POWERFUL PEDAGOGY IN THE SCIENCE-AND-RELIGION CLASSROOM

by William Grassie

Abstract. This essay is a discussion of effective teaching in the science-and-religion classroom. I begin by introducing Alfred North Whitehead's three stages of learning—romance, discipline, and generalization—and consider their implications for powerful pedagogy in science and religion. Following Whitehead's three principles, I develop a number of additional heuristics that deal with active, visual, narrative, cooperative, and dialogical learning styles. Finally, I present twelve guidelines for how to use e-mail and class-based listserves to achieve some of these outcomes.

Keywords: computer-mediated communications; e-mail; humility theology; listserves; pedagogy; science and religion; teaching; John Marks Templeton; Alfred North Whitehead.

The juxtaposition of science and religion in the college classroom presents a number of challenges to both professors and students in the modern university or college. Typically people regard either science or religion as the purveyor of reliable truth and a framework for values, so the constructive engagement of these powerful social and philosophical movements forces one to question previous assumptions about "what is really real."

This existential crisis in the classroom is also reinforced by an intellectual dilemma, as experts and students alike are quickly confronted with their finitude in the face of an enormous amount of relevant information. This is perhaps the genius of Sir John Templeton's notion of "humility theology." The science-and-religion classroom must seek to be intellectually rigorous, while affirming, in the words of Templeton, that

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Every person's concept of God is too small. Through humility we can begin to get into true perspective the infinity of God. This is the humble approach. It is also in humility that we learn from each other, for it makes us open to each other and ready to see things from the other's point of view and share ours with him freely. It is by humility that we avoid the sins of pride and intolerance and avoid all religious strife. Humility opens the doors to the realms of the spirit, and to research and progress in religion. (Templeton 1995, 3)

So the science-and-religion classroom presents some familiar and some new challenges to those of us who risk stepping outside our disciplinary area to engage our students and society in constructive inquiry.

WHITEHEAD'S STAGES OF EFFECTIVE EDUCATION

Alfred North Whitehead, who figures prominently as one of the early philosophers of modern science and religion, also provides some helpful insights into the educational process. In *The Aims of Education* (1929), Whitehead describes a three-stage cyclical process for effective education.

The first stage in powerful pedagogy is that of romance. We often forget that initial inspiration, fascination, awe, admiration, and reverence that moved us as students to devote our lives to a disciplined life of study. One cannot expect students to dedicate hours of tedious study to subject matter unless we ourselves can convey enthusiasm. Demonstrate your love for these studies and seek to evoke a similar passion in your students.

The second stage in Whitehead's typology is that of precision. Once the spirit is stirred, we must begin the disciplined and difficult work of critical study and observation, the careful weighing of complex evidence and competing worldviews, through which we expand our understanding of our universe and ourselves. The professor must act as Socratic gadfly at this stage by challenging self and others to resist lazy and sloppy thinking so as to prevent settling for simplistic and premature solutions to complex scientific and spiritual problems.

The third stage is that of generalization. This is the creative and synthetic moment in which people discover meaningful patterns and purposeful holism. It is a time of existential freedom in which people redefine worldviews and thus re-create the world and themselves. This integration in the science-and-religion classroom is a powerful stage that should evoke some trepidation in us professors. We must timidly face the possibility that the career and life choices of students may be significantly shaped at such key periods in their undergraduate education—and that the constructive engagement of science and religion pulls for exactly such transformative insights.

In Whitehead's view, these three stages—romance, precision, and generalization—are both cyclical and parallel operators, not simply a linear progression. In this trialectic, we must seek the balance that works for us

and our students. These principles can guide the structure of a single class session, the flow of the semester, or the praxis of a lifetime.

SOME KEYS TO LEARNING

Whitehead's three stages of effective education offer a helpful typology for beginning a discussion of pedagogy in the science-and-religion classroom, but I would add some further heuristics:

Decision Making.   People are more impelled to acquire new information if they are being asked to make significant decisions on the basis of that information. In a sense, a course on science and religion is asking people to make informed decisions on the most important life questions, matters of ultimate significance, meaning, and purpose. Students are being given the opportunity to chart their own pathways through the terrain of science and religion, to ground their own life philosophies and practices in ancient wisdom and modern knowledge at an extraordinary moment in the cultural evolution of our species and the natural history of our planet.

Visual Aids.   Most people learn and retain information through images. Although literate culture will continue to be the significant bearer of understanding and creativity, we can provide many visual tools to help our students follow this complex discourse about nature and culture. Use handouts, slides, overhead projections, charts, outlines, models, and films to aid visual learners. Such tools are common among science educators and less so among those working in the humanities. There is a wealth of visual imagery that can educate and inspire our students and thus also give life to abstract words and ideas.

Narrative.   Most people learn and retain information through narrative thought processes. Storytelling can take many forms in the science-and-religion classroom, but the narrative structure that we employ in our syllabi and with which we approach the field will have profound impact on how and how much information is learned and retained by our students long after the semester ends. Certainly one extraordinary opportunity that has emerged in the last few decades of scientific discovery and cultural studies is that the 15-billion-year development of our universe, solar system, earth, life, and culture presents itself as a narrative of mythic dimensions. We have the opportunity and challenge to interpret this epic of evolution as a revelation of divine meaning and order. This story offers an effective narrative structure on which to weave a diverse tapestry of scientific knowledge and religious insight.

Interactivity.   People learn best when they are actively engaged in communities of learning, rather than as passive and isolated recipients in a one-directional transmission of information. There are many ways to create interactive learning opportunities in your courses. Give assignments that require initiative and creativity. Promote significant participation and dialogue in and out of class through small and large group discussions, role-plays, group projects, student presentations, and shared papers. One especially effective technique is to set up a class-based listserve to expand and enhance class participation and dialogue through an asynchronous exchange of response papers and dialogue on e-mail throughout the week (see the Appendix that follows).

Evaluation.   Each of us employs many techniques to create a dynamic and powerful learning experience in our classrooms. Talking shop with our colleagues is a great way to enlarge our repertoire of techniques, but experimentation and evaluation are the only real ways to find out what mix works best for us and our students. The science-and-religion multidiscipline, however, requires all of us to rethink our normal pedagogy as we step into new territory. Perhaps these heuristics will help in providing a conceptual framework for your own continued growth as both scholar and teacher.

Epiphanies.   Whitehead suggests that "the essence of education is that it be religious," which he defines as education that "inculcates duty and reverence." Duty arises from our powers through knowledge to change the world and ourselves (Whitehead 1929, 14). Science and religion point to this profound "response-ability" that human beings assume and presume as created co-creators (cf. Hefner 1993). Willful or lazy ignorance in this view takes on the status of sin when such powers are involved.

Reverence, on the other hand, is an experience in the present moment of awe and wonder about our universe and ourselves. Whitehead writes that "the present holds within itself the complete sum of existence, backwards and forwards, that whole amplitude of time, which is eternity" (Whitehead 1929, 14).

As teachers in science and religion, we too have a profound duty to use our "response-ability" to create a learning environment in our classrooms that will engender such epiphanies.

USING E-MAIL AND LISTSERVES

A class-based listserve can be a dynamic enhancement to the traditional classroom. Through e-mail circulated to the entire group or to appropriate individuals, students and professor can open up many new channels

of communication that promote active and effective learning. Students who might otherwise never talk in class feel liberated to express their insights and confusion in the medium of e-mail. The following are some guidelines that I have developed in the use of class-based listserve, after teaching more than five hundred students in twenty classes during the last three years, with e-mail as a vital extension to my classroom.

1. Weekly postings to the class listserve must be a requirement of the course, significantly weighted in the grading (say 25 percent of the final grade). I expect students to check their mail at least two or three times per week. They must write at least one "substantive response paper" per week related to that week's assignments, with other, shorter pieces as appropriate or desired. I raise numerous questions for discussion but mostly leave it up to the students to decide how to enter the conversation.

2. Your role on the listserve is less as expert than as facilitator. You need not respond to every posting and every question. Allow students an opportunity to mull over and debate issues before adding your comments. You may want to play a more active role in promoting the conversation at the beginning of the semester and back off once students are acclimated to the academic discourse. Allow meaningful digressions, but do not let the students wander too far from the syllabus. Expect some "reverberations and staccato" in the flow of the conversation over the weeks of the semester.

3. The informality of e-mail is an advantage and a disadvantage. You must set clear expectations for the style and content. Your own postings should exemplify these. I tell my students that their postings are being assessed on the basis of whether they do the following:
   a. Discuss the texts that we are reading with appropriate citations, questions, and commentary.
   b. Respond to fellow classmates' constructively and engage them in dialogue related to the curriculum.
   c. Share their own experiences and perspectives as relevant to the issues.

This order of criteria also reflects my weighting. Students need not feel that they can or must accomplish all three in a single posting but will need to be gently pushed to write more about the text than about their opinions. Always require proper English. Do not yourself use or allow others to use e-mail shorthand.

4. Be prepared to be inundated with e-mail. A class of thirty students (more than thirty students should be broken up into smaller e-mail discussion groups) typically generates five to ten messages per day, as

students discover that the e-mail discussion is exciting. A typical student posts well over the weekly minimum. A good e-mail program with filtering and sorting capabilities is essential to you for managing the volume of e-mail from several listserves.

5. Student writing is best assessed in hard copy through portfolios. Don't even think of trying to grade on screen. I require students to submit a printed portfolio of all of their postings to the class listserve at midterm and end of term. They are asked to add hand-written annotations to their portfolios, making corrections and commentary as appropriate. I also ask them to write a short self-evaluation and self-grade on their e-mail at midterm and end of term. This shifts much of the assessment responsibility and work onto the students and produces much better outcomes as well. The midterm self-assessment becomes almost a contract for writing improvement.

6. Post essential information to the listserve as a way to promote regular interaction online. This may include study questions, lecture notes, supplemental resources, exam grades identified with student ID numbers, syllabus changes, and directives.

7. It is often helpful to reinforce the e-mail discussion in class by taking up a question or argument that a particular student made online or to direct unfinished issues and student debates from class to be continued on e-mail.

8. Don't write long messages to the class. Think of your commentaries as online minilectures. Break up long thoughts into several shorter messages. The maximum length of an e-mail message should be three screens. Use double spacing between paragraphs to aid the reader. Don't overuse the reply-to-with-text function. Save your postings for possible reuse in future semesters.

9. Use public praise online and in class, especially in the beginning of the semester, for students who write effective and insightful response papers. Explain what they did that was especially good.

10. Use private online and out-of-class communications for discipline to interrupt inappropriate postings to the class listserve. Such postings might involve "flaming" (sending sarcastic messages), extraneous conversations, offensive language, and inappropriately self-revealing comments. It is always possible to remove someone from a list, but I have never actually had to do this. Welcome strong disagreements with you or anyone else, as long as they are respectful and substantive, but remember that students do not necessarily know how to do this very well.

11. As listowner for your class, you will find it most effective simply to add all of your students to the class listserve at the beginning of the se-

mester rather than have them self-subscribe. Collect all e-mail addresses, names, and student ID numbers on a fill-in-the-squares form, so that time-consuming spelling errors can be avoided. This means more work for you initially, but can save confusion for students who are new to e-mail and listserves. Expect increasing automation of these functions with campuswide integration of student e-mail directories and class registration lists.

12. Befriend your systems operator because you will need some hand holding on the technical side of things on your first time through as a listowner. The best way to learn is to just start working. Managing a listserve does not require great technical prowess. A short meeting with the "sysop" before the semester begins and simple phone calls or short e-mail messages during the semester are all you really need to become proficient quickly. If you are already using e-mail, you know most of what you will need to manage a successful listserve with your students.

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