A postgraduate student of Applied Social Studies asks "*Who is the Learning For?"* and realises that it is for the students. His insights conclude that the physical space for learning is important, so that there is a sense of equality and that all have an equal voice. He develops his presentation by talking of "*promoting integration: helping students to listen to each other, to respect each other, to support each other during the debate".*

Time and again in their reflections and presentations, the graduate students learn valuable lessons about the nature of teaching, and more importantly, about the nature of learning. Their ability to conceptualise and share their thinking is also testament to their self- awareness and to the way in which they have internalised what it means to learn.

How does the institutional culture change because of SoTL? How does SoTL affect institutional cultures?

Faculty and graduate students see teaching as a form of scholarship and have developed an awareness of how research can be integrated into teaching and learning. They realise that their teaching helps their research and they apply a spirit of inquiry to their teaching and their students' learning. They become "reflective practitioners" in the best sense.

In UCC, teaching has parity of esteem with research. This is evident in the establishment and promotions criteria – it is not mere rhetoric. It is generally accepted that there is no dichotomy between being a good "teaching university" and a "research university". Good researchers can and should be good teachers and vice versa. The President's awards for excellence in teaching, and awards for research on innovative forms of teaching are visible manifestations of the esteem in which teaching is held.

The Strategic Planning framework of the university has articulated key performance indicators (KPIs) for teaching as well as for research. SoTL makes this possible, for it is built on the tenets of publication, critique, and peer review, common to all academic research.

Ionad Bairre (the Teaching and Learning Centre) is a research centre as well as a support centre for teaching and learning. Its philosophy is based on Bass's "ongoing investigation", rather than on the "terminal remediation" of more traditional teacher training models. Certificated courses for faculty and postgraduate students are based on a SoTL philosophy which underpins the work of the Centre.

What is learned in SoTL and how is SoTL advanced because of these initiatives?

In UCC, T&L courses, and support seminars for faculty and graduate students, have drawn on research carried out at Project Zero at the Harvard Graduate School of Education as well as on research carried out by CASTL. UCC is one of the few locations in the world where the findings of research arising out of Multiple Intelligences theory, Teaching for Understanding, Making Learning Visible, Teaching Thinking Skills etc. - projects which initially involved students in K-12 educational settings - have been applied in a higher education context. This has enriched our understanding both of SoTL and of the implications and potential of research on teaching and learning carried out by Project Zero.[23]

UCC has amassed a large collection of teaching and course portfolios in a variety of different disciplines. These are a rich source of research in themselves as well as being excellent examplars for other academics. SoTL provides a common language of discourse for various disciplinarians and allows interdisciplinary conversations to take place.

SoTL is a continuum that staff can enter at any point. It enables an inclusive approach with different points of engagement. SoTL makes teaching and learning more visible, open to critique and capable of being built on by others. It is the cultural shift – the new acceptance of teaching as a valid form of research – that has advanced the case for SoTL in UCC.

[23] See Chen, Jie-Qi, Moran, Seana and Gardner, Howard *Multiple Intelligences Around the World* Jossey-Bass 2009.

How does SoTL affect institutional leadership? What kind of leadership has emerged?

There has been positive engagement with SoTL by senior academic management since UCC became an Institutional Leader in the CASTL project. The CASTL team in UCC has included institutional leaders e.g. the VP for Teaching and Learning, VP for Research, the Director of the Quality Promotions Unit, the Dean of Graduate studies, and the Chair of the Academic Council's Graduate Studies Committee. A number of these individuals were recipients of the President's Awards for Excellence in Teaching at various stages in their careers, had published in peer reviewed journals on teaching and learning, and are recognised research scholars in their own disciplines. Members of the Senior Management Team, including the past and current President of the University, have publicly endorsed SoTL and have provided excellent leadership through example.

How sustainable is the CASTL project?

The CASTL philosophy will be sustained within UCC for as long as faculty and graduate students see the need to prioritise and enhance student learning and as long as the current leadership and faculty remain as committed as they currently are. It is envisaged that UCC will continue its collaboration with institutions in the CASTL Graduate Education network which are involved in projects from which UCC has learned and continues to learn – especially CIRTL's Delta Program in Research, Teaching and Learning; Central European University's SoTL Fellowship Program and its Training Program in Teaching in Higher Education; and Rutgers CASTL Fellows Program. UCC is still at an early stage of developing and delivering its programs for graduate students and for faculty on teaching and learning, and will continue to develop and refine these programs in the years ahead. However, we are aware that in the absence of the overall support and co-ordination of Carnegie's CASTL programme and its wonderfully supportive staff, especially Tony Ciccone, Pat Hutchings and Mary Huber, it will be more challenging in the future to maintain communication with partner institutions, and to develop strategies to ensure that collaboration and sharing of experience continues.