Providing Support for Faculty Who Wish to Shift to a Learning-Centered Paradigm in Their Higher Education Classrooms

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Abstract

Research shows that students who experience a learning-centered paradigm out-perform those who experience a more traditional teaching-centered paradigm. Faculty are generally not well prepared to adopt a learning-centered paradigm, and trying to do so without ongoing support is difficult, at best. We describe a model used at Iowa State University that provides the program and process necessary to help faculty make such a paradigm shift. Introductory and advanced workshops are coupled with ongoing bi-weekly meetings to help faculty develop the strategies and understanding of the learning process that are necessary to develop a learning-centered classroom. The approach used here could serve as a model for other colleges and universities wishing to help faculty who wish to make such a change.

"We won't meet the needs for more and better higher education until professors become designers of learning experiences and not teachers" (Spense, 2001).

Introduction

There is no question that we need better higher education. Classroom professors lament the fact that students don't perform well on exams, that they seem indifferent to materials being taught, and that they don't seem able to transfer what they have "learned" even from one class to the next, let alone from the university setting to the rest of their lives. Employers demand more than just technical knowledge of university graduates. They also want graduates who can think on their feet, work effectively in teams, communicate effectively, and create new knowledge that will give their employers the advantage in today's fast-paced world (Gardiner, 1994; NSF, 1996; Brown and Lassoie, 1998). Students complain that they don't see the relevance of classroom material to what they want to do for the rest of their lives. And through it all, frustration grows.

Meanwhile, a revolution is underway in some college classrooms. Once regimented to lectures, tests and student apathy, these classrooms are evolving into active, interesting and engaging places to be. The key is engagement, a notion that emphasizes a move from a passive to an active learning environment. Teachers and students alike are discovering what cognitive research of the past decade has shown; a world of difference exists between rote recall of facts and a deeper understanding of the principles underlying facts and processes. It is at this deeper level of understanding that true learning occurs, learning that can be transferred to the world beyond the classroom.

"Effective learning strategies almost always require the learner to participate" (Sanders, 1998). That statement is at the heart of attempts by faculty on many campuses to create a more learning-centered atmosphere in college classrooms. "Triggered by the 1983 report, *A Nation at Risk*, that warned 'the educational foundations of our society are presently being eroded by a rising tide of mediocrity', learning-centered efforts were energized by a second wave of reform reports that began appearing in the early 1990's. These reports focused the reform efforts on a common theme: to place learning first. A 1993 report, *An American Imperative*, called for 'putting student learning first' and 'creating a nation of learners.' In 1994 the Education Commission of the States urged a reinvented higher education system that would reflect a new paradigm shift centered on learning. In 1995 the Association of American Colleges and Universities issued a paper titled, The Direction of Educational Change: Putting Learning at the Center." (O'Banion 1998).

Underpinning the learning revolution is a growing recognition that facing the challenges of the 21st century will require more than minor adaptations to current practice (Mullin 2001). Current instructor-centered methods simply cannot sufficiently effect the complex outcomes (higher order thinking skills, problem solving, the ability to see from diverse perspectives, ethical reasoning, and life-long learning) that a prepared citizenry needs. Effecting these outcomes will require many changes in

the way faculty members approach the job of helping students learn. Leading those changes will be faculty who are skilled in designing educational experiences that make students active participants in their own learning.

The question isn't whether students who are actively involved in their own learning fare better than those exposed to a more passive style. That active learning techniques work is well documented in the cognitive research literature (Salvin 1990, Nastasi and Clements 1991, Gough 1987, Marzano et al 2001, National Research Council 2001). Not only do students involved in active learning situations out-perform those who learn through more passive classroom approaches, but also most of them actually prefer learning-centered classrooms once they understand the new set of expectations (Qualters 2001). The question is, what will help educators on college campuses move toward a learning-centered paradigm—both in belief and in action?

The shift to a learning-centered classroom atmosphere presents several challenges for college campuses and for faculty. Such a change is not easy, even for those who wish to make it. While some faculty have been successful in implementing a learning-centered approach in their classrooms, many dedicated faculty with genuine interest in improving classroom instruction grope for better ways of doing their jobs but are hampered by their own past experiences and lack of training in cognitive science. They are hindered further by university, college, and departmental administrators who cling to the idea that "teaching is telling, learning is absorbing, and knowledge is subject-matter content" (Spense, 2001). Learning-centered strategies are based

on knowledge of how students learn. Yet most faculty know little about how students learn. Moreover, because college professors have seldom learned much about teaching in the first place, they know even less about new views. What are needed, in order to surmount these obstacles, are opportunities for faculty to come together as learners to learn about learning.

To make lasting change, faculty need a chance to experience learning in a learning-centered atmosphere. They need opportunities to practice in their own classrooms with continuing support from those knowledgeable about practical applications of current cognitive research. They also need the support of their peers who are experiencing the same trials, tribulations, rewards, and joys of designing learning experiences for their students. Providing these kinds of learning opportunities is the mission of Project LEA/RN[TM] (Learning Enhancement Action/Resource Network).

The Model

Project LEA/RN[TM], at Iowa State University, is one model for providing support for faculty as they move from a teaching-centered to a learning-centered paradigm. Initiated by an Education Leadership professor in 1993 in response to requests from the College of Engineering, it was further expanded through a USDA Higher Education Challenge Grant to introduce additional faculty at Iowa State University and Alabama A&M University to the theory and practice of a learning-centered paradigm.

Project LEA/RN[TM] is not simply a program. More importantly, it is a process. Grounded in research (Licklider, et. al. 1998), it draws on several core elements of adult learning theory: critical reflection, purposed discussion with colleagues, accountability, and action (Cranton, 1994, Knowles, 1994, Mezirow, 1991). These critical aspects of learning are operationalized in Project LEA/RN[TM] through its core structures that apply best practices from staff development research (Joyce and Showers, 1996, Sparks and Richardson, 1997, Darling-Hammond, 1998, Sparks, 1993). In the program, participants (faculty members, administrators, teaching assistants, and staff) meet bi-weekly for two hours in large group sessions (15-20 members) led by a facilitator with a strong background in learning and pedagogy. Large group sessions are conducted using a learning-centered approach so that educators experience learning in the same ways their students will. Participant learning is extended in several ways including individual practice in the classroom, utilization of learning partners, and collaborative inquiry into educational literature. These structures support the most critical aspect of learning: reflection (Brookfield, 1995, Schon, 1983 & 1987). Opportunities to reflect, practice, and see themselves through the eyes of others enhance learning and enable LEA/RN[TM] participants to achieve student learning.

These structures also acknowledge that learning takes time. For both personal and institutional changes to take root, assumptions must be confronted and challenged. All aspects of the project are oriented to this need for individuals to confront assumptions coupled with the opportunity and support necessary to assist in making desired changes.

Each aspect of the program is grounded in learning theory and has a particular curricular focus. For instance, the focus for first-time participants exploring learning theories and the application thereof includes: interactive strategies designed both to involve students in their own learning and to develop their interpersonal skills with others; effective questioning strategies; articulating purpose of instruction; identifying student learning outcomes; and planning lessons. The curricular focus for ongoing participants depends on the needs of the group and what they want to accomplish, but most typically the groups next identify the need to learn about and apply theories and strategies for assessing student learning.

Higher Education Challenge Grant

This manuscript focuses on work supported by a Higher Education Challenge Grant and the reaction of participants to the Project LEA/RN[TM] model of support. The Challenge Grant supported four introductory workshops, one advanced workshop, and bi-weekly meetings during the three-year span of the project. Seventy-four faculty, teaching assistants, or teaching staff participated in one of the introductory workshops including six faculty from Alabama A&M University. Eleven faculty, including three from Alabama A&M, participated in the advanced workshop. Twenty-seven of the participants were involved in bi-weekly meetings for at least one year, with some being involved for all three years of the project.

In it's simplest form, Project LEA/RN^{TM} involves an introductory four-day workshop, an advanced four-day workshop, and bi-weekly two-hour meetings during the regular school year to provide additional learning opportunities and a support group for faculty who are working to apply what they have learned to their particular classroom situation. Both the workshops and the bi-weekly group meetings immerse faculty in a learning-centered environment so the educators can experience many of the things their students will experience as the new paradigm is implemented in their classrooms. Workshops and bi-weekly meetings are facilitated or co-facilitated by faculty and staff from the College of Education who not only are well grounded in current research in learning-centered instruction, but also can assist novices with transferring research into practice.

The introductory workshop focuses on comparing a competitive, teacher-centered approach to a cooperative, learning-centered approach. Participants frequently work in small groups during the workshop as they experience specific learning-centered strategies. The workshop also introduces participants to the necessary elements for effective teams (Johnson et. al. 1998), allows them to learn specific team skills that contribute to more effective team functioning (Johnson et. al. 1991), and gives them a safe place to practice teaching team skills. Central to the workshop is the notion of faculty taking time to confront their beliefs about learning. In addition to experiencing several specific learning-centered strategies for enhancing student achievement, faculty have opportunities to begin to adapt the strategies for application in their own

classroom settings as they work together to plan specific lessons for their particular courses. Typically, these workshops involve from twelve to thirty participants from numerous disciplines. The cross-disciplinary interactions help faculty internalize the concepts of learning theories as they confront their beliefs and assumptions about teaching, learning and students.

Observations

During the introductory workshop, participants often struggle with their own beliefs about how college-level courses should be taught. Much of the struggle revolves around their own past experiences, successes, and failures with a teacher-centered paradigm (lecture format), and an ingrained sense that they must "cover" the material. Curiously, there seems to be an all-pervasive assumption on the part of participants that if they cover the material in lectures, students learn it. If that were entirely true, complaints about students not performing well on exams or about students not being able to transfer knowledge from one situation to another or from one course to another should be much less pervasive than they are.

The struggle with beliefs usually begins to manifest itself during the second day of the workshop and is most often heard first from those whose disciplines are in the "hard sciences." Paraphrased, it goes something like this:

> "I can see how this might work in a history class, but I can't see how I can use it in chemistry (or math or engineering,

etc.). I have to cover the whole book on introductory chemistry (or math or engineering, etc.), and I don't have time to do these things."

As the workshop progresses, there usually is a softening of this stance as participants begin to experience learning in a different way and interact with colleagues from many disciplines. Those who keep an open mind and genuinely want to make changes usually begin to see applications in their own classrooms for at least some of the pedagogical strategies they are experiencing. The following comments are from participants in the introductory workshops.

"I was having trouble understanding how I could implement some of these concepts in the classroom and now, after this workshop and interfacing with others in the group, I think I have a better understanding of the concepts and how they can be utilized effectively in the classroom."

"I can see where some group activities can be used in a technical course. Previously, I saw them as difficult to use here. I have seen the usefulness and how to facilitate people talking in a course. I can recognize the difference in

questions and how to rethink and restructure questions even more than before."

"My course is Field Botany, so it's intended to be holistic, relaxed, and interactive, yet I had no idea how to make it work successfully. Modeling from our facilitators showed me how to bring about active student interactions yet how to reign it in and set limits if things got too off topic."

The advanced workshop introduces faculty to more complex strategies for creating learning-centered classrooms and extends their abilities to apply more highly structured activities. In addition to expanding the number of strategies faculty may use, the advanced workshop delves more deeply into research findings related to learning and learning-centered paradigms. Participants continue to develop ways to adapt their own new learning for application in their classrooms. Participants are asked to continue to confront their own beliefs about learning and teaching. They continue to shift their focus from a teaching-centered paradigm to a learning-centered paradigm throughout the workshop, but the resistance to that change is less pronounced. This is probably due to the fact that the advanced workshop is self-selecting for participants who already know something about learning and learning-centered classrooms because of participation in the introductory workshop. Those people who elect to participate in the

advanced workshop tend to be those who genuinely want to make the shift in paradigms. They tend to be open-minded enough to realize that there are probably applications for the new ways of designing learning experiences in their classes even though they may not see them immediately. In addition, participants in the advanced workshop seem more willing to risk doing things differently in their classrooms and appear much more comfortable discussing both successes and failures with the colleagues they have come to know and value.

When asked why they came to the advanced workshop and what they expected to gain, typical responses were:

"I felt the need for reinforcement of the principles learned in the first workshop. Also, [I] expected to get additional tools to improve my teaching. I like the people I've met with similar interests in improving teaching so this is a support group."

"My Project LEA/RN™ group and the first workshop have given me ideas to increase the cooperative learning for the students. It has given me the language of learning and a supportive atmosphere to pursue improving labs and what the students will get out of it."

"This workshop was important for me as a way of reviewing information about applying cooperative learning in my classroom, to help consolidate and practice information and ideas I have already tried, and to deepen my understanding and appreciation of this approach. The workshop framework is an excellent way to get an overview of a variety of issues and to reaffirm my commitment to cooperative learning."

"My confidence level has increased due to clear instruction, modeling and opportunities to practice and receive feedback. Because of increased confidence, I will use the interactive strategies more often and take a few risks in stretching my expectations for what students can contribute and take with them from their own learning experiences."

Experience with Project LEA/RN™, both as a part of the Challenge Grant and as a part of the program since its inception, suggests that workshops are sufficient to start the faculty shift from teaching-centered to learning-centered classrooms, but the workshops by themselves aren't sufficient to maintain the effort. To ensure that faculty have a chance to continue to build on their successes, to find out how to create successes from their failures, and to continue their own learning, ongoing support and on-site technical assistance

is necessary. That support is provided in the form of bi-weekly meetings during the academic year, led by the same facilitators who led the workshops. The facilitators plan each meeting as if it were a lesson for students in the classroom, as, indeed it is, complete with expected educator learning outcomes. The facilitators are committed to providing experiences for the participants that are based on learning--they expect faculty to do what faculty ask students to do including assignments to implement their learning in their own classrooms between meetings. During the two-hour meetings, participants have a chance to discuss what has worked for them as well as what needs improvement. The interaction in the group is typically rich with ideas for new approaches to creating learning-centered atmospheres in classrooms. Additional readings are often assigned between meetings, and there is an expectation that participants will try a specific strategy in their classroom during the intervening time between meetings. The meetings help hold participants accountable for continuing the conversion to learning-centered classrooms as well. Participants who continue to be involved with Project LEA/RN[TM] through the bi-weekly meetings typically continue to enhance the learning-centered environments in their classrooms. Those who don't attend the meetings often make marginal or no progress in implementing changes in their classrooms after the newness of the workshops wears off.

Fifty of the seventy-four participants in the project responded to a post-project survey. Those fifty led learning for students in sixty-one different courses in 18 departments from 5 different colleges. Of those fifty respondents, thirty-nine had an opportunity to attend bi-weekly LEA/RN[TM] meetings. Responses for those individuals were categorized by the frequency with which the respondent had attended bi-weekly meetings. Categories were "Always", "Frequently", "Infrequently", and "Never". Participants were asked to rate the impact of changes they made in their classrooms on a number of student behaviors. Response options were "Much Worse", "Worse", "No Difference", "Better", and "Much Better". Table 1 shows the percentages of participants who responded with "Better" or "Much Better" for each of the student behaviors by frequency of the respondents' participation in bi-weekly group meetings. When divided into the four categories, the number in each group is relatively small, so additional investigation is needed to substantiate statistically the differences, but the percentages of responses in each group are suggestive none-the-less.

The most striking difference is between those who elected not to attend bi-weekly meetings and those who did attend, regardless of the frequency of their participation. Involvement in the bi-weekly group meetings gives participants an opportunity to fine-tune their learning-centered strategies for their particular classroom settings. The meetings not only help hold participants accountable for continuing efforts to enhance student learning, but also provide the assistance and support faculty need to explore ways to turn failures into successes.

Table 1
Percent of participants reporting "Better" or "Much Better" student behaviors based on participant
frequency of attendance at bi-weekly LEA/RN[TM] support meetings

Student Behaviors						
Frequency of Attendance	Interaction with other students	Interaction with instructor	Willingness to discuss material	Willingness to ask questions	Learning in General	Preparation for Class
Always (n=6)	100	100	100	83	67	50
Frequently (n=11)	91	82	73	73	91	45
Infrequently (n=10)	90	70	90	80	90	40
Never (N=12)	67	58	58	58	33	17

The pattern of participant responses for "Learning in General" and "Preparation for Class" appears to be different from the other four student behavior categories. In all categories except "Learning in General," those who always attended bi-weekly group meetings had the highest percentage of participants reporting better or much better student behavior. A lower percentage of participants who always attended reported better or much better "Learning in General" observed among their students as compared with those who frequently or infrequently attended. Given the findings of other researchers about improved performance of students in learning-centered classrooms (cited earlier in this paper), a 67 percent response level by those who always attended bi-weekly meetings is somewhat surprising. Certainly, small sample size may be entirely responsible for the discrepancy. However, the possibility that faculty begin to hold higher expectations for student learning as a result of participation in Project LEA/RN warrants further study.

As faculty begin to understand more about student learning they may begin to hold higher expectations for student achievement. Those who always attend bi-weekly meetings for more than one year often begin to explore the use of classroom assessment techniques (Angelo and Cross, 1993) and other methods to assess student achievement of intended learning outcomes more frequently. These techniques provide faculty with numerous ways of quickly determining whether students are learning the important points for a class period or a unit covered. Faculty who begin to use these techniques are often surprised by the amount of confusion or misunderstanding that remains with the students at the end of a class period. In more traditional classrooms, that confusion and misunderstanding may not become evident until exam time. Once this discovery is made, faculty then have to decide how to address the problems. It is possible that the lower response percentage in this category is a result of faculty reacting to initial learning rather than the final learning achieved by students at the end of the course. Further inquiry is needed in this area. However, the trend of lower response percentages from participants who never attended bi-weekly groups than for those who did attend holds, even for this category.

The percentages for all participants reporting better or much better "Preparation for Class" on the part of students was lower than the other five categories. This isn't surprising because the initial emphasis of Project LEA/RN[TM] is on approaches to learning led by faculty in the classroom rather than strategies for increasing preparation for class. However, bi-weekly groups do occasionally discuss the problem of how to get students to do a better job of preparing for class. It is possible that a shift in emphasis in Project LEA/RN[TM] could lead to participants implementing more strategies that would improve student preparation for class. Despite no direct emphasis on approaches to promote student preparation for class, higher percentages of faculty who received on-going support through bi-weekly meetings reported that students were better prepared for class as compared with faculty who never attended bi-weekly meetings. This indicates it may be worth investigating, among students, their thoughts about preparation for class in more learning-centered classrooms.

It is encouraging that strong percentages of all faculty who participated in on-going learning opportunities reported better student interactions with each other and with the instructor, better willingness to discuss material, and more willingness to ask questions. Learning theories tell us these are all behaviors that enhance the likelihood for learning to happen.

Reflections

Several things have become apparent during the course of the project that can be of assistance to others who may implement a similar program.

Participation in such a project should be voluntary. Those who enroll in the workshop because they have a genuine desire to change their teaching styles are much more likely to invest the time and effort necessary to be successful than are those who are "asked" to attend by their department heads. As the joke goes, "How many psychiatrists does it take to change a light bulb? One, but the light bulb has to want to change."

A facilitator with expertise in education and leading effective professional development should plan and lead the workshops and on-going meetings. Not only must facilitators have a firm grounding in literature related to teaching, learning, and the learning-centered paradigm, but they also must be adept at helping faculty transfer that research to their own practices. That background is essential for helping participants maintain focus, grounding the workshops in sound research findings and for helping faculty make connections across disciplines. In addition, facilitators have the responsibility to ensure that all meetings and interactions are safe so that faculty will honestly reflect about, and share with colleagues, what is happening in their classrooms.

Both the workshops and the bi-weekly meetings should be conducted in a learning-centered style. Much of the initial "conversion" from teaching-centered to learning-centered thinking takes place because participants are intrigued by the experience of being immersed in a learning-centered workshop.

Workshops alone will not create the kind of substantial paradigm shift that is needed in higher education. Workshops create the initial excitement and interest, but bi-weekly meetings maintain the interest and build on the basics learned in the workshops. They provide the on-going support and on-site technical assistance research has shown is critical for effective faculty development (Joyce & Showers, 1996).

And finally, university administrators who are eager to see faculty shift to a learning-centered paradigm must be willing to provide base level support for a program such as Project LEA/RN™. Faculty must be able to depend on the availability of introductory and advanced workshops as well as bi-weekly support group meetings. That level of long-term dependability is difficult if not impossible to achieve based entirely on soft money support.

Final Thoughts

Indeed, we must do a better job in higher education of preparing students to meet the challenges they will encounter after their collegiate years. It appears that faculty working and learning together in a structure like Project LEA/RN™ may well move us in that direction. One student, involved for several years in the learning revolution in the Department of Forestry, had this to say about his experience:

> I have gained from Project LEA/RN™ in several aspects, both social and academic. Socially I have gained a group of friends who will be valued colleagues throughout my career. These colleagues

that I learn with on a daily basis are a motivation beyond myself. I learn as fast as I can so I can be a greater asset to the group. Academically, we went from being spoon-fed concepts to hunting for knowledge to feed ourselves. I can spend the rest of my life getting fat on ideas. The concepts I worked hard to gain, hold value for me. Therefore, I grasp and hold onto them tenaciously."

Making this kind of difference with students is what we ought to be about. There is a substantial time and energy commitment on the part of educators to change post-secondary student learning experiences, but it certainly seems worth the effort.

Literature Cited

Angelo, T. A., and K. P. Cross. 1993. Classroom assessment techniques: a handbook for college teachers, 2nd edition. Jossey-Bass Publishers.

Brookfield, S. D. 1995. Becoming a critically reflective teacher. San Francisco: Jossey-Bass.

Brown, T. L. and J. P. Lassoie. 1998. Entry-level competency and skill requirements of foresters: What do employers want?. Journal of Forestry Vol. 96, No. 2. pp. 8-14.

Cranton, P. 1994. Self-directed and transformative instructional

development. Journal of Higher Education Vol. 65 pp. 726-744.

Darling-Hamond, L. 1998. Teacher learning that supports student learning. Educational Leadership Vol. 55. pp. 6-11.

Gardiner, L. 1994. Redesigning higher education: Producing dramatic gains in student learning. Vol. 23, No. 7. Washington, DC: The George Washington University, Graduate School of Education and Human Development. (ASHE-ERIC Higher Education Report).

Gough, P. B. 1987. The key to improving schools: an interview with William Glasser. Phi Delta Kappan, 68, 656-662.

Johnson, D. W., R. T. Johnson, and Holubec, E. 1991. Cooperation in the classroom, Edina, MN: Interaction Book Company

Johnson, D. W., R. T. Johnson, and K. A. Smith. 1998. Active Learning: Cooperation in the College Classroom. Edina, MN: Interaction Book Company.

Joyce, B. and B. Showers. 1996. Staff development as comprehensive service organization. Journal of Staff Development Vol. 17, No. 1, pp. 2-5.

Knowles, M. 1984. Andragogy in action: applying modern principles of adult learning. San Francisco: Jossey-Bass.

Licklider, B. L., C. Fulton, and D. L. Schnelker. 1997. Revisioning faculty development for changing times: improving teaching and learning. Journal of Organization, Staff, and Faculty Development Vol. 15, No. 1, pp. 17-28.

Marzaon, R. Ju. D. J. Pickering, J. E. Pollock. 2001. Classroom instruction that works. Association for Supervision and Curriculum Development.

Mezirow, J. 1991. Transformative dimensions of adult learning. San Francisco: Jossey-Bass.

Mullin, R. 2001. The undergraduate revolution. Change, the Magazine of Higher Learning (Sept./Oct. 2001) pp. 54-58.

Nastasi, B. K., and D. H. Clements. 1991. Research on cooperative learning: implications for practice. School Psychology Review Vol 20, No. 1:110-131.

National Research Council. 2001. How people learn: brain, mind, experience, and school. National Academy Press. Washington D.C. 374pp.

National Science Foundation. 1996. Shaping the future: New expectations for undergraduate education in science, mathematics, engineering, and technology. Report on the Review of Undergraduate Education. Washington, DC: National Science Foundation Directorate for Education and Human Resources.

O'Banion, T. 1998. The learning revolution in higher education. Satellite down link produced by

R. Jan LeCroy Center for Educational Telecommunications, Dallas County Community College District. Presented by PBS Adult Learning Satellite Service, January 29, 1998.

Qualters, D. M. 2001. Do students want to be active? The Journal of Scholarship of Teaching and Learning Vol. 2, No. 1. pp. 52-60.

Salvin, R. E. 1990. Cooperative learning: theory, research, and practice. Englewood, NJ: Prentice Hall, Inc.

Sanders, B. R. 1998. The learning revolution in higher education. Satellite down link produced by R. Jan LeCroy Center for Educational Telecommunications, Dallas County Community College District. Presented by PBS Adult Learning Satellite Service, January 29, 1998.

Schon, D. A. 1983. The reflective practitioner: how professionals think in action. New York: Basic Books.

Schon, D. A. 1987. Educating the reflective practitioner. San Francisco: Jossey-Bass

Sparks, D. and J. Richardson. 1997. A primer on professional development. Journal of Staff Development Vol. 18, No. 4, pp. 1-8.

Sparks, G. M. 1983. Synthesis of research on staff development for effective teaching.

Educational Leadership Vol. 43, No. 3, pp. 65-72.

Spense, L. D. 2001. The case against teaching. Change, the Magazine of Higher Learning (Nov./Dec. 2001) pp. 11-19.