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A Conversation about Content vs. Pedagogy:

What is “Highly Qualified?” and

What is Best for Students in the Age of No Child Left Behind?

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Abstract

What is more important in education? Content? Or pedagogy? “Highly Qualified,” according to No Child Left Behind, is laden with references to content knowledge, while pedagogical knowledge is a metaphorical footnote. This paper is a dialogue between four experts on content and instruction. In the end, it is evident that content and instruction are guided by subject matter and the needs of the learner. Without a solid foundation in each, however, learning can be limited.

## Introduction

This dialogue followed the conversation among Dr. Bob Blake, assistant professor of chemical education, Texas Tech University, Dr. Jon Preston, associate professor of computing education, Southern Polytechnic State University, Dr. Carla Shaw, associate professor of curriculum and instruction, Northern Illinois University, and Dr. Andrew Kemp, assistant professor of curriculum leadership, Northern Illinois University.

The format of this paper was conceived based on a conversation between Drs. Shaw and Kemp. After a discussion regarding class preparation and the use of pedagogical knowledge to stimulate learning, it was decided that having the input of a content specialist might make for an interesting conversation. After some investigation, Drs. Blake and Preston were invited to take part in the conversation, with each exploring a different viewpoint based on expertise, pedagogical experience, content specialty and interest. The following paper is the result of this conversation, which was conducted via email over the course of two weeks, from September 22, 2008 to October 6, 2008. The writers/discussants decided that editing would be made for errors in grammar, usage and mechanics, as well as for APA style. However, the bulk of the content was left to reflect the natural flow of the conversation. Only slight modifications were made for clarity, appropriateness of language, and flow. There was one significant change made to the conversation, however. At one point a side conversation developed regarding teaching evaluations in higher education that did not contribute to the overall topic. This side conversation was removed.

At the end of the process, a conclusion was written to summarize the discussion and to identify common themes and substantial differences that emerged. More or less, the majority of

the content was derived by each individual and consisted of personal expertise, reflection and the process of engaging in the conversation. At the conclusion of the email conversation, Drs. Blake and Kemp attended the AATC conference in Austin, Texas to continue the dialogue during a presentation and involve others in the conversation.

Therefore, this paper is the outcome of the continuous dialogue among the various experts listed above. It was the intention of this panel to discuss the relationship between content knowledge and pedagogical knowledge and see where the conversation went. Each section is introduced with the name of the speaker.

#### Purpose

A purpose of this paper was to delve into a new sort of qualitative dialogue in research. How often has a conversation from a conference or a meeting ended with a statement like, “That would make a great paper”?

Stimulated by numerous conversations about the role of content and pedagogy in teaching and learning, the authors decided to attempt the following dialogue as a sort of preliminary qualitative exploration. Much as interview transcripts serve as qualitative data, the content of this conversation may be viewed as data that could be subjected to systematic analysis. In keeping with qualitative inquiry, our conversation took place in as realistic, or naturalistic, a manner as possible. As Marshall and Rossman (1999) put it, qualitative research takes place “in the natural world, uses multiple methods that are interactive and humanistic, is emergent rather than tightly prefigured, [and] is fundamentally interpretive” (p. 3). At times, the conversation became spirited, as participants reacted to one another’s comments, sometimes without apparent reflection. And while the conversation is informed by research and theory, it was based largely on the conversants’ professional and personal experience and perspectives.

Just as ordinary conversations among scholars are not punctuated by parenthetical citations, neither is this dialogue, except when deemed absolutely necessary. This conversation represents an attempt to recreate, as realistically as possible, those meaningful conversations through which much learning is accomplished.

### The Dialogue

*Drew: (1):*

As the No Child Left Behind (NCLB) legislation becomes more dominant in the culture of American education, a serious question must be addressed. What is the role of content knowledge vs. instructional techniques? One of the provisions of NCLB is that all teachers must be “highly qualified.” According to NCLB (2004), a highly qualified teacher must have a bachelor’s degree in the subject to be taught, must complete an approved certification program and must show expertise in the subject area (usually through successfully passing an examination).

While a majority of teachers receive teaching certification through a traditional program, almost one-third of new teachers acquire certification through an alternative program (Feistritzer, 2007). However, certification in alternative programs is quite varied. While alternative certification does require a bachelor’s degree and content area expertise, there is little attention paid to instructional techniques, or instructional strategies beyond a vague reference to full certification. The question looms, “Is content knowledge all that is needed to be a good teacher?”

The purpose of this dialogue is to address the issue of content knowledge vs. instructional techniques. Which is more important? The focus of NCLB suggests that content knowledge is essential. However, a case could be made that instructional expertise is also essential. Boe, Shin

and Cook (2007) suggest that pedagogical expertise is a key indicator of a “highly qualified teacher,” as defined by NCLB—full certification and in-field teaching. In addition, Porter-Magee (2004) notes that the NCLB Act does not specify any requirement for certification.

*Carla (2):*

Through teaching—that is, conveying content by means of pedagogy—we learn our content more deeply. How does this happen? Through consideration of the *learner*. We take something we know well and deeply, content, and translate it into terms understandable to the learner. We put ourselves in the mind of the learner—her prior knowledge, level of maturity, professional and personal experience—as we “rehearse” something we are planning to teach. Putting the content together with the learner in our own heads, we are able to identify those parts of our content that are likely to puzzle, confuse, or bore our students. And so we think through our content, which may be second nature to us. As we imagine our students’ responses to our instruction, we think our content through and try to make it as clear, straightforward, and intriguing as possible.

Pedagogy—the art and craft of teaching—comes into play when we think about *how* to stimulate understanding of content. If we were interested only in *conveying* content, we would do nothing but lecture. But if we are interested in our students understanding, interrogating, and applying content, we think about other methods that require overt learner engagement. For example, if we want students to gain other perspectives, we may engage them in particular forms of cooperative learning. If we want students to come away with an understanding that is greater than the sum of various perspectives—a felt and understood sense of the “big picture”—we structure instruction in such a way. The more ways, or methods, we can use to engender this understanding, the better. The central thesis of Caine and Caine’s *Making Connections*:

*Teaching and the Human Brain* (1994) is that multiple connections, often by means of the senses, are necessary for deep understanding.

One of Caine and Caine's (1994) 12 principles of brain-based learning is: "Each brain is unique" (p. 95). This statement used to strike me as overly simplistic, self-evident, and unworthy of mention—sort of a "duh" statement. But the longer I teach, the more I think this principle is at the heart of the matter. That is, while in real teaching, content and pedagogy are inextricably interwoven, the learner, too, must be interwoven. There are three pieces, not just two.

While we're on the brain, there's a fascinating article in a recent issue of *The New Yorker*, "The Eureka Hunt" (Lehrer, 2008), that details what happens in the brain when we experience insight. It totally affirms, from a biological perspective, what Gestalt psychologists have been saying for a long time: Before having an aha! moment, we first have to struggle, and then we have to forget about it; we have to let our struggle recede into our subconscious so the problem can incubate. Then, when we are relaxed and least expect it, insight happens.

To my mind, the material of the struggle is content. The question for teachers then becomes: How do we shape pedagogy so as to prompt insight for our students?

*Bob (3):*

In reference to *Carla's* (2) comments about how insight happens, I'm fairly confident that I have, more often than not, achieved insight while struggling with the material. Thus, I have some severe visceral opposition to the words "have to" in the above. I think that the relative importance of content knowledge training for a teacher increases as we progress vertically in the curriculum. Finding a group of people who have the necessary content knowledge to teach first grade math (the number line?) "should" be simple. Finding someone to

teach molecular orbital theory to freshman science majors is more difficult. I'm not sure if the need for good pedagogy also changes vertically in the curriculum. I think that many approach teaching as if it is an art form, but I prefer to talk of teaching methods first and teaching style second. I think there are some foundational methods for the science of good teaching that should work for everyone. It bothers me when people talk of art and science as if they are mutually exclusive and of teaching as if it is mostly art.

"There is science in the making of art, just like there is art in the making of science". <-- I just made that up.

*Drew (4):*

Deng (2008) notes in the *Sage Handbook of Curriculum and Instruction* that the content knowledge of the academy disciplines is not entirely related to the content knowledge of elementary, middle and secondary education. While, for *Bob (3)*, the need for knowledge of "molecular orbital theory" might be necessary in higher education, the focus on pre-university work, while laden with content, should be more focused on the acquisition of ideas that introduce topics. While it would be fantastic to discuss molecular orbital theory with secondary students and all of the fascinating aspects of electrons, electrical charges and the exchange of particles in the creation of ions and complex molecular structures, getting that information into the minds of the high school student is difficult. The greatest content is lost without a vehicle for transfer. That is where solid teaching comes into play. I think too often, the "system" assumes that if you have knowledge, you can teach.

I hate to admit it, but there was many a day that I taught at the secondary level, never having read what I assigned the students. In fact, to this day, I have never read *To Kill a Mockingbird* in its entirety. Yet, I taught this book six times. In each we had discussions of

race, of social class, of youth and of guilt. Students used the text to defend ideas, to support their notions and to validate their thoughts. Was I caught up in the content of the novel? No. I was enamored with the ideas.

I know that science and math might be different. Here, I struggle.

So, *Bob* (3), you stated, "I think that the relative importance of content knowledge training for a teacher increases as we progress vertically in the curriculum." I would agree. Perhaps, my lifelong attachment to secondary education causes a difference in my view. As a new assistant professor, I haven't run into the wall of, "Uh oh...I don't know what I am saying or I don't know the answer." Perhaps, because I am new, I am playing it safe.

*Carla* (5)

A gargantuan study (Darling-Hammond, 1999) may shed light on whether or not teachers' content knowledge should increase as we progress vertically in the curriculum. Reviewing and triangulating four sources of data from the 50 states, Darling-Hammond concludes that "the proportion of well-qualified teachers is by far the most important determinant of student achievement ... in both subject areas [mathematics and reading] in all years and in all subject areas" (p. 30). "Highly qualified" is defined as possessing full certification, which, presumably, includes pedagogical preparation, and a major in the subject one teaches. Both qualifications were correlated with student achievement at a considerably higher level than full certification alone.

To me, these findings highlight the insufficiency of either content knowledge or "teaching knowledge," as Darling-Hammond (1999) puts it. Just as important, these findings suggest the role content knowledge may play in effective teaching. That is, the deeper a teacher

knows her content, perhaps the more clearly she is able to explain it to her students—even at the elementary level.

*Jon (6)*

I teach from a very content-centric perspective; the vast majority of our course material/time focuses on the content of computing: what steps does the computer go through to execute a program, how are computer graphics generated, how is memory managed within an operating system, etc. Of the seven learning outcomes for the Bachelor of Science in Computer Science degree at SPSU, four are Computer Science content focused, and three are social (communication, ethics, and team skills).

I have never taken a course on pedagogy, yet I have elected seminars and brown-bag meetings and picked up a few things over 10+ years of higher ed teaching. I did take a course in the design of educational software, and was thus exposed to a small amount of educational theory. Enough to be dangerously ignorant of how to teach. And, as *Bob (3)*, it's been mostly on the job when I've found what works and what doesn't. That seems to be the experience of the vast majority of graduate students, and it seems this is how the Academy is set up (for most of us). Yet I consistently earn high student evaluations, so I'm either doing something right or I'm fooling my students (and my administrators). :)

Historically, my teaching is very content-driven, as is the assessment of their knowledge. And as assessment is a means by which we determine what the student knows (relative to the course and what we want them to have obtained from the course), then we should be able to examine the learning outcomes, what we teach (and how we do it), and how we assess students' knowledge as a measure of the emphasis we place in our curriculum.

Do I care that students know different data types (int, float, double, etc.) and how many bits each type consumes in memory? Sure—they can't get a job without such knowledge. Do I care if students know how long a particular sorting algorithm takes to run given a particular set of input? Sure—performance of computer systems is important. This is the content of the discipline. But I also want them to know the 'why,' not just the 'what.' And while I might facilitate them in finding the 'why,' they must ultimately find it themselves. The 'what' is necessary, but not sufficient.

The reference to *To Kill a Mockingbird* is an excellent example of this struggle. Do you teach and have students read this book so that they know the book's content (what is the story, who are the characters, etc.), or do you use this book so that the students can explore issues of youth, guilt, race, class, etc. The content of the book is necessary, but not sufficient. The real goal is the "why" of the book. And how can such concepts be taught without the students' introspection? Thus, my assignments aren't designed to elicit the students' responses; rather, they are a means by which students are encouraged (forced?) to spend time "simmering" in the content of the course.

If every brain is different, then every brain will acquire, process, and contextualize content in different ways. There are sure to be patterns, but it's that processing and contextualizing part that is within the student and must be wholly theirs. I can present the content, but they must process it and place it into their context and past knowledge/experience. From which patterns should emerge and deeper understanding should occur. I can't make that happen for them. They must do this, and it takes time and introspection. This is the subconscious struggle that "The Eureka Hunt" speaks of (*Carla* [2], *Bob* [3]). Can it happen without the "have to" receding? I'd imagine that it can when one is actively engaged, patterns

and “a-ha” moments can occur. Perhaps the idea of deep learning happening subconsciously is because, like good food that must simmer for a long while, deep understanding often (always?) comes when the patterns percolate up; this is the processing and contextualizing part.

And to spur the conversation, I'll throw out a radical (intentionally hyperbolic) idea that content is all that is needed and instruction doesn't matter at all except to provide a means by which students are exposed to content and encouraged to process it themselves. This is predicated on the idea that they have a framework within which to add the new content (so I'll admit that the issue of grade level and primary/secondary/post-secondary is of paramount importance). It also assumes that learners are self-actualized enough to process the content and have enough distraction-free time... which is a big assumption in our society where silence isn't golden, it's profane.

*Drew (7)*

*Jon (6)*, you make the point that "we determine what the student knows." But, is knowing enough? I will admit that if the goal is content knowledge, then the type of instruction that you are suggesting, based on specific learning outcomes, is warranted. However, in some subjects, like curriculum theory and philosophy, it is the dialectic that spurs the genesis of thought. Sure, there is content as a foundation, but it is the application of the content to amorphous educational situations that cause the deep learning of which you write.

I see instruction and content as being both age and discipline driven. In some subjects—curriculum theory, philosophy, social justice, democracy and critical thinking—hardcore content, while part of the equation, is only a small part. In reality, facts are only a cursory part of the bigger picture...seeing holistically. However, in the sciences, math and engineering, content becomes much more tangible and necessary. There are things that you must know. Yet, I feel

that if there is only a regurgitative replication of content, something is lost. There must be some act of discovery...some application...some transfer to not only rote memory, but long term transfer through multiple connections. This comes through solid pedagogy.

*Jon (6)*, you note, "I'll throw out a radical (intentionally hyperbolic) idea that content is all that is needed and instruction doesn't matter at all except to provide a means by which students are exposed to content and encourage to process it themselves." I don't see this at all as being radical. In fact, it is exactly my point. Content, when viewed as only content, is nothing more than a memorized text. But, pedagogy encourages processing. Processing that does more than record. It becomes part of the individual.

*Bob (8)*

*Drew (7)*, in your description of learning and the role of content, it strikes me that you speak of abstract terms and/or abstract ideas as being important learning objectives. Most of my students are still at a concrete level of thought. Thus, it might be good to identify particular content as common ground for the introduction of ideas in a concrete way. If you wish to talk of "race, of social class, of youth and of guilt", it seems prudent that everyone in the class be familiar with the same content (*To Kill a Mockingbird*) in detail. In that way, you can use common specific examples from the book to illustrate key ideas. Then everyone can show their understanding of the key ideas by using other examples from the book. This reinforces the skills of reading comprehension (or at least checks to see if students are reading at all). Many of my peers saw classes that had general expectations as opportunities to skip their assignments and to count on their ability to make up answers by making up stories.

We could have classes bring forward specific examples from personal experiences as the starting point for deep discussions about youth and guilt, but in my experience, most people

(especially students) do not speak or write as beautifully as Harper Lee. We could teach line and color by looking at the class crayon drawings or we could examine Monet. In the end, we would want to do both, but I prefer to start from a point where there are exceptionally good concrete ideas on the table that everyone is expected to know and understand (lower level Bloom's Taxonomy stuff) and later to try to apply this information to their own lives or explain relationships, which is higher level stuff.

I do something similar in Chemistry. In order to teach stoichiometry, which is a somewhat difficult topic for college students, we start with a problem involving a recipe for sandwiches. Then for the rest of the problems involving stoichiometry, I can refer back to this example.

Back to the point of content vs. pedagogy in teacher preparation, I think teachers should have a demonstrable base of content knowledge as a starting point. I have a Teacher Quality Grant to prepare high school chemistry teachers to teach Chemistry. The teacher participants scored 47% (average grade of F) on a pre-test diagnostic exam that covers high school level chemistry concepts and 67% (average grade of D) after 4 weeks of instruction. It strikes me that the teachers seeking out the extra learning opportunities are probably more motivated and do not represent the worst teachers in terms of content knowledge, but even among the most motivated teachers there is a severe lack of content knowledge.

I trust that none of us would think that regurgitation of facts from rote memory is the upper limit of our educational goals. For me, rote memorization of facts is a good starting point for learning, as it can give focus and consistency to later discussions. Most of my students can not even define the terms they use. A person with conceptual understanding of an idea and good language skills can construct a definition from their understanding. Thus, when my students are

totally unable to define a term for me, there is a breakdown both in rote memory and deeper understanding. The teachers suffer from the same disease. They are so content knowledge deficient that they can not even define key terms (or apply the ideas behind the words to specific problems).

Maybe it is because content knowledge weaknesses are so pervasive and easily measured that they have taken the NCLB emphasis. Pedagogy is very important in my opinion, but how do we measure one's ability to instruct? How well I teach is probably a function of the content I am teaching, the age group of the learners and the previous knowledge of the learners, just to name a few variables.

*Drew (9)*

*Bob (8)*, you make some excellent points that I hadn't considered in my defense of instruction. You note that "it strikes me that you speak of abstract terms and/or abstract ideas as being important learning objectives." I think that this has a lot to do with context. In the classes that I teach or I have taught at the secondary level, the students were competent readers and writers. In language arts (in my recent past) and in curriculum theory (the present), the holistic ideas are the focus on my objectives. Your point about having common content is sound. I agree that a common content is important. However, to me, the content gained through reading and a brief discussion is sufficient. Admittedly, I am not trying to create chemists, or physicists, or engineers. My focus is on adaptability and change. In order to create a common vocabulary, I spend a lot of instructional time on hermeneutic inquiry. We spend hours defining the undefinable. Terms like curriculum, instruction, democracy, learning and education are defined, discussed and debated. I suppose that this is my content. Although there is ample reading on the issue, the formal discussion is far more effective.

As far as *To Kill a Mockingbird*, yes, they all read it. However, I do not belabor points of plot, character, setting and tone. These are part of the instructional process. I do teach my students how to be better, active readers using many of the points suggested by Mortimer Adler (1972) in *How to Read a Book*. We use these ideas to make reading more meaningful. You stated, "I prefer to start from a point where there are concrete ideas on the table that everyone is expected to know and understand (lower level Bloom's Taxonomy stuff) and later to try to apply this information to their own lives or explain relationships, which is higher level stuff." In essence, I think we totally agree. Perhaps, our methods are a bit different. For instance, at the university, I don't give tests. Everything is papers and projects that are authentic means of assessment. But, I realize that this can't be done on every subject.

You make a strong statement about teachers not having enough content knowledge about chemistry. I ask, for what level. If a student has a degree in chemistry, it would make sense that s/he would have enough information to teach high school. However, this might not be the case. Either way, this only furthers my belief in the necessity of sound pedagogical knowledge. I truly believe that a teacher that knows what is what, can teach some content without the benefit of mastery. I think I could probably teach a few chemistry lessons effectively, with my cursory knowledge chemistry (one semester of chemistry for chemistry majors my first year of college—I really considered it as a career path). Now, I know that I couldn't teach an entire class or even a unit. But I contend that someone that is only a content specialist might not be able to adapt quite as well. At the high school level, many times they can't even handle their own content.

All in all, I think that we agree for the most part. Content and pedagogy are the yin and yang of education. You can't have one without the other. Purpose, content and focus can change, but all in all, you can't have one without the other.

*Carla (10)*

As I read recent contributions to this dialogue and think about them, the distinction between content and pedagogy seems to be dissolving. *Jon (6)* notes that he can present the content, but it's up to students to process it—to arrive at eureka moments themselves. True, students must have some accountability for their own processing—onset of insight doesn't occur as if by magic—but can we structure instruction in such a way that insight is more likely? I'm sick of the word, "facilitate"—but can we facilitate insight?

Along the same lines, *Drew (7)* refers to dialectic as a means by which his students process content—so that they are able to connect the facts into the big picture. Again, how do we structure instruction so that a true dialectical discussion takes place?

In both cases, I think when we structure learning so as to arrive at particular outcomes—whether insight, dialectical understanding, or something else—we are using pedagogy.

*Drew (9)*, in talking about pedagogy, implied that his situation may be different because after all, he is not teaching chemists or engineers. I'm currently involved in a project with faculty from the Colleges of Engineering, Liberal Arts and Sciences (math and geology), and Education. For a whole year, we met once a week and had incredibly stimulating arguments—“trialiectics” really—about the role of content vs. pedagogy. Our product is a new degree—the Master of Science in Teaching in Engineering Education, in which Engineering professors strive to teach engineering content in as exciting a manner as possible. In this program, we use "engineer" as a metaphor for the teacher; with this metaphor, content and pedagogy are virtually inseparable.

Here's how we put it in a paper we're working on:

Teacher as Engineer. Engineers are designers of practical solutions to real-world problems, drawing on the content of multiple disciplines, primarily mathematics and science, and taking into account various conditions and contingencies. MST-EE

teachers are also engineers – engineers of learning. They design instruction that is responsive to the learning and motivational needs of their students. For content, they draw from math, science, and emerging technologies. They align their curriculum and instruction with standards of the Illinois State Board of Education, professional organizations (e.g., National Council of Teachers of Mathematics, National Science Teachers Association, International Society for Technology in Education) and the Accreditation Board for Engineering and Technology. Additional conditions and contingencies teachers must keep in mind as they design instruction include strands woven throughout the program: engineering applications, identity formation, integration of content and pedagogy, action research, and teacher leadership.

This brings me to the teacher. *Bob* (8) notes that evaluations are probably the function of a variety of variables, including the particular group of students and the content. Of course, you're talking about evaluations of teaching, not actual teaching or actual learning. But it was interesting to me that you didn't mention what the teacher him- or herself brings to the table. After almost 10 years in secondary education and almost 20 in higher education, I've come to believe that the teacher is what matters most, more than either content or pedagogy. I realize this may sound touchy-feely, but I believe it to be true and would be interested in hearing your thoughts.

Finally, thinking about the chemistry teachers and how little they know, I'm reminded of Darling-Hammond's study (1999) and the idea that deep learning of content—well beyond what they will teach in K-12 classrooms—enables teachers to do a better job of explaining content and structuring instruction.

A story on myself illustrates this point. In a course for secondary teachers of a variety of subjects, I was demonstrating the Guided Inductive teaching model (Joyce, Weil, & Calhoun, 2009). Determined to help students discover for themselves the formula for figuring the sum of the interior degrees of a polygon, beforehand I figured it out for myself. The formula I came up

with was in reference to the circle and it was rather long and complicated. I was pleased with myself. So I proceeded to teach the lesson. Much to my surprise, it was torturous. Afterward, a couple of math teachers took me aside and tactfully told me that there was a much simpler formula—less conceptually labyrinthine. The point is that because my knowledge of math was so limited, I taught the lesson inadequately and I failed to convey the elegance that mathematicians prize so highly! As I see it, here was a clear case of content trumping pedagogy.

*Bob (11)*

I think it is amazing how people can gravitate toward assuming that credentials signify something other than fulfilling of the requirements for the credential. Demonstrating knowledge and skills at one point in time certainly is no guarantee that the same knowledge and skills will be present later. *Drew* said: "If a student has a degree in chemistry, it would make sense that s/he would have enough information to teach high school. However, this might not be the case." I completely agree that it would make sense that they would know chemistry, but in my experience, that is not the case. When I gave a first-semester freshman level chemistry exam to graduating seniors and incoming graduate students who are chemistry majors, the average score was 50%. I do not think that someone who scores 50% on a basic exam has the content knowledge to teach high school chemistry. There is a lot of cramming and forgetting in college. Even worse might be the amount of cheating that goes on in take-home projects and papers (authentic assessment of whom?). A four-year degree does not impart or imply a mastery of the fundamental knowledge or skills of a discipline.

This is a place where we might talk about pedagogy and content together, as I think both are essential for quality teaching. I think that content knowledge and pedagogy work hand-in-hand in the methods used by master teachers, but I do not think I could prove this to someone

else. Only an idiot would hire me to teach dance classes, as I do not have the content knowledge of the discipline (even though I did take a year of modern dance in the 1980s). I believe that teaching methods are equally important, but how do we define and measure "good teaching methods"? This is where I look toward you and other members of our group.

You suggest potential differences among the different disciplines. I think this is a good idea in several ways that we have already touched on. The number of new topics or ideas in my chemistry class far exceeds the number of ideas in any philosophy class I ever took. A philosophy test typically asked us to ramble on about an abstract idea, opening the door for non-specific and perhaps creative answers which could earn a very good grade. Science or history classes often had tests of my rote memorization of facts, but not necessarily my understanding of those facts. Chemistry classes often ask us students to follow simple algorithms to determine an answer, but do not apply these answers to real life or complex situations. I think that every discipline should unite the knowledge of facts with the understanding of the abstract ideas that the facts illustrate. The ultimate goal of education for me is to enable students to acquire knowledge and apply it to new situations and new problems. In practice, I think different disciplines tend toward different deficiencies in their teaching, which might be an interesting topic to explore.

I agree that both content and pedagogy are important to good teaching. Until the definition of a Highly Qualified teacher raises the bar for content knowledge and includes criteria that address pedagogy, then we can label many teachers "highly qualified" who are not. Someone who knows how to teach in general but does not know the material will have problems teaching the material, as will a teacher who has the content knowledge but does not know how to convey it. The so-called "highly qualified" high school chemistry teachers who I taught this

summer are in my words "an embarrassment to NCLB standards." They neither know chemistry well themselves nor can explain chemistry in terms I could understand.

*Jon (12)*

*Carla* points out in (10) that "After almost 10 years in secondary education and almost 20 in higher education, I've come to believe that the teacher is what matters most, more than either content or pedagogy. I realize this may sound touchy-feely, but I believe it to be true and would be interested in hearing your thoughts." I couldn't agree more. If content was central, than any book would do. We as "education nerds" who have made education and learning central to our lives can pick up a book and learn. But most people don't find this so easily done. And this is why certain universities have reputations and students seek out specific programs and pay a premium (in money or effort or whatever) to go to a specific school. It's the faculty and their contributions that determine such reputations. If they publish a book, that's not good enough—I want them. I, as a student, want exposure to them and their deep content knowledge/expertise. They might be a horrid teacher, but I'll endure that so I can get access to them personally because published material they've written isn't interactive, and I can't explore queries and probe into new areas of their content unless I have access to them personally.

So perhaps we've constructed a "pedagogy vs. content" diametric where it should be framed as "pedagogy vs. content vs. teacher/person." Or does the person just embody pedagogy and content in various degrees?

*Drew's* comment (in 9) about how he could teach a class (or a few classes) in Chemistry based upon his past minimal experience as a Chem major, stems from his vast experience as a teacher... and he could pull this off because he's got experience in this domain of improvising when needed about content. He's been there when faculty demands have pulled him away from

really prepping for lecture like he'd want and should do, and he had to "wing it" in front of his class. Given any domain, we as educators could pull off some minimal instruction and get away with it. But I'd doubt any of the students would remember the content years from then; we might be able to fill in for a colleague sufficiently to get them through the test/assignment/paper, but it's only the experts with the deep knowledge of content that can frame the discussion/lecture in such a way that the content sinks in deep and students can then reflect on it and gain true knowledge.

And *Carla's* comment (in 10) that their new degree strives to "teach engineering content in as exciting a manner as possible" is fascinating to me. We've engaged in "active learning" for 3+ years at my past and now current university, and while this approach is a "no brainer" to me in that we should engage our students and attempt to share the learning process and the content ownership, it appears that this isn't always done in all classes. I know I, from time to time, don't always hit my mark when teaching due to other pulls on my time (research, service, etc.), but I've been at one research and two teaching universities, and I've always focused on teaching first. To me, in my experiences in the classroom, pumping out content without thought to the audience and without engaging them doesn't work as well as having them active in the process. From time to time, this included throwing out mini candy bars (it is getting close to Halloween again!) to those students who could answer my "OK, what did we do last session?" lecture warm-up time to having students prep and deliver lecture on their chosen content from the course. This has always been a part of my instructional methods. And sometimes it works better than other times. Some semesters, the students just don't seem to care, no matter what tactics (apology—"pedagogical methodologies") I use.

So I arrive at the conclusion, from experience and discussion from other colleagues, not from pedagogy research, that student motivation is key to learning. If they don't see the

relevance of the content to their lives, future careers, etc., then they just shut down and don't care, and consequently, don't learn. I can try to make them care; I can relate the content to their experience and to their future careers/lives, and I'm successful some of the time.

### Conclusions

Among the members of our group, coming to a consensus seemed more of a professional courtesy at times than a true consensus. On occasion, we took extreme positions for the sake of argument (and perhaps sometimes in practice) to help define and delineate the opposing viewpoints—to enhance the dialectic. Perhaps the one area that we agreed upon was that educators should not talk so much about content versus pedagogy, but rather the integration of content with appropriate pedagogies. It is a seeming impossibility to have one without the other. In addition, we should consider the teacher and the student as the key components of this marriage.

However, some extreme differences were also noted. Both speakers from outside of professional colleges of education noted that while pedagogy was important, there was no substitute for content area expertise. I think we all agree on this point. Perhaps, though, our greatest contention in this area comes from level of education. While Drs. Blake and Preston were working from a framework in higher education, where expertise in the subject is part of not only the degree, but the ability to become a professional in that specific field, Drs. Shaw and Kemp contended that the ability to create learning environments in elementary and secondary education is as important as some of the content. The role of the teacher and the purpose behind the instruction are to stimulate the students' minds toward greater understanding of the subject for the purposes of lifelong learning. In addition, there was a definite conflict in the nature of the relationship between the instructor and the student. Dr. Preston suggested, "I can present the

content, but they [the students] must process it and place it into their context and past knowledge/experience. From which patterns should emerge and deeper understanding should occur. I can't make that happen for them. They must do this, and it takes time and introspection.” Perhaps this is one area of disagreement that rings most prominently. In terms of pedagogy, one role of the instructor is to provide methods for this transference to take place. In other words, the instructor should set up learning situations in which deeper understanding is shaped into the instructional process. Is this to say that every single student can be taught 100% of the time? Certainly not. But Drs. Kemp and Shaw believe that teachers should *act* as if this were a possibility.

In the end, there was some agreement that was summed up best by Dr. Blake, who eloquently stated, “I agree that both content and pedagogy are important to good teaching. Until the definition of a Highly Qualified teacher raises the bar for content knowledge and includes criteria that address pedagogy, then we can label many teachers 'highly qualified' who are not.”

There are various levels of students with a panoply of needs and various outcomes that are warranted. However, it is in the blend of content and instruction, along with the personality of the teacher and the needs of the learner, that significant learning occurs. Throughout this discussion, one theme became perfectly clear. Any educator cannot separate content from instruction. While there are many variables to consider, pedagogical decisions made with the content in mind are essential to good teaching, successful learning, and the creation of a vibrant educational system that not only is filled with worthwhile knowledge, but with learning that lasts a lifetime.

### Looking Back on the “Method”

Overall, the process caused the participants to conduct serious self-reflection regarding content and pedagogy, even though this reflection was not always readily apparent. As can be seen in the context of the conversation, the ideas evolved quickly as more and more evidence for each side was offered to the group. As noted previously, although there was no consensus on the issue, certain areas found substantive agreement.

The stimulation of the conversation caused many responses to occur quickly as an almost reactionary response to previous postings. As the conversation extended into the second week (and into a second email string because the email servers would not transmit messages of this magnitude effectively), reflection on the big picture was lost at times. In future qualitative discussions of this sort, a longer time frame would make for a more obviously reflective conversation. In the subsequent analysis and interpretation, connections to pertinent theory and research would be drawn. Until that time, the conversants offer their dialogue in the hope that it will provoke discussion and stimulate reflection on the enduring issue of the optimal relationship between content and pedagogy in teaching and learning at all levels.

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