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NEFDC EXCHANGE

www.nefdc.org New England Faculty Development Consortium

Message From The President
Where Would You Be
Tom Thibodeau, Assistant Provost, New England Institute of Technology

Have you ever stopped to wonder *where* you would be without your education? Or, how about *who* you would be? I know that for myself, I would probably be in a very different place… not necessarily better or worse but definitely different. I would probably be building houses like my brother and our uncles before him. I spent a lot of time during high school and college working for them on various projects. It was work that I usually liked (and still do) but it was very different work. The great thing about working with your hands is that at the end of the day you know exactly what you have accomplished…it is right there in front of you… I can't always say that now after a day of teaching or administrative work. Much of the work that I do now takes days, weeks, or months to see the light of day.

The question "who I would be without my education" is a far harder question to answer. I certainly learned a lot about a lot of things, but how does one accurately gauge the effect of an education on your personality or your attitude? I would like to think that my education has positively impacted me… made me a "better "person, but there is probably no way that I could ever assess the change except to appreciate what I "have" now. After all, I don't have the "other" non-educated me to compare to in a study and I may be just a bit too close to the subject to objectively assess the change.

However, research is showing that learning, the primary goal of education, does change the brain. Our keynote speaker for our spring 2010 conference, Dr. G. Christian Jernstedt from Dartmouth College, has been researching this process for 35 years and will share his thoughts with us during his presentations. The more we understand this process and the more we incorporate the concepts and findings into what we do every day, in and out of the classroom, the better we will be as teachers so that we can positively affect our students.

Now if education does change us, where would the world be without education? I know that education happens everywhere, not just in schools and colleges, and many of our most important life lessons happen in our

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From the Editors:

If you are fortunate enough to work in an academic setting, as many (if not most) readers of the Exchange are, then you have witnessed the wonderful and transformative effects that learning and education can have for students. How do such transformations come about, and what are the features of learning "environments," broadly understood, that play a critical role in creating such experiences? More simply, how and where does deep and meaningful learning take place and how can we most effectively use this information?

The authors in this issue explore learning and teaching from a variety of perspectives and contexts, and provide opportunities for deep reflection as well as practical insights. For example, the Keynote Speaker of NEFDC's upcoming spring conference, G. Christian Jernstedt, has provided a remarkable list of readings, all of which explore some facet of the "internal environment" of the mind. In addition, we have contributions that explore feedback on student writing; that describe efforts to use an online course to improve the learning of introductory science; that encourage thinking about course web site design from a pedagogical perspective; and that seek ways to both create and effectively use our classroom environments.

We hope you enjoy this issue, and we welcome your feedback and contributions. If you would like to submit an article for our Fall, 2010 newsletter, please send a word document, by May 14, to Jeanne Albert at jalbert@middlebury.edu.

In This Issue...

New England Faculty Development Consortium

Spring 2010 CONFERENCE

Teaching for Learning

Friday, May 21, 2010

Westford Regency Inn & Conference Center

Westford, MA

KEYNOTE SPEAKER: Dr. G. Christian Jernstedt

"How Learning Changes Brains"

Dr. G. Christian Jernstedt is Professor of Psychological and Brain Sciences at Dartmouth College, Adjunct Professor of Community and Family Medicine at Dartmouth Medical School, and Director of the Center for Educational Outcomes at Dartmouth. He specializes in human learning.

Dr. Jernstedt's research is in the area of learning as it occurs both in formal classroom settings and in the natural environment. This research is directed towards understanding the breadth of learning, including its cognitive, behavioral, and affective aspects. He examines what leads to learning, what happens during learning, and what outcomes emerge from learning experiences. His research has examined classroom and other intentional learning, technologically enhanced learning, service-learning, and experiential learning programs.

Dr. Jernstedt has received both of Dartmouth's awards as well as national recognition for distinguished teaching. He offers seminars and lectures throughout the country on learning and teaching, potentials of the human mind, and institutional and program assessment and development.

Message From The President Continued from page 1

homes with our family as our first teachers. Our friends and enemies get in on the process too, on playgrounds, dance floors, and beaches. But, schools, colleges, and universities play a special role and have an incredible affect upon all of us and on future students. Aamazingly, it is now our responsibility as educators to not only continue this process but also to improve it!

This responsibility is why it is so exciting and so challenging to be in higher education today. We have a great opportunity to change not only what we do and how we do it but also to change the people we work with and for on a daily basis. I work at New England Institute of Technology, an accelerated, open admissions, technical college that provides degrees in a variety of technical fields from allied health to video production. Many of our students are the first in their families to attend college. To witness their joy upon graduation is to confirm all of our hopes for what an education can do. We probably all have a story that brings this home. My story is about a young man who was from my hometown and a friend of my son. Before college, he was not a very good student. He barely got by, but he had a dream to become an electrician. He went to New England Tech and excelled in the electrical program, graduated as a "Tech Scholar" (the top of his class) and is now working as a licensed electrician and has a great job that he loves. It is no doubt that his education… the one he wanted… changed him. But it not only got him a good job, it made him a fine young man that all of us in education can be proud of today. I don't think this change would be any different or any more appreciated in any college or university in the world. To be there when the "light turns on" for the student is a great thing to witness.

All of us on the NEFDC board hope that you can join us for our Spring Conference on May 21, 2010, at the Westford Conference Center in Westford, Massachusetts.

A Book and Readings List for Thinking about the Human Mind

G. Christian Jernstedt
Professor of Psychological and Brain Sciences, Dartmouth College

GEMS TO CONSIDER FIRST

Well-written, authoritative, fascinating books that connect us to basic science and the brain.

Welcome to Your Brain: Why You Lose Your Car Keys but Never Forget How to Drive and Other Puzzles of Everyday Life, Sandra Aamodt & Sam Wang, March 2008, Bloomsbury Publishing, ISBN 13: 978-1-59691-283-0

The Accidental Mind: How Brain Evolution Has Given Us Love, Memory, Dreams, and God, David J. Linden, March 2007, Harvard University Press, ISBN 13: 978-0-674-02478-6

The Canon: A Whirligig Tour of the Beautiful Basics of Science, Natalie Angier, April 2008, Houghton Mifflin Harcourt Trade & Reference Publishers, ISBN 13: 978-0-547-05346-2

PERSONAL GROWTH

Books that consider important and useful aspects of our brain and how to use it well.

The Five Things We Cannot Change: And the Happiness We Find by Embracing Them, David Richo, June 2006, Shambhala Publications, Inc., ISBN 13: 978-1-59030-308-5

What You Can Change and What You Can't: The Complete Guide to Successful Self-Improvement Learning to Accept Who You Are, Martin E. P. Seligman, January 1995, Random House Publishing Group, ISBN 13: 978-0-449-90971-3

Authentic Happiness: Using the New Positive Psychology to Realize Your Potential for Lasting Fulfillment, Martin E. P. Seligman, December 2003, Simon & Schuster, ISBN 13: 978-0-7432-2298-3

White Bears and Other Unwanted Thoughts: Suppression, Obsession and the Psychology of Mental Control, Daniel M. Wegner, May 1994, Guilford Publications, Inc., ISBN 13: 978-0-89862-223-2

Learned Optimism: How to Change Your Mind and Your Life, Martin E. P. Seligman, January 2006, Knopf Doubleday Publishing Group, ISBN 13: 978-1-4000-7839-4

Mozart's Brain and the Fighter Pilot: Unleashing Your Brain's Potential, Richard Restak, October 2002, Crown Publishing Group, ISBN 13: 978-0-609-81005-7

Getting Together: Building Relationships As We Negotiate, Roger Fisher & Scott Brown, September 1989, Penguin Group (USA), ISBN 13: 978-0-14-012638-9

STRESS

Books dealing with the stress and pressures of our lives.

The End of Stress As We Know It, Bruce S. McEwen & Elizabeth Norton Lasley, April 2004, National Academies Press, ISBN 13: 978-0-309-09121-3

The Yoga of Breath: A Step-by-Step Guide to Pranayama, Richard Rosen, August 2002, Shambhala Publications, Inc., ISBN 13: 978-1-57062-889-4

Why Zebras Don't Get Ulcers, Robert M. Sapolsky, August 2004, Henry Holt & Company, ISBN 13: 978-0-8050-7369-0

Monkeyluv: And Other Essays on Our Lives as Animals, Robert M. Sapolsky, October 2006, Simon & Schuster, ISBN 13: 978-0-7432-6016-9

BRAIN OVERVIEWS

Broad summaries of the scientific literature emerging from the brain sciences.

The Seven Sins of Memory: How the Mind Forgets and Remembers, Daniel L. Schacter, May 2002, Houghton Mifflin Harcourt Trade & Reference Publishers, ISBN 13: 978-0-618-21919-3

How the Mind Works, Steven Pinker, October 1997, W. W. Norton & Company, Inc., ISBN 13: 978-0-393-04535-2

Human: The Science Behind What Makes Us Unique, Michael S. Gazzaniga, July 2008, HarperCollins Publishers, ISBN 13: 978-0-06-089288-3

Stumbling on Happiness, Daniel Gilbert, March 2007, Knopf Doubleday Publishing Group, ISBN 13: 978-1-4000-7742-7

Paradox of Choice: Why More Is Less, Barry Schwartz, January 2004, HarperCollins Publishers, ISBN 13: 978-0-06-000568-9

Mind Wide Open: Your Brain and the Neuroscience of Everyday Life, Steven Johnson, May 2005, Simon & Schuster, ISBN 13: 978-0-7432-4166-3

The Mind's Sky: Human Intelligence in a Cosmic Context, Timothy Ferris, March 1993, Bantam Books, ISBN 13: 978-0-553-37133-8

CONSCIOUSNESS

Books covering questions about human consciousness.

Consciousness Explained, Daniel Clement Dennett, October 1992, Little Brown & Company, ISBN 13: 978-0-316-18066-5

The Feeling of What Happens: Body and Emotion in the Making of Consciousness, Antonio Damasio, October 2000, Houghton Mifflin Harcourt Trade & Reference Publishers, ISBN 13: 978-0-15-601075-7

The Illusion of Conscious Will, Daniel M. Wegner, September 2003, MIT Press, ISBN 13: 978-0-262-73162-1

HISTORY AND PHILOSOPHY

Writers thinking about the human existence, building in part on a scientific foundation.

Coming of Age in the Milky Way, Timothy Ferris, July 1988, HarperCollins Publishers, ISBN 13: 978-0-688-05889-0

The Human Touch: Our Part in the Creation of a Universe, Michael Frayn, February 2007, Henry Holt & Company, ISBN 13: 978-0-8050-8148-0

Uncertainty: Einstein, Heisenberg, Bohr, and the Struggle for the Soul of Science, David Lindley, February 2007, Knopf Doubleday Publishing Group, ISBN 13: 978-0-385-51506-1

On Intelligence, Jeff Hawkins, July 2005, Henry Holt & Company, ISBN 13: 978-0-8050-7853-4

The Mind's I, Douglas Hofstadter, April 1985, Bantam Books, ISBN 13: 978-0-553-34584-1

PERSONALITY

Books on basic characteristics of facets of the human personality.

The Introvert Advantage: How to Thrive in an Extrovert World, Marti Olsen Laney, February 2002, Workman Publishing Company, Inc., ISBN 13: 978-0-7611-2369-9

Women's Ways of Knowing: The Development of Self, Voice, and Mind, Mary F. Belenky & Blythe M. Clinchy & Nancy R. Goldberger & Jill M. Tarule, September 1986, Basic Books, ISBN 13: 978-0-465-09212-3

ETHICS AND VALUES

Books examining science, religion, and values.

The Ethical Brain: The Science of Our Moral Dilemmas, Michael S. Gazzaniga, May 2006, HarperCollins Publishers, ISBN 13: 978-0-06-088473-4

The Neuroscience of Fair Play: Why We (Usually) Follow the Golden Rule, Donald W. Pfaff & Sandra J. Ackerman, December 2007, Dana Press, The, ISBN 13: 978-1-932594-27-0

Embracing Mind: The Common Ground of Science and Spirituality, Brian Hodel & B. Alan Wallace, February 2008, Shambhala Publications, Inc., ISBN 13: 978-1-59030-482-2

BIOLOGY, EVOLUTION

Writers considering core elements of human development.

In Search of Memory: The Emergence of a New Science of Mind, Eric R. Kandel, February 2006, W. W. Norton & Company, Inc., ISBN 13: 978-0-393-05863-5

The Beak of the Finch: A Story of Evolution in Our Time, Jonathan Weiner, May 1995, Knopf Doubleday Publishing Group, ISBN 13: 978-0-679-73337-9

Evolution for Everyone: How Darwin's Theory Can Change the Way We Think about Our Lives, David Sloan Wilson, March 2007, Dell Publishing, ISBN 13: 978-0-385-34021-2

Original Intelligence: The Architecture of the Human Mind, David Premack & Ann Premack, August 2002, McGraw-Hill Companies, The, ISBN 13: 978-0-07-138142-0

The Mismeasure of Man, Stephen Jay Gould, January 1983, W. W. Norton & Company, Inc., ISBN 13: 978-0-393-30056-7

EXAMINATIONS OF MIND IN THE POPULAR PRESS

Writers drawing in part of brain science and writing on popular topics for a broad audience.

Freakonomics: A Rogue Economist Explores the Hidden Side of Everything, Steven D. Levitt & Stephen J. Dubner, May 2005, HarperCollins Publishers, ISBN 13: 978-0-06-073132-8

Blink: The Power of Thinking Without Thinking, Malcolm Gladwell, April 2007, Little Brown & Company, ISBN 13: 978-0-316-01066-5

Deep Survival: Who Lives, Who Dies, and Why, Laurence Gonzales, 2003, W. W. Norton & Company, Inc., ISBN 13: 978-0-393-32615-4

Made to Stick: Why Some Ideas Survive and Others Die, Chip Heath & Dan Heath, January 2007, Random House Publishing Group, ISBN 13: 978-1-4000-6428-1

Nudge: Improving Decisions about Health, Wealth, and Happiness, Richard H. Thaler & Cass R. Sunstein, April 2008, Yale University Press, ISBN 13: 978-0-300-12223-7

Outliers: The Story of Success, Malcolm Gladwell, November 2008, Little Brown & Company, ISBN 13: 978-0-316-01792-3

The Pleasure Center: Trust Your Animal Instincts, Morten L. Kringelbach, November 2008, Oxford University Press, Inc., ISBN 13: 978-0-19-532285-9

Sway: The Irresistible Pull of Irrational Behavior, Rom Brafman & Ori Brafman, June 2008, Knopf Doubleday Publishing Group, ISBN 13: 978-0-385-52438-4

Influence: Science and Practice, Robert B. Cialdini, June 2000, Allyn & Bacon, Inc., ISBN 13: 978-0-321-01147-3

The Tipping Point: How Little Things Can Make a Big Difference, Malcolm Gladwell, January 2002, Little Brown & Company, ISBN 13: 978-0-316-34662-7

The Visual Display of Quantitative Information, Edward R. Tufte, 2001, Graphics Press, ISBN 13: 978-0-9613921-4-7

POSITIVE PSYCHOLOGY

Scientific article collections examining the field of psychology that studies healthy behavior.

Character Strengths and Virtues: A Handbook and Classification, Christopher Peterson & Martin E. P. Seligman, March 2004, Oxford University Press, Inc., ISBN 13: 978-0-19-516701-6

Flourishing: Positive Psychology and the Life Well-Lived, Corey L. M. Keyes (Editor) & Jonathan Haidt (Editor), December 2002, American Psychological Association, ISBN 13: 978-1-55798-930-7

A Psychology of Human Strengths: Fundamental Questions and Future Directions for a Positive Psychology, Lisa G. Aspinwall (Editor) & Ursula M. Staudinger (Editor), November 2002, American Psychological Association, ISBN 13: 978-1-55798-931-4

READINGS TARGETED FOR EDUCATORS

I. Readings in the science of learning

Written primarily for K-12, these are the best summaries of techniques for all learners:

Classroom Instruction That Works: Research-Based Strategies for Increasing Student Achievement
Robert Marzano, Debra Pickerling, and Jane Pollock. Alexandria, VA: Association for Supervision & Curriculum Development, 2003. ISBN: 0-87120-793-1 (paperback).

How People Learn: Brain, Mind, Experience, and School
John D. Bransford, et al., Editors., National Research Council. Washington, D.C.: National Academy Press, 2000.
Web ordering: www.nap.edu
ISBN/ISSN 0309070368 (paperback book),
ISBN/ISSN 0585321078 (e book).

Reading lists from the National Academy of Science
http://www.nap.edu/browse.html

Written for researchers, these are designed to be read by a wider audience interested in up-to-date, valid evidence of broad importance to society:

Current Directions in Psychological Science
ISSN 0963-7214 (scientific journal)
Perspectives on Psychological Science
ISSN 1745-6916 (scientific journal)
Psychological Science in the Public Interest
ISSN 1529-1006 (scientific journal)
Washington, DC: American Psychological Society.

II. Overviews of research and educational issues

K-12 focus:

Educational Leadership
Alexandria, VA: Association for Supervision and Curriculum Development.
ISBN/ISSN 0013-1784 (journal).

Phi Delta Kappan
Bloomington, IN: Phi Delta Kappa. ISBN/ISSN 0031-7217 (journal)

Education Week
Washington, D.C.: Editorial Projects in Education. ISBN/ISSN 0277-4232 (newspaper).

College focus:

Making the Most of College: Students Speak Their Minds
Richard J. Light. Cambridge, MA: Harvard University Press, 2001. ISBN/ISSN 0674004787 (paperback book).

The Chronicle of Higher Education
Lancaster, PA: Editorial Project for Education. ISBN/ISSN 0009-5982 (newspaper).

Teaching Tips
Wilbert J. McKeachie. Boston, MA: Houghton Mifflin Company, 2002.
ISBN/ISSN 0-618-11649-4 (paperback book)

III. Tools and materials for improving teaching and learning

Center for Teaching Excellence - University of Kansas
http://www.cte.ku.edu/cteInfo/resources/websites.shtml (web portal)

What Works Clearinghouse (WWC), established in 2002 by the U.S. Department of Education's Institute of Education Sciences (IES).
http://www.whatworks.ed.gov/

Regional Educational Laboratory Program
http://ies.ed.gov/ncee/edlabs/

IV. Browsing for brief descriptions of noteworthy discoveries about the brain

Science Times, The New York Times (newspaper, Tuesday edition).

Embracing the Intimidating: Assessing Student Learning in a Non-major Online Science Course

Kristine Larsen
Professor of Physics and Astronomy, Central Connecticut State University

One of the double-edged swords of the classic general education system found at many universities is that students often find themselves thrust out of their comfort zones (i.e. their major) into disciplines which may emphasize completely different sets of knowledge and academic skills. An example of this is science courses for non-science majors. Historically, such courses have often suffered from bad press among the student body, either as being impossibly hard or so watered down as to be almost meaningless. In either case, they are often considered to be a rite of passage to be suffered through rather than an opportunity to acquire valuable knowledge or hone important skills such as effective communication or critical thinking. While there has been increasing attention paid to improving these courses in the past decade (such as work in the astronomical community on the ubiquitous "Astro 101"1), the question remains: just how much do students actually learn in these courses, and how do we know that they are in fact learning? Couple this with the increasing popularity of online courses and we have an excellent opportunity for a paradigm shift in non-major science courses. With this should come not only a change in how we deliver such courses, but how we assess student learning, as well. The development of creative learning opportunities (i.e. assignments) should be an integral part of this brand new world of science education.

Introductory survey courses in general earth science (usually a smattering of topics selected from geology, meteorology, oceanography and astronomy) are often a bread-and-butter course for non-science majors at many universities. Ours is entitled Introduction to the Earth (ESCI 110), and historically has been well-subscribed by students while almost universally disliked by the faculty who are cajoled into reluctantly teaching it. A number of years ago I took the move from a traditional on-ground version of this course to an online version (taught in either a three or five week format during summer and winter sessions) as an opportunity to completely revise how I assess student mastery of the material. Gone were the multiple choice tests – in fact, tests were gone completely. In their place was a series of seven units, each one with four different written assignments: answers to homework questions, an essay, a personal reflection, and a discussion board thread. The move has improved student (and in my case, faculty) satisfaction with the course and I am finally convinced that students are actually learning both content and general education skills which they will take with them long after the end of the term.

Over the past four years, 226 students have passed through my 10 online sections of ESCI 110. Of these, 14% have been nonmatriculated students (from other universities). Among matriculated students, 43% have been seniors and 36% juniors. Students are asked in their initial discussion post to explain their reason(s) for taking the course, and not surprisingly 51% took the course to fulfill a science general education requirement and another 20% were using the course as a general elective for graduation. Thankfully, 23% expressed interest in the material as one of their reasons for registering. The student population had a decidedly skewed flavor in terms of majors, with 19% in the education program (pre-service teachers), 28% business majors, 12% majoring in English, and 26% majoring in one of the behavioral sciences (Psychology, Criminology, Sociology, Social Work). Regardless of their major, one common theme tied together a number of the students – an admitted science phobia. One student wrote "I am an English major just hoping to speed up my graduation process and am horrible with science," while another admitted that her goal was "to learn that science is a subject I can handle with grace in some way." Students often described themselves as "not the strongest science student" and being nervous about the course.

Given the apprehension of the students and the low level of enthusiasm for the topic, crafting assignments which would simultaneously challenge students to learn the material in a deep and meaningful way and demonstrate that learning in a way that might even be considered (dare I say it) fun was certainly a challenge. In keeping with Bloom's taxonomy, assignments should avoid asking students to merely list or define, and instead force them to interpret, criticize, assess, predict, and appraise. What I have found to be a useful mantra in developing these assignments is to have the students relate the material to their personal experiences and previous knowledge whenever possible. Engaging students with the material in a meaningful way has been key to the evolution of this course.

Take for instance one of the required essays: "Evaluate your home for its 'earthquake-proofness.' How do you think it would fare in a quake? What kind of damage do you believe would be caused? Where in your home would you want to try and 'hide' to safely ride out the event? Where would you definitely NOT want to be caught in your home?" Consider not only what basic knowledge you would have to have mastered in order in answer such a question, but how deeply one would have to apply that knowledge in order to answer all parts of that question. Although the students were given a link to an online home

evaluation survey, since it was written for homes in California the students had to make modifications/approximations in their assessment. One student prefaced her essay with the following aside:

Amazingly, I have never thought of earthquake proofing our home, and in fact, when I asked my parents they never thought of it either. If truth be told, when I asked, their reply was, "why would we do that?" When I explained the essay, there was not much enthusiasm to help. Therefore, after reading the chapters, I decided to get some assistance via the internet…. I printed the list and went to work; I looked around to see how well we would fare….

Another noted

Before reading the material on earthquakes, I had always believed that if an earthquake occurred, the safest place to position myself would be in a doorframe or under a table. The idea that a doorframe is the safest place to be during this event is no longer recommended as it was at one point in time.

The remaining six essays in the course similarly ask students to relate the sometimes abstract concepts covered in the chapters to real-world situations, and play the role of expert. For example, in another essay students select and research a mass wasting event that resulted in the loss of life or severe property damage and analyze its causes as well as possible preventative measures which might have been taken.

Discussion thread topics also ask open-ended questions which cause the students to think in a deep way about the course material and make it relevant and personal. Some of these are "between a rock and a hard place" type questions such as, "Which would you rather live next to: an active fault line or an active volcano? Why?" In another discussion thread, students were asked to share an example of erosion, weathering, or mass wasting in their hometown and suggest one realistic way in which it could have been prevented or its effects lessened.

One student wrote

I live on a street that starts out pretty level then there is a steep incline….. Most slopes of my yard are pretty gradual; however, on the left side there is a very steep slope along the side of my driveway that gets steeper as you move away from the street. When I moved here 10 years ago, my driveway was in danger of sliding down the slope at the points closest to my house. We planted many (about 12) fast growing trees on the steepest portion and that has alleviated the deterioration and my driveway has remained intact.

Another shared

There is a local cemetery in my town that I run by. I remember when I was little I went inside a few times and read some of the gravestones. Many of the old ones from the 1800s were very hard to read, which I now know is due to weathering. Over the years, either through semi acidic rainwater or wind, many of the tombstones have been disintegrated. I'm guessing these are softer materials such as marble. To prevent such weathering, other materials such as granite could be used. When my grandfather passed away this past Fall, we made sure his headstone was granite so that it wouldn't weather away.

In these answers, students have integrated scientific concepts and terminology (such as slopes, sliding and weathering) and then related them to their personal lives in a meaningful way; consequently, the ideas have a better chance of staying with them after the end of the course than if they had been assessed using standardized tests.

Another integral part of the course is the personal reflection. For each unit, students are asked to write about the most surprising thing they learned, how the unit's material relates to their life, and any unanswered questions they have about the material. These reflections allow the instructor to get inside the student's head and see how students are integrating the information with previous knowledge, as well as note any remaining misconceptions or uncertainties. One of the most gratifying aspects of reading these reflections is that one can almost see the light bulb going on over the students' heads as they are writing their reflections. For example, for the first unit reflection, one student wrote

At first it was hard for me to relate the material to my personal life. After taking a closer look at it though, I realized that much of what is discussed in the chapters are things I come in contact with on a day to day basis….

Some reflections are as humorous as they are insightful. One young man wrote

My mother is a runner, and during humid weather, she is constantly talking about how her hair grows (meaning out). She comes home and her hair is cone shaped. I was surprised to find out there is a device called a hair hygrometer that actually measured the amount of humidity in the air. This became a topic of conversation during Sunday supper; we joked about how we can now refer to mom's hair as a hygrometer!

Reflections sometimes also illustrate how students are motivated to do additional research on a topic to answer their own questions. For example, one student recounted in detail how during an impromptu stargazing session on a beach a stranger tried to convince his family that Saturn was so bright because it was the closest planet

[A]fter watching over 200 students learning rather than memorizing, becoming more comfortable and confident with science, and realizing its relevance to their lives, I dread the thought of teaching this material in any other way.

to the earth. This student realized that this did not make sense so he "decided to look it up [on the internet]…. It is not really that Saturn is closer to Earth, it is that 'this is Saturn's yearly opposition to the sun.... This is when Earth comes closest to Saturn for all of 2009. In turn, Saturn now shines at its brightest in our sky and is visible all night long.' This now made sense to me."

The questions students ask as part of their reflections are always answered by the faculty member, even if that answer is only directing the student to a reliable source where the student can read the answer for themselves. A commonly asked question is, "what will our continents look like in the future?" In the case of such common questions, I normally post a series of references to the entire class after reading their reflections, tying together the individual students into a cohesive class once again. Non-major science courses can also be thought of as microcosms of the general public's views on science. As such, I am increasingly faced with questions and comments about the supposed impending 2012 world disaster. For example, one student noted, "I also learned that the electromagnetic field has been shifting, which could soon result in a polar shift. Even though I didn't learn these things directly from the book, I know that it is obviously related to my life as well as everyone else's." Such misconceptions can easily be addressed by the faculty member in their personal response to the student's reflection, allowing the students to voice misconceptions in a "safe" environment and receive personalized intervention in clearing up such mistaken ideas.

Teaching ESCI 110 online has been a rewarding experience for me, despite the fact that I openly admit that it has been significantly more work on my end in reading and responding to the students' individual work. But after watching over 200 students learning rather than memorizing, becoming more comfortable and confident with science, and realizing its relevance to their lives, I dread the thought of teaching this material in any other way. In the words of one student, "the whole class was very interesting for me. I learned more than I thought I would get out of an online course. This is my first online course and I really enjoyed it." More importantly, I am confident she understands far more about our world (and how we know about our world) than she did before enrolling in the course, and will carry some kernel of this knowledge with her beyond her graduation date. In the end, isn't that the ultimate goal of a general education science class?

[1] For information on the ongoing movement to overhaul Astro 101, see the archives of the *Astronomy Education Review* (http://aer.noao.edu/).

SAVE the DATE!

The Colleges of Worcester Consortium
The New England Faculty Development Consortium
The Association for Authentic, Experiential and Evidence-Based Learning
present

2010 FALL CONFERENCE

"Better Teaching – Better Learning"

November 19, 2010
Westford Regency Conference Center
Westford, Massachusetts

Dan Willingham, Ph.D.
University of Virginia

Daniel Willingham earned his B.A. from Duke University in 1983 and his Ph.D. in Cognitive Psychology from Harvard University in 1990. He is currently Professor of Psychology at the University of Virginia, where he has taught since 1992. Until about 2000, his research focused solely on the brain basis of learning and memory. Today, all of his research concerns the application of cognitive psychology to K-12 education. He writes the "Ask the Cognitive Scientist" column for American Educator magazine, and blogs at the Washington Post. He is also the author of Why Don't Students Like School? (Jossey-Bass). His writing on education has been (or is being) translated into Chinese, French, Korean, Thai, Portuguese, and Russian.

Did You Mean What You Thought I Said You Think I Thought? The Power and Pitfalls of Feedback

Claude Caswell, Ph.D.
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When I was freshman at Bowdoin College, sometime in the last century, my first paper in English class was an analysis of tragedy in Shakespeare's Henry II. It was tragic. Professor Louis Coxe gave me a D- (for "content")/F (for "mechanics"), with the following comment: "Written as though translated from the Swahili by an intelligent but ignorant Korean." Call me a Pollyanna, but I thought, hey, the guy thinks I'm intelligent. Whew!

I often think of that comment when I'm writing responses to student papers. Professor Coxes's dry quip (which I have framed, on my outhouse wall) was far from the worst feedback I ever got. Far worse, to me, was the "Very Good"—sometimes written as "VG"—or even the more useless, "Excellent!" Then there was the dreaded √, or if you were lucky, the √+, and even sometimes, I confess, its doppelganger, the √-.

At least Professor Coxe reeled me in, made contact, let me know he was a human being with a wit who was paying attention. He was actually a warm and brilliant man—a poet (he also wrote the screenplay for Billy Budd)—who met with me in private conference and helped me tremendously. "Build your writing on the simple declarative sentence," he said. "Simple sentences do not mean simple ideas." " 'Call me Ishmael'," he quoted, and " 'Jesus wept' and 'The woods are lovely, dark and deep'." Professor Coxe taught me the meaning of prolixity—literally and figuratively—and passed on his love for the elegance of clarity.

The feedback that lit a bonfire in my writer's soul, however, came in graduate school at Southern Illinois University. I took a course in the modern American novel from Henry Dan Piper, a wonderful old professor who was writing a book about Zelda Fitzgerald. The first paper I wrote for him was on Winesburg, Ohio, a book that touched me profoundly on a linguistic as well as emotional level. Professor Piper gave me an A+, with the comment: "A damn fine essay—sensitive, analytical, and well written." I immediately sent a thank you note and flowers to Louis Coxe (just kidding, but I wish I wasn't).

Holy explication, Batman, I was hooked forever. My life was changed. People could really say this stuff?—to me?—outside my family? Man, this writing thing was really something.

Over the years, like most writing teachers, I've written thousands of pages of feedback (no, that's not hyperbole). Along the way I've done a lot of thinking, made a lot of mistakes—always on the quest for the right response at the right time for the right reasons to the right person. Still, the questions remain: What should feedback do?

What is the most useful feedback? What is too little? What is too much? When to rip and tear? When to praise and celebrate?

Professor Coxe gave me some tough love, got my attention, and helped me focus on fundamentals—but he didn't kill my fragile faith in myself or my budding love for writing. He paid me the respect of letting me know I had the stuff in me to get better. Professor Piper saw something good in my mind and style and was wonderfully generous to a young man who needed that validation more than he could ever know. He wasn't gushy, but he gave me an energy I still draw from, even to this day.

Both approaches have merit, I think, and as a teacher I have skated the thin ice between the two—if you can follow that twisted metaphor. My first course at Granite State College (then College for Lifelong Learning) as an instructor was the Writing Process. I was a Teaching Assistant at the University of New Hampshire, working on a doctorate. I was used to teaching UNH freshmen. CLL was different. Yikes. Adults were more demanding—and more vulnerable—and more complicated—and ultimately more rewarding. But I had a lot to learn.

I wrote to one student that her writing was technically correct but that she might consider digging deeper. I said I felt she had much more to say and that she should take the risk of expressing more feeling, more passion, more

I sense that feedback, no matter what the discipline, is partly about craft and partly about psychology—partly about honest assessment and partly about inspiring mentorship—partly about the ruthlessly pragmatic and partly about the poetically ineffable.

personal connection to her subject. I meant to open a door and instill confidence in her that she did indeed have those qualities of heart and mind that could carry her further. Many years later I saw her at a CLL function, long after she had graduated, with honors. She came up to me, smiling, and I expected . . . well, you know, the old "thanks for getting me started" or "I still have a place in my heart for that class" or "I just won the lottery and I'd like to split it with you." What she said instead was, "I just want you to know that you almost ruined me as a writer. You destroyed my confidence and made me feel like my writing was repressed and boring. Luckily other, better teachers restored it. So thanks for nothing." Wow. Other than that, Mrs. Lincoln, how was the play? I thought I had encouraged her to see she had more to say. Sometimes you should stick to advice on comma splices and leave the pep talks to Knute Rockne.

I have no doubt that we all have our stories from the trenches, and I always learn from collegial discussions where we give each other the benefit of what we have seen and learned in our years of giving (and receiving) feedback. I sense that feedback, no matter what the discipline, is partly about craft and partly about psychology—partly about honest assessment and partly about inspiring mentorship—partly about the ruthlessly pragmatic and partly about the poetically ineffable. Sometimes students need to know how to find the core of the thesis they have only half formed. Sometimes students need to know how and why to add more objectivity and balance. Sometimes students need to know how to ground their intuitive views in reliable research or contemporary theory. What I find most often in Critical Thinking is that students need guidance in realizing that values and ideas about the universe—particularly the human universe—are a cultural construct—a matter of perspective and assumption and complex debate—and that one must stand outside a system of thought to see it clearly.

I think we teachers have so much to teach each other. Feedback, in my experience, is an incredibly difficult, nuanced pedagogical skill. In these days of ever more refined assessment practices, the feedback we give our students may be even more relevant to our professional lives.

If you would like to continue this discussion or if you have ideas how we might take it further, please e-mail me at doccasual@metrocast.net. I'd appreciate the feedback.

The Expectancy Effect and the Sixth Principle for Good Practice

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Beginning in the 1950s, Robert Rosenthal embarked on an extensive research agenda about "how one person's expectation for another person's behavior can quite unwittingly become a more accurate prediction simply for its having been made" (Rosenthal & Jacobson, 1992, p. vii). This *expectancy effect* has been evident in medicine and business, as well as education. In the now classic Rosenthal and Jacobson study (1968), schoolteachers were led to believe that students would succeed at levels better than expected, and the students did evidence significant gains in IQ when compared to other students at the school. The expectancy effect also applies to higher education, and it has been promoted as good practice.

In 1987 Chickering and Gamson, with many others' assistance, reported on the outcomes from a study supported by the American Association of Higher Education (now defunct), the Education Commission of the States, and The Johnson Foundation. The study produced guidelines for faculty, students, and administrators to improve teaching and learning in higher education. That now famous report is known as *Seven Principles for Good Practice in Undergraduate Education* (available online at http://learningcommons.evergreen.edu/pdf/fall1987.pdf). The sixth principle, *Good Practice Communicates High Expectations*, suggests that articulating student learning expectations will affect student learning positively:

Expect more and you will get more. High expectations are important for everyone—for the poorly prepared, for those unwilling to exert themselves, and for the bright and well motivated. Expecting students to perform well becomes a self-fulfilling prophecy when teachers and institutions hold high expectations of themselves and make extra efforts.

Although the expectancy effect is not referred to in the description, I surmised that the sixth principle was reflecting it. By the late 1960s the effect was well known. The self-fulfilling prophecy concept has been frequently substituted for the expectancy effect, although it was coined by Robert Merton and pertains primarily to the self, not others. In addition, Chickering and Gamson offered nothing else theoretical or empirical to support practicing the principle. If I am correct in my assumption, a caution is in order. The expectancy effect was produced when schoolteachers were led to believe that their students were high achievers. The teacher, primarily unconsciously, behaved toward the students in ways that resulted in their improved performance. Thus, the expectancy effect began with a belief, and then students' performance was affected.

Beliefs, affect, values, and behaviors are elements of attitudes. Attitudes are social psychological constructs that are comprised of our learned beliefs about people, ideas, or objects, and the values and affect that align with our beliefs; together they prompt us to behave toward the target in similarly aligned ways. This highly simplistic description does not do the construct justice. Moreover, it cannot be so simple to merely communicate high expectations and expect

to see changes in student learning. We can communicate expectations by informing students about what we believe they should be able to learn. We can communicate expectations by including statements about them in the course syllabus. But, as Rosenthal clarified, "it's possible that such a syllabus does not cause anything to happen, *but* the kind of person who does this kind of careful planning is likely to teach well, care about teaching, have high expectations" (Rhem, 1999, p. 3). From the extensive research Rosenthal (1994) conducted, he delineated four behavioral clusters that were evident among teachers who believed their students would be high achievers (see also Eden, 1990). The factors are: climate, feedback, input and output.

Teachers created a warmer socio-emotional climate when they believed their students would succeed. These warm, friendly behaviors were often nonverbal and subconscious. When teachers believed a student would succeed they smiled more, made eye contact more often and for longer duration, got physically closer, and through body language and posture they sent a message of approval by nodding or leaning in. In the higher education classroom, the belief that students can succeed would likely be evident in the professor's teaching style, as well. Faculty who teach to encourage active learning, where students become involved in the instruction, are likely to display these kinds of behaviors when they effectively give up some of their control of the class session and increase positive interactions with the students. The student's active learning experience requires a change in the teacher's role. Teachers spend more time as instructional designer and less time as presenter. The result is that students spend more time talking, listening, reading, writing, and reflecting; faculty spend less time presenting behind a lectern (Meyers & Jones, 1993).

The second factor is input, which refers to excellent and exemplary teaching behaviors that enter the scenario. Teachers who believed their students could achieve taught more material and more difficult material to those students. If we consider the value of teaching for active learning, the practice of more material and more difficult material may not necessarily be reflected in teaching more content, per se. When we design our courses we ask ourselves what we want our students to be able to know and do by the end of the course. By focusing on what students will be able to do, the roles of content and process are brought into an appropriate balance (Myers & Jones, 1993). Fink (2003) provided numerous examples of how content can be linked to learning activities in creative ways. Using film, practicum experience, art forms, and discussions are a few examples of ways to incorporate content into a course, and at the same time providing active learning experiences.

The third is output.Output refers to students having opportunities to show what they have learned. Teachers who believed their students could achieve at high levels developed more assignments and other ways students could demonstrate their learning. Along with teaching for active learning and focusing on process over content in higher education, good practice provides for assessments that not only measure learning but encourage learning. Weimer (2002) contends that assessments of student learning should not only provide evidence of learning; in addition they should serve as instruction and as tools for how to self- and peer-assess. This can be accomplished by encouraging students to see study skills as ways of learning, rather than ways of completing an assignment; by including more low-stakes assignments that provide scaffolding to greater learning, rather than increasing the stress resulting from high-stakes assignments; and by including feedback that improves performance, rather than relying on summative feedback that students frequently ignore.

Feedback is the fourth factor. Teachers who believed their students would succeed gave more feedback and the feedback varied in type. Sometimes the feedback was in the form of praise, sometimes in the form of criticism. Whether to praise or criticize, the feedback given to students whom the teacher believed would succeed was more informative and contextualized than the feedback given to those he or she believed would not succeed. Since Rosenthal's discoveries, the role of feedback has been examined closely. In a 2007 review and analysis of feedback, Hattie and Timperley suggested that providing feedback is a complex process. For example, feedback about the task, the process to complete the task, and what the student needs to do next contribute to enhanced learning more than feedback about the student as a person, such as praise. In addition, Hattie and Timperley note that "feedback can only build on something; it is of little use when there is no initial learning or surface information" (p. 104). Therefore, without clear learning goals and assessments that serve to support learning, feedback cannot be as powerful as it could be to influence learning.

If we believe that students can learn, if we value learning, and if we have positive affect toward students, our behaviors will reflect the resulting attitude. We are likely, primarily unconsciously, to create a warm, friendly climate; to teach in ways that promote active learning; to give students plenty of opportunities to show their learning; and to provide feedback to students about their learning. The expectancy effect is not something that comes about because you communicate high expectations aloud or on paper. Perhaps the sixth principle should be: *The right attitude leads to good practice.* When faculty truly believe students can learn and when they value the teaching and learning process, their behaviors are likely to nurture the expectancy effect.

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Making a Difference in Teaching and Learning through Website Design

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Many faculty members start using course Websites through a course management system such as Blackboard by adding syllabi, lecture notes, web links, or starting an online discussion. The list of resources starts to grow and continues growing, leading to a page with links pointing to the .ppt, .pdf, Web links, and videos available through the site. When we considered redesigning our course site, we wanted to create a successful online space that reflects the course design itself, facilitates teaching and learning, and presents an organizational structure to which the students would best respond. Emerson College's Department of Performing Arts serves approximately 500 undergraduate students. The required course World Drama is taught for two sequential semesters at the sophomore level in four sections of 25-30 students each. To facilitate student learning and support World Drama instructors, we have redesigned the course Website that includes a visually rich collection of multimedia resources that immediately immerses students in the course subject.

To redesign the site, we revisited the goal of the World Drama sequence: to familiarize students with various theatrical traditions, from Greek Drama to Chinese Opera, from Shakespeare to Chekhov. The course is a backbone of the Performing Arts program. It provides the students with theatrical knowledge of several historical periods and geographic regions. Because of the sheer volume of material that needs to be covered, the course is demanding and fast-paced. It requires students to absorb many different concepts, to recognize and distinguish various kinds of theatres (and costumes, styles, etc.), and to read and critically analyze theatrical works across cultures and historical periods.

After using a multimedia rich course Website for several semesters, we felt it beneficial to step back and rethink the delivery of these digital materials. Combining input from colleagues and students on the optimal use of the Website, a couple of things became apparent: the students learn best through a combination of written texts and visual materials. Moreover, the easy access to course material online alleviates student anxiety in class, allowing them to better absorb the subject. After much thought and consideration of the teaching and learning process that is best for our sophomores, and of the need for a faculty development tool for new instructors across the program, we redesigned the media-rich Website to reflect the student learning process.

We decided that streamlining the World Drama resources to reflect the course subject while paralleling the course design would best help the students access the materials while increasing their awareness of the course process. Initially, the Website had categories such as "Powerpoint Lectures," "Videos," and "Readings." These categories covered the entire course website. Now, after our reflective practice, we decided to redesign the interface both visually and linguistically by topic instead of media type. Thus we divided the materials into thematic categories paralleling the course topics, such as "Greek Drama," "Chinese Drama," and "Japanese Drama." As a result, instead of having a link on the front page with a folder titled "Powerpoint Lectures," it now has a section titled "Greek Drama," and includes all the materials pertaining to this particular subject heading: the PowerPoint files, readings, and Weblinks about Greek drama, on a well-labeled, visually rich content-specific page.

The student feedback to this change has been excellent. We conducted student evaluations of this project, and noticed that student responses were some of the best we have seen -- consistent, positive feedback throughout the survey and with almost all the students. After surveying a class with over a 90% response rate, the

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students unanimously voted that the course materials on the site were easy to locate. They commented: "Everything is extremely organized and labeled very clearly," "the breakdown of subjects allowed me to find the resources needed," "everything was listed according to what we were studying in class that day," and that the materials "correlate with how we use them [the media-rich resources] in class." Some students were really enthusiastic: "This was the best course Website that I have had. It was basically like having the whole class at your disposal!" Other poignant comments focused on the main page: "I liked the initial page very much. It helped give me a brief overview of the course. You can use the site to review the course from beginning to end. It is extremely helpful when studying/reviewing for a test," and "in comparison to other classes, the evolution of this course was so much easier to see."

Our decision to step back and redesign the course Website accomplished the primary objectives of the course. The visual design, the clarity and accessibility of the material now immerse students immediately into the course subject, and help guide them through the learning process.

Students have become increasingly comfortable with the Internet as a learning tool. Providing them with a learning method that reflects the standards of the new information age is a critical component of their development. The site not only advances student learning, but it is also invaluable for other World Drama teachers, especially instructors who have not had extensive experience teaching this kind of complex survey course. Further, this instructional re-design approach to the course Website exemplifies collaborative work among faculty members, instructional technologists and librarians.

Teaching for Learning in the 21st Century: A Pedagogical Approach for Using an Advanced Technology Classroom

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While in graduate school, I attended a faculty and graduate student workshop on the topic of the 21st Century Classroom. The discussion centered on the technology and equipment necessary to enhance student learning. Since education is more than simply the transfer of information from the teacher's mind to the student's mind, a new type of classroom should encourage more than mere listening by students; it should provide hands-on learning experiences and opportunities to interact with the subject material in real and practical ways. During the workshop, many impressive ideas were presented: from state-of-the-art multimedia components to finding ways to bring three-dimensional objects or virtual humans into the class. The critical conclusion was that whatever else the 21st Century Classroom might do, it must help create and encourage an immersive and active learning environment where teachers can more effectively connect with students.

My excitement toward using a "21st Century Classroom" stemmed from the reading and preparation I did during my graduate studies. As a new instructor, I wanted to ensure my classroom encouraged active learning by engaging students, motivating them to participate in discussions, using groups for problem-solving challenges, and providing real world applications to the theory being presented. Evidence shows that active learning leads not only to increased understanding and retention, but also enhances the student's ability to construct knowledge (DeHann, 2005). Bonwell and Eison (1991) state, "To be actively involved, students must engage in such higher-order thinking tasks as analysis, synthesis, and evaluation." I believed that the technology in the classroom might help me guide students further along Bloom's taxonomy. I hoped it would ensure the participation of the majority of students by enabling me to find effective techniques that appealed to visual, aural, reading/writing, and kinesthetic learners alike (Tanner and Allen, 2004). Howard Gardner, in Changing Minds, suggests that improved technology could enable teaching to become more personalized to the student, thus creating an opportunity to bridge multiple intelligences and learning styles simultaneously (Gardner, 2006). Therefore, the approaches I took in using the classroom were inclusive of all dimensions of student preferences and styles for learning (Felder and Silverman, 1988).

Arriving as a new instructor at West Point, I was quickly introduced to the features of the Center for Teaching Excellence's new multimedia classroom. The room holds 18 students comfortably, and is equipped with a smart board at the front of the classroom, six plasma flat screens with writable overlays that enable similar smart board effects, computer plug-in stations for students, video-teleconferencing capability, and assorted dry-erase boards. After receiving guidance and advice from the instructional technology

manager and a fellow instructor who had been using the room, I began utilizing the room on a regular basis for my first academic course, *Military Leadership*, a survey course on leadership theory within the context of the military profession. While my use of the room did not revolutionize my teaching methods, it did succeed in both enhancing the students' classroom experience and in aiding my implementation of what I knew to be good teaching practices.

The technology in the room facilitated many opportunities that greatly improved student learning. While students enjoyed the change of location from our normal classroom and the change in my instructional method as a result of using the room, they appeared to see the academic benefit as well. In a course survey, one student stated, "*The use of the multimedia classroom was very beneficial because I am a visual learner and I liked having all of the material we needed in a concise form on the walls around us." Another student added, "I felt like we got a lot of really good and beneficial group work done in the multimedia classroom."* These two students' comments highlight only a couple of the many benefits that the 21st Century Classroom offers to teachers and students. In addition to making learning visual, active, and collaborative, the classroom allowed me to highlight student work more easily, focus students on the topic discussion without the pressure of taking notes (because we were creating notes as we conducted class), naturally move part of the learning process outside of the classroom through either pre-class preparation assignments or take-home note packets, and effortlessly combine the best ideas from the class into a single document.

There were several methods that I found to be effective as I put the classroom to use. On occasion, I began class by providing 15 to 20 minutes of individual work time. I assigned various students the same question and had the students work separately. I observed the students working, answered their questions, and looked for solutions demonstrating comprehension of the subject material. For each question I then selected students whose answers most effectively combined that lesson's theory and evidence from the case to bring up their work on one of the plasma screens. The remainder of class was spent discussing what was displayed, allowing those whose work was being highlighted to discuss their thoughts and explain how they reached their conclusions, and enabling others who were not selected to question and critique. This approach established a comfortable and non-embarrassing setting for peer evaluation. I found that it also benefited students who tend to be more reflective and enjoy individual assignments. In addition, those who had been struggling with the assignment were able to clearly see things they had missed. Finally, we were able to collectively improve the answers from the selected students and send everyone home with a solid solution to that day's problems.

One variation that I took to this exercise was to assign all of the questions ahead of time as study questions with the expectation that students come in prepared to tackle any one of the problems. I even had them email me their solutions prior to class so that I could review their work ahead of time, thus allowing the entire class period for discussion. Looking at their work before class was particularly efficient on days when the material required more explanation on my part and processing on theirs.

A second method that I put into use in the multimedia classroom focused more on group work. The benefits to collaborative learning environments include testing one's ideas, observing others, developing a self-identity, and building problem-solving skills (National Research Council, 2003). Furthermore, R. Johnson and D. Johnson show the significant lasting effects of collaborative methods over competitive and individualistic approaches with regard to increased student performance, content mastery, and capability to handle complex tasks (1994). With this in mind, I adjusted the individual method discussed earlier. I assigned groups a question and allowed them 15-20 minutes to prepare an answer. We spent the remainder of the class period with the students briefing their classmates, taking questions, and improving their answers. The clear advantage to this method was the great confidence with which students presented the material after having discussed it in a group. The drawback was a somewhat limited discussion, as only the assigned students had thought about the other questions. My solution was to assign the questions as an individual study assignment to be turned in. When they arrived in class I then assigned them to groups with a specific question.

I varied this approach in several ways. Sometimes I allowed them to select their own groups instead of being assigned; other times I allowed them to choose their group questions. I found that allowing self-selection often increased both their motivation and the quality of their responses. Another variation was to assign groups and their group question before class and require them to come to class with a prepared solution. I again faced the same issue as before (limited discussion), so in response I had groups prepare all of the questions and bring their entire presentation to class. I would then choose one group to present all of their responses while other groups would ask questions or present their answers if they differed greatly. On other occasions I made the presentations due before class, reviewed them, and

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then had each group brief their best answer or one that enabled me to focus on a particular aspect of the subject.

Students clearly recognized the extra work being asked of them and noted so on the end of course surveys, as my class's average score in the area *"I had the time to adequately prepare to demonstrate optimum academic performance"* was slightly lower than the course average of my fellow instructors (Course = 4.04, My Class = 3.95, on a 5-point scale where 5 was "Strongly Agree"). My students, however, also recognized the added value of working with the material in a more interactive way, as the score in *"I understood the learning outcomes desired for the course and each lesson"* was significantly higher than the course average (Course = 4.19, My Class = 4.41). Additionally, in regard to application of course material, *"I feel more confident that I can develop innovative and creative solutions to confront ambiguous situations,"* my class again outscored my fellow "Military Leadership" instructors (Course = 4.25, My Class = 4.54).

I am excited about the opportunities that the 21st Century Classroom makes possible. I did learn that the advanced technology classroom was not the best match for every lesson and thus I became very deliberate in my selection of which lessons to conduct there. Specifically, classes that focused on discussion-- such as cases or simulations-- worked extremely well in this environment, whereas classes where brand new material was introduced or a more Socratic dialogue was desired fared better in the "traditional" classroom. With that small element of caution in mind, I strongly encourage any instructor of any discipline who has the opportunity to test their teaching prowess in such facilities to certainly do so.

Not only does the technology allow the instructor to find new, innovative and creative ways to present the material but it also encourages different learning styles. Wilbert J. McKeachie believes that the use of technology in the classroom can build confidence for future challenges, encourage teamwork, improve inter-personal skills, and enhance cognitive development (2005). My students agreed: 73 percent of 71 students stated that using the classroom improved their learning. As an instructor, I have also found that many of Barkley, Cross, and Major's collaborative learning techniques are significantly easier to execute in this type of classroom (2004). The "Pass the Problem" exercise, for example, is extremely easy with a single computer at each station and the ability to rotate groups around the room. Additionally, the "Jigsaw" activity, where students become experts and then teach each other, is easy to conduct as either an out-of-class prep or an entirely within-the-class project. Regardless of the teaching vehicle used, the bottom line is this: the use of this type of classroom improves student learning by creating an atmosphere that encourages debate, questioning, and discussion, pushing learning out of the classroom, and developing students who are critical thinkers and lifelong learners.

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Connecting With Others

There are two dominant national organizations —POD (Professional and Organizational Development in Higher Education) and NCSPOD (The North American Council for Staff, Program, and Organizational Development)—whose members do faculty development work. Both have excellent fall conferences, with many sessions appropriate for faculty members interested in professional development. Visit their websites at www.podnetwork.org and www.ncspod.org.

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