Academic Learning: Integrating Faculty Conceptions of Research and Teaching

Research and teaching, the two core academic practices of the university, are often construed by faculty as mutually exclusive and fragmented, even incongruous, activities that have little overlap in practice (Colbeck, 1998). The metaphor of a "tightrope" has been employed to explain the fine line that faculty members—particularly those on the tenure track—must tread, in order to preserve the tenuous balance between research excellence and quality teaching (Wolverton, 1998). Indeed, there is an inherent 'rivalry' between these two practices which undermines their common goal of learning and the production of knowledge (Barnett, 1997; Barnett & Hallam, 1999; Light & Cox 2001). Even those who do view research and teaching as complementary activities often find integration difficult to achieve in practice (Rowland, 2000).

Several key constructs related to each of these core practices have been examined, including faculty approaches to and conceptions of teaching (Kember, 1997; Kember & Kwan, 2001; Prosser & Trigwell 1999; Samuelowicz & Bain, 1992, 2001; Trigwell, et al. 1999), faculty understanding of student learning (Prosser & Trigwell, 1999), faculty experience of the improvement of teaching (Mckenzie, Akerlind 2003) and faculty conceptions of research (Brew, 2001; Brew, 2003; Boud & Brew, 1999). Importantly, several studies have linked these constructs to one another, and to student learning outcomes (Kember & Kwan, 2000; Light et al. 2005). These studies investigate constructs associated with different academic practices. In an earlier study, Light & calkins 2006 investigated an general, more inclusive construct of academic practice uniting research and teaching through their common goal of learning. This study disclosed critical dimensions of variation in the way faculty understand or conceive of academic

practice with specific implications for teaching. This paper reports on a current study which addresses whether these faculty conceptions of academic practice can be impacted by a faculty development program intended to improve the understanding and practice of teaching by drawing upon faculty's own understanding on learning in their own research practices.

Conceptions of Core Academic Practices

We use the term "conception" to describe the ways in which someone experiences "something," a phenomenon or practice. Pratt (1992) describes conceptions as "specific meanings attached to phenomena which then mediate our response to situations involving those phenomena. We form conceptions of virtually every aspect of our perceived world, and in so doing, use those abstract representations to delimit something from, and relate it to, other aspects of our world." The concept may express a general understanding of a given discipline (e.g. History) (Entwistle, 1997), or of particular practices such as essay writing (Hounsell, 1997), or creative writing (Light, 2002), or student learning (Marton, et. al.1993). It has also been used in a more narrow way to describe how students understand a particular topic or idea in a syllabus (Marton & Booth, 1997). We focus here on the application of this concept as a key descriptor of more general conceptions of experience and understanding; specifically, how a faculty member experiences or understands the practice of teaching in higher education.

Over the last two decades, how faculty experience teaching, in terms of both their conceptions of and approaches to teaching, has been a rich source of inquiry. Researchers have found two broad orientations of teaching (Kember, 1997; Prosser & Trigwell, 1999; Trigwell & Prosser, 2004), although there is some variation in the theory and description of each (Akerlind, 2003; Trigwell, 2003). The studies generally differentiate between faculty who view teaching as information transmission (IT), that is, a way for faculty to organize and passively transmit

content and their own knowledge to their students, and those who view teaching as a means to facilitate conceptual change (CC), that is to help their students construct their own knowledge and world view. The former is generally viewed as a teacher-centered approach to teaching, while the latter is usually viewed as a learner-centered approach (Barr & Tagg, 1995). Significantly, several studies have further connected conceptions of teaching to student learning, demonstrating that student-centered conceptions and approaches to teaching correlate strongly with deeper student approaches to learning and improved learning outcomes (Trigwell et al. 1999; Prosser & Trigwell, 1999).

More recently, there have also been a number of studies exploring how faculty members conceive of research. In a recent study, Brew (2001) investigated the conceptions of research of senior Australian researchers, identifying four qualitatively different ways in which they understood research. This research was, however, primarily contained within the research practice with not immediate implications for teaching or a wider understanding of academic practice.

Much has been written about the seeming divide—artificial or real—that sets research and teaching apart as separate practices at the university. Yet, little has been done to connect research and teaching in terms of learning. This may be due, in part, to the historical dualism characterizing academic work and also the failure to conceptualize faculty conceptions of research in terms of learning, despite a substantive paradigm change away from looking at teaching in terms of the practices of instruction towards its outcomes in terms of learning. One exception to this is an on-going study by the authors (Light & Calkins 2006) examining faculty conceptions of academic practice which focus on faculty understandings of learning within their research and it relationship to their understandings of learning of undergraduate students in teaching. That study suggests that rival conceptions of learning compete within the experience

of many faculty with particular implications for their understanding and experience of teaching. Indeed, where there was a disconnect, it was always between a less sophisticated conception of undergraduate learning in their teaching and a more sophisticated conception within their research. The implications are that research & teaching are not only rival practices, but more disturbing, many faculty experience this rivalry as a "rivalry of learning" within their core understanding of what they do as academics. Moreover, this disconnect hinders the development of more sophisticated conceptions of teaching and thus, as indicated above, the potential for more sophisticated student approaches to learning and, ultimately, improved student learning. outcomes. This study examines whether or not this disconnect in conception of academic practice might be ameliorated within a faculty development program which includes encouraging faculty to draw upon their understanding of learning in their research to inform and enrich their understanding of learning in their teaching.

Conceptions of Academic Practice

There are four different types of conception of academic practice and they fall into two broad categories: disconnected conceptions and connected conceptions (Light and Calkins 2006). These different types of conception are characterized by three distinctive features —one learning feature and two practice features (see Table 1 below). The connectedness aspect of the conception is mainly related to the learning feature which describes the variation in the ways in which faculty understand the relationship of their learning in the research context to the way they understand student learning in the teaching context.

In the disconnected conceptions, faculty understand their learning (in research) and undergraduate student learning (in the teaching situation) as fundamentally different, particularly in regards to undergraduate learning. Unlike their experience of learning in the research

situation as active, personal, problem-focused, making connections, they tend to regard student learning as more passive, impersonal, and focused on the acquisition of facts, content and abilities. Their overall experience of learning of one aspect of their academic practice is detached from their experience of the other (Type I). While some recognize a resemblance in learning in research and teaching, this resemblance is regarded as incidental (Type II).

In the connected conceptions, the overall experience of learning is integrated across faculty academic practice. Faculty regard the process of student learning as very similar to their own: active, problem focused, concerned with making connections. Learning is experienced as fundamentally the same in both the research and teaching situations (Type IV), although in Type III conceptions faculty see student learning as "sequentialized", as having to go through a more passive acquisition stage in class before integration with the learning of the research situation.

The practice features describe the variation in the ways in which faculty experience the relationship between research and teaching from two perspectives. The first perspective looks at the different ways in which faculty view research practice informing teaching practice, and the second concerns variation in the ways in which they see teaching informing research practice. In the disconnected conceptions, faculty regard the practices as entirely separate activities with minimal or no content overlap (Type I), or as providing some material, structure or ideas, but strictly at the content level (Type II).

In the two connected conceptions, however, faculty experience a more dynamic relationship between their teaching and their research. The focus of the relationship goes beyond content towards the promotion of critical thinking. This process can happen two ways: problems and questions from research raise issues for critical thinking in class, and questions/ideas raised in class provide material for re-thinking ideas in research (Type III). While in the third type of conception faculty regard this sharing of ideas, problems and thinking as important, the

awareness of this sharing happens accidentally and the potential is then recognized and developed. Type IV conceptions are characterized by a more intentional sharing and integration of the activities common to the two practices. Faculty intentionally take models, values, and philosophy from their research and bring them into their teaching to encourage students to think and learn as researchers and scholars do in their discipline. Similarly, they will construct interactive sessions in class to stimulate and raise new ideas and questions in their research.

Table 1: Conceptions of Academic Practice (Learning, Teaching, and Research)

DEFINING FEATURES	**Disconnected CONCEPTIONS**		**Connected CONCEPTIONS**	
	I	**II**	**III**	**IV**
Learning **Undergrad & faculty**	*Detached* Learning is different (passive for students; active for faculty)	*Detached* Learning is different (but accidental resemblance)	*Integrated* Learning is similar but there is an initial passive stage for students	*Integrated* Learning is similar (active for both)
Practice **How research informs teaching**	No research used in undergrad teaching; or provides minimal material from research *Content-focus*	Provides only material/content from research for the syllabus or helps in structure of syllabus *Content-focus*	Raises problems and questions from research in the teaching situation to promote critical thinking *Thinking-focus*	Provides research values/ philosophy as well as problems and questions to promote and model critical thinking in the discipline. *Thinking-focus*
How teaching informs research	Teaching doesn't inform research; preparation might remind researcher of content not seen in a while	Teaching provides new research material/content and questions researcher had not seen before	Interaction with students provides new ideas/ content and helps re-think research questions	Interaction with students structured to *intentionally* raise new ideas/content and help re-think research questions

Research Methods

This study essentially takes a pre-post approach to measuring change in conception from the beginning to the end of the program. The study does not attempt to identify particular asctivities as specific causal agents in this change, but rather to ascertain whether a faculty development program focused on developing faculty understanding of teaching in terms of student learning might impact their general conceptions of academic practice.

Methodology

The study takes a phenomenographic research perspective (Marton, 1981; 1988a,; Marton & Booth, 1997) to the investigation of faculty conceptions of learning in academic practice. The focus of phenomenographic studies is not on 'correct' or 'incorrect' conceptions, but rather on the the experience or conception of the phenomena. In contrast to an 'observational' or *1st order* perspective, phenomenographic research is an 'experiential' or *2nd order* perspective. As Martin & Booth (1988) explain;

> In the first and by far the most commonly adopted perspective we orient ourselves toward the world and make statements about it. In the second perspective we orient ourselves towards people's ideas about the world (or their experience of it) and we make statements about people's ideas about the world (or their experience of it). (Marton1988b p178)

Phenomenographic studies focus on the different ways in which the meaning of a particular phenomenon is conceived or understood; or more precisely the variation in the ways in which key features or aspects of a particular phenomenon are experienced. Variation in the ways

in which the phenomena is conceived is disclosed in terms of the awareness of each of the key features of the phenomenon identified. Conceptions vary in terms of how the key features of the phenomena are distinguished, indeed, in terms of the awareness of the different ways in which these key features can be distinguished and related – i.e. the awareness of potential variation in and between the key features. The aim of phenomenographic study is to identify these key features and map out the different categories of conception – ways of experiencing the phenomena in terms of the features and their relationships.

Methodologically, this has important implications. Phenomenographic research relies (although not exclusively) on direct in-depth interviews of the subjects who experience the phenomena. It also takes as its unit of analysis the experience (conception) of a particular phenomenon, not the individuals who experience it. In addition to looking at the data for key features of the phenomena within individuals' experience, the analysis focuses on the variation in that experience and the relationship between the key features. As such, the research looks at the data very carefully for the extent of discernment of the different features of the phenomenon being researched.

Participants

Between 2003 and 2005, 28 full-time, tenure-track faculty members at a private research intensive university participated in a year-long substantive faculty development program in two separate annual instances of the program (12 and 16 respectively). All participants had nominated themselves for the program after receiving a letter sent from the university provost to a wide range of junior faculty with at least one to three years of teaching experience, which encouraged them to enroll.

Faculty Development Program (FDP) Design

The FDP was designed to promote critical inquiry into teaching and learning among its participants. Throughout the academic year, participants must attend a series of linked events related to learning and teaching in higher education, including 4 faculty development workshops, an intensive two-day retreat, 6 dinner workshops, and 3 peer group meetings. In addition, participants must develop and share an evidence-based project related to their teaching, either by creating a new course or course component or revising an existing course or course component. The program particularly focused on providing faculty an understanding of student learning and its role in all aspects of teaching. Over the course of the program, faculty are engaged with theoretical readings, interactive presentations, active exercises and workshops on learning theory and learning in the teaching and research context. Participants are made aware of program objectives and requirements before they formally apply to the program, and must submit a tentative project proposal in their application in order to be accepted into the program.

Instrument

The interviews were semi-structured and open-ended, lasting on average about 40-50 minutes. Two members of the Center staff conducted all of the interviews. The instrument included ten questions designed to capture the relationships between teaching, research, and learning. Several questions aimed to elicit these conceptions directly, asking how the participants understood the relationship between teaching and research. Other questions focused on the relationship less directly, asking the participants to define learning or to explain how they learned within their disciplines. To contextualize these questions, we also asked participants to describe the courses that they usually taught. Focusing on one specific course, participants were asked to identify and describe course goals and expectations, teaching methods, and assessments.

We followed up with less structured questions to probe for more information, to clarify initial questions or responses, or to refocus responses that had gotten off track. Such probes included: "Could you explain what you meant by that?", "Can you give me an example?" The interviewers tried at all times to refrain from leading the participants' responses.

We were also careful to keep questions about student learning and the learning related to the professor's research separate; we specifically did not want the interview to be an experience for our participants in which relationships not prviously drawn, were noe being made, nor did we want their conceptions to be affected over the course of the conversation. We were concerned that making such connections explicit to our participants might taint the research data. As Rowland (2000) observed, while "people normally used the terms teaching and research in a relatively unproblematic fashion, once some of them began to think of their academic activity in more specific detail, the two terms became much more closely intertwined" (21).

Procedure

At the start of the program, we interviewed all 28 faculty members concerning their understanding and attitudes towards teaching, learning, and research. Although one participant dropped out of the program in the second year when he could not reconcile several scheduling conflicts, we still used his interview data. We did, however, exclude three other subjects from the study when taping errors precluded accurate transcription of their interviews (2 from the first year, 1 from the second year). Complete pre program interview data was obtained from 25 participants comprised of 18 men and 8 women. The faculty came from a range of disciplines, with 7 from medicine, 9 from science and engineering, and 9 from the humanities and social sciences. All 25 participants interviewed at the beginning of the program were also interviewed at the end of the program using the same interview protocol, augmented with some questions and

probes about their experience of the program. All pre program and post program interviews were audio-taped and fully transcribed.

Analysis

As the objective of this study was to examine whether a faculty development program could have a positive impact on faculty conceptions of academic practice, for the purposes of this study, full analyses of post program data with respect to faculty conceptions of academic practice were only made on those faculty who pre program were identified as having less sophisticated or "disconnected" conceptions: type I and type II conceptions. Fifteen faculty were identified as having Type I and Type II conceptions. One of these participants dropped out of the program for scheduling reasons and one participant had post program transcript errors. Full analyses were thus conducted on a pool of 13 faculty. We analyzed the interviews with reference to the conceptual framework of conception types (Light & Calkins, 2006) discussed above and presented in Table 1 above. To conduct this analysis, one of us first read through the transcripts. The researcher isolated passages in which participants identified, defined, or described their experience of teaching, learning, and research. We then independently coded the specified passages, employing the framework of faculty conceptions, and compared our analyses to achieve consensus. If we disagreed, we reexamined the transcripts and discussed the larger context of the passages. Throughout the process, we reviewed the entire transcripts to assure that passages remained in context and fit their assigned categories.

Results

The results of the analysis of the transcripts is shown in table 2 (below). The table displays the conception types for the 13 faculty identified as beginning the program with type I or type II

"disconnected" at the beginning of the eight month program and again at the end of it. The results here disclose three distinct patterns of change of conception.

1) a pattern of categorical change in conception
2) a pattern of partial change in conception
3) a pattern of no change in conception

A pattern of categorical change is one in which a faculty member appears to have completed the program with a substantive and distinct change in the way they understand and possibly experience the teaching-learning-research relationship which characterizes the key dimensions of their academic practice. Seven faculty displayed a pattern described by this kind of change. In each case, the change was from the disconnected category to the connected category of conception. In all cases this was to a Type III conception. The second pattern of change is referred to as partial because it describes either a change within the same disconnected category or it suggest change to a conception not fully describable by a type wholly within the more connected category. Three faculty revealed evidence of partial change. In one case this consisted of a change from Type I to a Type II conception, but was limited to the disconnected category. In two other cases, change in conception was from a type I or a Type II conception but only to conception, Type II/III, not fully describable by category. The final three participants in the study disclosed no pattern of change in conception type. These three faculty started with and retained Type II conceptions. Case examples of the both the patterns of categorical and of partial change are provided below. **We didn't have any Type IV?**

Table 2: Change in faculty conceptions of academic practice over the course of an eight month faculty development program in teaching and learning[1]

Faculty	Conception of Academic Practice		
	Pre FDP Program	Post FDP Program	Pattern of Change
P1	II	III	categorical
P2	II	II	No
P3	II	II	No
P4	I/II	III	categorical
P5	I	II	partial
P6	II	III	categorical
P7	I	II/III	partial
P8	I/II	III	categorical
P9	II	II	no
P10	I/II	III	categorical
P11	I	III	categorical
P12	I/II	III	categorical
P13	II/III	III	partial

*Pattern of Categorical Change (***Type II to Type III)**

This pattern is characterized by a change in conception from a limited awareness of the influence of teaching on research with respect to unanticipated provision of new ideas, material and/or questions towards an intentional connection between teaching and research.

"When I teach in each of the courses, I define the constraints that I am working with or have the basis of that. Even though it has so many concepts, the fact that they [students]

[1] Conceptions of academic practice described by two letters separated by a slash indicates individual comments relating two both types noted.

have no pre concepts, lets them question the way you approach things. This makes you think twice about their questions and the way it's always been done." (Computer Science: Pre Program)

"What I …do is provoke the right questions in the mind of the student…T]he projects are very close to the material that I do my research upon….One they make me revisit my ideas, and the second one is that they are directly involved with the projects that I am working on." (Computer Science: Post Program)

*Pattern of Partial Change (***Type I to Type II)**

Faculty with Type I conceptions of academic practice report that their research does not inform their teaching at all or provides minimal content. Their teaching does not inform their research to any great extent, except to remind them of material.

"I don't have a strong connection between [teaching and research] *and maybe because of that I don't necessarily feel that there is a strong inherent link between the two. I see that there could be positive externalities between the two and certainly teaching the material has made it easier for me to think about my own writing in clear ways. But I feel the two are really quite separate tasks."* (Pre Program: Political Science)

While this same professor discloses a change in conception in the post-interview, it is partial or limited to course content/material and an enthusiasm for the material. There is no indication of a substantive change towards impacting how students think.

"How I frame the undergraduate classes has a lot to do with how I will approach research as well: presenting similar style of problem in class to what I would be interested in research. Just by the virtue of the fact that in order to teach the material with enthusiasm you actually have to be enthusiastic about it and so I better choose the things that I think are interesting in the subject and not the ones that I think are boring. In a secret way, my undergraduate syllabi have a lot to do with my research interests but it's not obvious to the students." (Post Program: Political Science)

Pattern of no change **(Type II to Type II)**

This pattern is characterized by a lack of change in conception about the relationship of teaching and research. In this case, the professor held a Type II conception throughout the program. He views his student's learning as separate and detached from his own. He may use encourage his students to use some tools from the discipline, but does not otherwise see much connection between his undergraduate teaching and his research.

[Teaching is related to my research] in part, but not as much as it would be when I am doing the graduate course. That will be more related to the intellectual content in the discipline. Right now the [undergraduate] course I have been teaching does use tools that I use in my own research and some students have found it very useful and there is the beginning research and graduate labs and using these instruments….[A second Engineering] course I am teaching is not relevant because I am not a [specific type of Engineering] scientist and that was not my training. It was my introduction as well when I taught it to the students. [Pre Program: Engineering]

By the end of the program, this professor still holds a Type II conception, using almost identical language to describe his understanding of the relationship between teaching and

research. He still sees them as detached practices, only giving his students some tools and some content from the discipline. He clearly views his graduate classes as a much more obvious way to integrate research into his teaching.

> *I took over [an undergraduate Engineering course] for the person that developed it […] because my PhD was in a related field; the stuff I was doing for my thesis, which is a little different than what I am doing now. So, there was some overlap in a couple of the techniques that were described. I didn't necessarily learn a lot from that. But, it was fun. Because you know I knew something. [A second undergraduate Engineering course] was the first time I taught it… so, it has been more useful to me than it would be for someone that did not start in that field. And then what I will be doing next year is developing a graduate course which would be most directly related to the research that I do. . [Post Program: Engineering]*

Conclusions

Building on previous research disclosing a qualitatively distinct set of four faculty conceptions of academic practice, the preliminary findings in this paper indicate that it is possible to effect positive change in the way in which faculty experience the key practices at the center of their academic work. The main difference between these conceptions rests in the integration (or detachment) of learning within the overall experience of academic practice. In the disconnected conceptions, there appears to be a critical gap in the very experience of learning. This gaps suggests not only a rivalry between the faculty member's agenda and teaching responsibilities, but indicates an even more disquieting rivalry embedded within an academic's experience and understanding of arguably the most important construct in academic work: learning.

This study suggests that encouraging faculty to reflect on the relationship of their own learning to their students' learning is crucial: not only for improving faculty teaching, but for helping faculty integrate research, teaching, and learning into their academic life.

References

Akerlind, G.S. (2003). Growing and developing as a university teacher--variation in meaning. *Studies in higher education (*28), no 4. 375-390.

Barnett, R. (1997). Beyond competence. In F. Coffield & B. Williamson (Eds.), Repositioning higher education. London: SRHE/Open University Press.

Barnett, R. & Hallam, S. (1999). Teaching for supercomplexity: A pedagogy for higher education. In *Understanding pedagogy and its impact on learning.* London: Paul Chapman Publishing.

Barr, R.B. & Tagg, J. (1995). From teaching to learning; a new paradigm for undergraduate education. Change. 13-25.

Boud, D & Brew, A. (1995) Teaching and research: establishing the vital link with learning. Higher Education 29, (3), 261-273.

Brew, A. (2001). Conceptions of research: a phenomenographic study. Studies in Higher Education, 26, (3), 271-285.

Brew, A. (2003). Teaching and research: new relationships and their implications for inquiry-based teaching and learning in higher education. *Higher Education Research and Development,* 22, (1), 3-18.

Colbeck, C.L. (1998). Merging in a seamless blend: How faculty integrate teaching and research. *The Journal of Higher Education* 69, (6): 647-71.

Entwistle, N. (1997) Contrasting perspectives on learning. The Experience of Learning. In Marton, F., Hounsell, D. and Entwistle, N. (eds.), Edinburgh: Scottish Academic Press.

Hounsell, D. (1997) Contrasting conceptions of essay writing, in The Experience of Learning, Marton, F., Hounsell, D. and Entwistle, N. (eds.), Edinburgh: Scottish Academic Press.

Kember, D. (1997). A reconceptualisation of the research into university academics' conceptions of teaching. *Learning and Instruction, 7*(3), 255-275.

Kember, D. & Kwan, K-P.(2000). Lecturers' approaches to teaching and their relationship to conceptions of good teaching. *Instructional Science* 28: 469-490.

Light, G. & Cox R. (2001) *Learning and Teaching in Higher Education: The Reflective Professional,* London: Paul Chapman Ltd. (Sage Publications).

Light, G. (2002) From the personal to the public: student conceptions of creative writing in higher education. The International Journal of Higher Education and Educational Planning, 43 (2), pp 257-276.

Light, G., Luna, M., Calkins, S., Drane, D. (2005). Assessing the impact of faculty development programs on faculty approaches to teaching, presented at the American Education Research Association Annual Conference, Montreal, Canada, April 13th, 2005.

Light, G., Calkins, S. (2006). Understanding Academic Practice: Faculty Conceptions of the Research-Teaching-Learning Relationship, presented at the American Education Research Association Annual Conference, SanFrancisco, CA, April, 2006.

Marton, F. (1981). Phenomenography: describing conceptions of the world around us. Instructional Science, 10, 177–200.

Marton, F. (1988a) "Phenomenography: A Research Approach to Investigating Different Understandings of Reality" in Qualitative Research in Education: Focus and Methods ed. Sherman & Webb. The Falmer Press, London and New York.

Marton, F. (1988b) "Describing and Improving Learning" in Learning Strategies and Learning Styles ed. R. Schmeck. Plenum Press, New York & London.

Marton, F., & Booth, S. (1997). Learning and awareness. Mahwah, New Jersey: Lawrence Erlbaum Associates.

McKenzie, J. (2002) Variation and relevance structures for university teachers' learning: Bringing about change in ways of experiencing teaching, *Higher Education Research and Development.* HERDSA 2002, p. 234-241.

Pratt, D. D. (1992). Conceptions of teaching. Adult Education Quarterly 42 (4): 203-220.

Prosser, M. & Trigwell, K. (1999). *Understanding learning and teaching: The experience in higher education.* Buckingham: Society for Research into Higher Education and Open University Press.

Rowland, S. (2000). *The Enquiring University Teacher.* Buckingham, Society for Research into Higher Education/Open University Press.

Samuelowicz, K. & Bain, J.D. (1992). Conceptions of teaching held by academic teachers. Higher Education, 24, 93-111.

Samuelowicz, K. & Bain, J.D. (2001). Revisiting academics beliefs about teaching and learning. Higher Education, 41, 299-325.

Trigwell, K., Prosser, M. & Waterhouse, F. (1999). Relations between teacher's approaches to teaching and students' approaches to learning. Higher Education 37, 57-70.

Wolverton, M. (1998). Treading the tenure-track tightrope: finding balance between research excellence and quality teaching. *Innovative Higher Education* (23): 1, 61-79.