

Conversations in a Coffee Shop: Voices from within a community of teaching practice of university science faculty

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Abstract:

Members of our community of teaching practice in science (CoPSci) come together with a shared vision of improving the learning environment for our students. We meet regularly in an informal setting. We represent a variety of disciplines and span a range of teaching tasks. Our personal journeys within the community, and consequently in our classrooms, are varied. We have woven our eleven narratives together, and identify a number of common threads that occur across these narratives. Common themes that arise include a number of significant and critical aspects of CoPSci, including: (1) the importance of sharing and exchanging ideas in a supportive and trusting environment; (2) the value of developing pedagogical knowledge through this collaboration and in the context of science teaching and learning; (3) the impact of this community in developing individual confidence and creating a willingness to undertake calculated teaching risks and exploring creativity; (4) the significance of diversity within the group, particularly with respect to the range of science disciplines and teaching modes represented; (5) the framework for our sessions within a casual setting, with a loosely-defined but flexible topic for discussion; (6) the critical role played by reflection, both in terms of teaching, and in terms of self; and (7) the ways in which involvement in this community of practice has resulted in transforming our classroom teaching practices. The values of this community extend beyond the immediate members to the wider university community, and in evolving steps, are changing the teaching and learning environment.

Key Words:

community of practice; science teaching; transformation; sharing; trust; reflection; teaching; learning; pedagogy.

It had to be in a coffee shop

Our community of teaching practice in science (CoPSci) was born when a small number of early-career faculty in science defied the norm in a research-intensive university and joined a group of others interested in conversations about teaching and learning. I started this group five years ago, with the support of the dean. From the beginning, the structure was flexible and the atmosphere casual. Members come from a number of different disciplines within the sciences, and have varied teaching roles, from teaching large first and second year lecture-based classes to smaller multi-section labs, and small senior seminar or lab courses.

It had to be in a coffee shop: the conversation needed to be free and open, built on the needs of the community itself, keeping in mind the ebbs and flows of the teaching year. Coffee shops offer an informality, a place where diverse people come together, a “neutral” space that is not a regular working place, and where typically conversations around ideas evolve over a cup of tea or coffee. The atmosphere is relaxed, yet from Hemingway to Newton (who once dissected a dolphin in a Grecian Coffeehouse)¹ coffee shop conversations have served a role in the sharing and propagating of ideas and in building communities. There was a risk that these encounters might have degraded into gripe sessions, but this has not happened. Rather, the discussions are enriching, lively, and supportive. We laugh a lot, we sometimes sigh; we talk about our teaching, the joys we find and the struggles we experience; and we share in the

excitement of our students' successes as well as their frustrations. We elaborate on our own triumphs as well as our failures; we explore other ways of viewing the world, and of approaching our classrooms and the individual students we meet daily. We reflect on who we are as teachers, what we value, and what we learn from each other and from other disciplinary ways of thinking, albeit all under the broad umbrella of science – it is actually quite amazing how varied our ways of viewing and operating within the world really are! While I do carefully select a short reading on a topic of interest by means of starting a purposeful conversation each session, our conversations often diverge from this starting point in a variety of ways.

How did this CoPSci come to be? My interest in getting the CoPSci off the ground stemmed from what I had found missing when I started teaching: a community of like-minded others with whom I could chat about what I particularly valued, the teaching and learning environment. I muddled through, and sort of found my niche through workshops in our Centre for Learning and Teaching, but I still felt somewhat isolated in our science fortress when it came to the idea of discussing teaching, particularly teaching in the sciences. Subsequent informal encounters with part-time faculty reminded me of just how much those of us “seasoned” instructors take for granted. Those new to teaching have many questions around where to find out about this or that, or what the unwritten expectations are; they wonder about classroom management issues and how best to support student learning. This led me to question again where we find the support and encouragement to develop our teaching identities, take the risks that might improve the learning environment for our students, and just talk about our experiences. It seemed that something had to be done. One of the key things I have learned from this community is that change sometimes can, and indeed should, come from those directly working with the students: we can be agents of systemic change. CoPSci has now grown to be open to any science faculty member who is interested in discussions around teaching and learning, not just those in their first year or two of teaching. We currently have members who are brand new this year, some who have been with us for a few years, and some who have joined us from a mid-career perspective.

In referring to Edward's definition of learning as “within person changes which modify the way in which we interpret and may act on our worlds” (Edwards, 2005, p. 50) it has become clear that our CoPSci has become a community of learners, and not just a community of teaching. This contribution represents our collective interest in sharing what we believe to be the value of such communities, as well as some of the outcomes in terms of our own growth and development, and the growth and development of both our students and the teaching assistants who work with them. My voice (AMR) serves to introduce these narratives and offers a brief synthesis and discussion of key commonalities and their connections to the literature. In framing this writing, my invitation to past and present members was for anyone interested, to write a couple of paragraphs about something or some way in which they changed in a positive (or not-so-positive!) way, as a result of being involved in CoPSci. The voices of 11 of these members, both present and past, are included here, and attest to the value and significance of such a community. Their individual voices are captured just as they have written their stories, and span the disciplines of biology, chemistry, oceanography, earth sciences, and psychology-neuroscience.

Voices in the coffee shop: voices around the table

Interestingly, although everyone wrote their story independently, a number of recurring themes are evident. Dominant among these threads that are woven throughout, is the importance of sharing and exchanging ideas in a supportive and trusting environment, amongst like-minded individuals. Each narrative explicitly or implicitly speaks to the significance and relevance of this theme. The critical importance of these elements has been highlighted by Petrone and Ortquist-Ahrens (2004), who speak to the role faculty learning communities have in building community across disciplines, and the significance of building relationships through trust and shared respect. Similarly, Cox (2004) addresses the importance of such learning communities, particularly because teaching in higher education can be a somewhat isolating activity.

Of no less importance are a number of other recurring themes woven throughout the narratives. The significance of diversity, particularly with respect to the range of science disciplines and teaching modes was identified as important for providing alternative viewpoints and perspectives that otherwise might have gone unconsidered. Not unsurprisingly, given that one of the purposes for developing CoPSci was to create an environment for sharing ideas and research on teaching and learning, the value of developing pedagogical knowledge in the context of science teaching and learning occurs in more than one of the narratives. Building on the significance of multiple voices and ways of viewing teaching and learning, as well as developing a knowledge base, is the role CoPSci has played in developing confidence and creating a willingness to undertake calculated teaching risks and exploring creativity.

A number of the voices speak directly and indirectly to the idea that it is not enough to stop at this point, and recognize the significance of the CoPSci in providing an opportunity for, and encouragement of, reflection, both in terms of teaching, and in terms of self-knowledge. Reflection without action does not bring about change, and in what follows, you will also meet voices that speak to some of the ways in which involvement in this community has resulted in transforming classroom teaching practices. Each of these themes has evolved in part because of the framework for our sessions: the setting is casual, with loosely-defined but flexible topics for discussion.

These key themes are further unpacked below through each of the narratives. In many ways, these divisions are artificial, as each narrative speaks to more than one theme. However, each serves to highlight the manner in which CoPSci contributed to a given theme, and where more than one narrative is included, they offer different perspectives on this common theme.

Diversity, particularly with respect to the range of science disciplines and teaching modes

MM's narrative speaks specifically to the value of making connections with others across disciplines who share her scholarly interest in teaching and learning. She talks about an unanticipated way in which CoPSci ideas circulate beyond the boundaries of the immediate group, to the benefit of the students' learning, in an interesting juxtaposition of conversations.

I gained a lot by being part of the teaching and learning community at Dalhousie. As a new faculty member in the Fall, I knew very few people on campus, let alone people who share my scholarly interest in teaching and learning. Joining the group helped me to meet people on campus with shared interests and provided me with a sounding board to bounce off ideas about teaching in my own classes. Further, I was hired to teach in, and coordinate, a multi-disciplinary first year science program. Joining the community of teaching practice meant I made connections with faculty from a variety of science disciplines in the first year of my job. This helped me to make connections to the other science departments across the campus, an important aspect of my job. Without getting to know these faculty members, it may have taken me several years to get to know other science faculty interested in teaching and learning, and to see how my program fits into the broader landscape of undergraduate science teaching on my campus.

An unexpected benefit of the teaching and learning community of practice was that it helped me to start conversations about teaching with people I work with in my own program, who are not part of the group. My colleague from the psychology department and I, were planning a cross-disciplinary class with our students. I proposed that we use a jigsaw approach, have the students work in small “expert” groups to learn about a specific topic, and then join larger “multi-expert” groups where each would share their perspective on the topic. My colleague was concerned students would struggle with the content and that more explanation from us, the professors, was necessary. I disagreed, but had trouble convincing her. Shortly after that, I described my idea to the community of teaching practice. A person in the group, also a member of the psychology department who works closely with my colleague, subsequently had a conversation with her about my idea, and then she was convinced! She came to me and said that she’d decided that we should go ahead and try the jigsaw approach to the lesson. We did, and it was very effective. It wouldn’t have occurred to me to include other people in planning our lesson, but it turned out that discussing it with another person, with whom she has worked longer, led to her being open to trying something new in her teaching.

Cox (2004) outlines enhanced respect for others’ perspectives as an outcome of faculty learning communities at Miami University. MM’s narrative speaks not only to the influential and important role of diverse voices within our conversations. This also addresses the value these conversations have in bringing about transformations in practice, even beyond the immediate CoPSci, as the conversations are continued beyond the “boundaries” of the CoP, even to the point of achieving small transformations in teaching beyond our own classrooms.

Developing pedagogical knowledge in the context of science teaching and learning

Any community of practice revolving around teaching and learning should have as an important outcome, increased knowledge and understanding of teaching and

learning. LG speaks to the role CoPSci plays in developing teaching that is rooted in best practices and learning theory.

As a new faculty member, the weekly meetings demonstrated to me that there was interest in having faculty develop good teaching practices at our university. Meeting faculty across the science disciplines reinforced what was presented in the articles we read, in that we all faced many of the same challenges and rewards of teaching.

Being involved in CoPSci, together with my involvement with a discipline-specific journal club, and conversations on the role of instructors, led me to institute pedagogical discussion into my weekly meetings with teaching assistants. This helped them shift their focus from strictly presenting content in the laboratory sessions to thinking about how best to deliver content to novice students.

Being involved with CoPSci gave me confidence that I was familiar with, and had an understanding of the literature, and had sufficient experience to guide my TAs towards current thoughts and ideas of how best to teach.

In her narrative, LG also speaks to the value she, like MM, felt in the diversity of disciplines present during the conversations, and in the role CoPSci played in developing confidence.

In what follows, DG writes about the value of the conversations in the broader sense, and speaks to valuing these discussions have in building a scholarly approach to teaching. DG also draws attention to risks she has taken in her teaching as a result of her involvement in our CoPSci, and the responses of her students to such risks.

The most fundamental impact of our CoPSci has been the support for discussion of teaching in a scholarly way. We address some aspect of teaching every time we meet, but in a non-threatening, non-competitive, supportive and understanding environment. There is a good mix of new and experienced faculty from different departments, but all with a common focus on science, so we're usually speaking the same language. I have become comfortable with understanding teaching pedagogy, building knowledge of many different teaching strategies, and alignment of learning outcomes and assessments. We have discussed practical aspects of our teaching, such as how to write excel formulas to sort out the two lowest marks of a type of assignment for each student in a class of 250 students. We also discuss deeper issues of improving our students' critical thinking abilities, encouraging them to master threshold concepts, and honing their analytical skills when looking at data.

Our wide-ranging discussions sometimes digress into unexpected confidences, things we have tried and perhaps didn't work out as expected, or things we tried that have exceeded our wildest dreams. We try to have a balance so it's not just venting about difficulties, but accepting each other's views and fresh ways of thinking about challenges and dealing with student issues. The supportive environment allowed us to take risks with our teaching, to try something new; to be confident enough to stop if we think something is not working, and to change strategies on the fly.

Some of my best classes have been when I went into lecture without a firm idea of what I would be saying and developed the content in discussion with my students. One example was a lecture to prepare students for their upcoming poster presentations on their research projects. Rather than giving them a list of rules for good features of posters, I had them bring in photos of posters they found on campus, and together, we looked at each and analyzed what was effective and what was not. This was very effective in producing excellent quality, clear, and communicative posters for our mini-conference. Involvement in CoPSci gave me the confidence to take this risk and try teaching without a definite lesson plan.

I love this way of modeling analytical behavior, getting students to try interpretation, and gently guiding them into higher levels of thinking. I think educators are at our best when we're stimulating our students to think, to encourage their natural inquisitiveness and I am thrilled when I get feedback in reviews such as: "very little busy work", "we had to think to answer the questions". The members of the community of teaching practice all get joy from seeing the light bulb come on in our students' minds. It is wonderful to be part of a community of like-minded, but unique individuals with a common purpose: to engage students, to improve their ability to think critically, and to teach and learn how to distinguish the important from the ephemera.

Although DG highlights the importance and significance of developing pedagogical knowledge and a scholarly approach to teaching, she also talks about the joy and excitement we feel when we incorporate these ideas into our teaching, and see the positive results in the students' learning.

These narratives also speak to the value learning about teaching has in building confidence to move beyond current comfort zones into new territory, and how rewarding this forward movement is.

Developing individual confidence and creating a willingness to undertake calculated teaching risks and exploring creativity

As new faculty, or even seasoned faculty in new teaching environments, impostor syndrome can raise its ugly head. Moving past this takes courage, built on a confidence gained, in part, by honing our knowledge, but also by having a supportive and interested community with which to explore ideas. In the first of the narratives below, the role of CoPSci in building confidence is highlighted; in the second narrative, AS speaks to the role CoPSci has played in encouraging risk-taking and creativity in teaching.

SK writes of the experience of a neophyte, her worries around being the content-knowledge expert, in many ways addressing the imposter syndrome many of us feel as we begin our teaching careers. For her, CoPSci became the "wind for her sails", and provided support for developing confidence in the classroom.

The CoPSci quite literally put the wind in my sails when I first started teaching. I learned the nuts and bolts of teaching in these meetings. But more importantly, discussions in CoPSci fundamentally changed my attitude towards teaching. As an early career faculty member, my initial "knowledge of teaching" was based on

my own experiences as a student, and my concept of a university teacher was that of the "sage on the stage".

When given the first teaching assignment, my mind went on a roller coaster of profound panic. [Clearly, I was not able to fill the role of the sage in the stage]. Discussions with CoPSci, however, made my expectations much more realistic. As a result, I now see teaching as a relationship and an exchange of best efforts between students and teacher. On a practical level, this means that I put effort into staying current on the science, being well prepared for each lecture, explaining concepts clearly, and caring for the individual. In return, I expect my students to make efforts to take ownership of their learning. This means they come to class prepared, think along and answer questions, and are willing to stretch their thinking, writing, and quantitative skills.

AS has chosen to provide a visual and biological metaphor to highlight her concept of CoPSci, which she weaves for us in clear and definitive ways. She talks in particular about the support CoPSci provided, that led to developing confidence in risk-taking and exploring creativity in the teaching and learning environment.

In most cases, faculty who teach at universities do not get any formal education training. We are thrown into the classroom with our passion for passing on the knowledge that inspired us with only past experiences to draw from. The CoPSci is a space that fosters the exchange of knowledge and experiences around teaching and learning in the sciences and has been vital for the development and continued evolution of my own teaching practice. I have depicted my view of CoPSci using familiar biological terms and concepts.

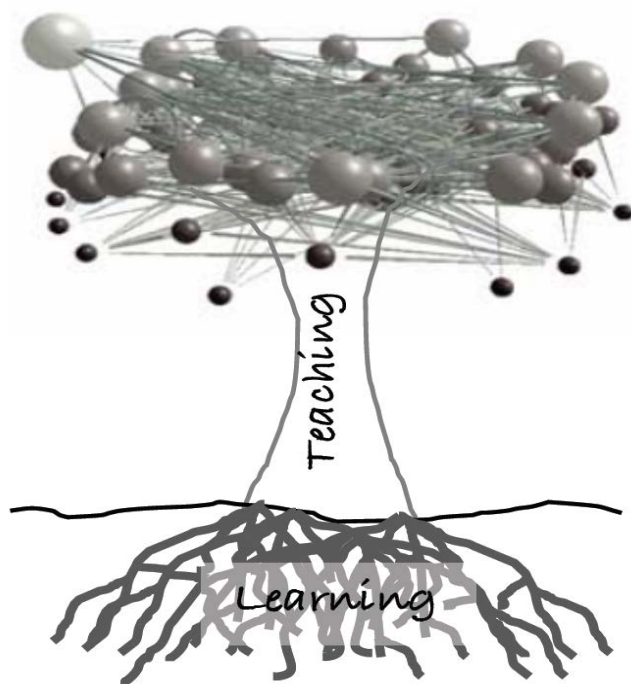


Figure 1: One view of CoPSci

The CoPSci is a dynamic group of individuals, new and experienced teachers across the scientific disciplines, represented in the tree canopy as spheres of varying size that are connected directly and indirectly to each other, like a food web. Some individuals have more direct connections. They play an important role in the community by linking many people indirectly in sharing their knowledge, stories and passion for teaching. These individuals are what we call keystone species in ecology because they have a disproportionate influence on the community for being only one individual. These keystone individuals serve to ground the community by connecting us all to our common denominator, teaching, but the group can only function because it is firmly rooted in our collective passion for learning. It is from this passion that our individual teaching philosophy and practice arises and it is our curiosity about teaching that allows our practice to grow and evolve with our learning. CoPSci introduced me to the extensive education literature through our journal readings and engaging discussions on teaching that revealed our similarities and differences in the challenges we face as science educators. My learning roots were deep, which led me into the literature to nurture and strengthen my sprouting practice as well as ensuring that it continues to grow and mature. Our discussions led to sharing many ideas on how to deal with the challenges as well as reflection on how to enhance our classroom practice in the face of our challenges.

Although difficult to see in my image, the community also serves to strengthen connections between individuals. Symbioses develop, and people work together in a mutually beneficial association with the goal of creating a more stimulating learning environment for our students. I have had the pleasure of working in symbiosis with one of the keystone individuals on many projects with the main goal of creating a community among science students of different disciplines as well as equip them with the skills needed to be successful in life beyond their undergraduate degree. Being a part of this community has led me to view education differently than when I started. Teaching is a dynamic exchange between students and educators, where everyone is a learner. This new perspective has challenged me to view the world through many different lenses and pushed me to use different forms of media to communicate or explore ideas. What I have learned so far has reassured me that taking well-founded risks in the classroom are worthwhile, even if they don't always turn out the way we intended; they are learning experiences. I have also learned to step outside my comfort zone and push myself to be more creative, resilient and empathetic in my teaching and learning and in life, through being part of this network of individuals that support each other and push forward teaching and learning in our university.

As in previous narratives, SK and AS both speak to more than one theme, although the significance of CoPSci in building confidence and calculated risk-taking is clearly evident in these voices.

The critical role of reflection, in terms of teaching and in terms of self

In 1991, Baird et al. emphasized the critical role reflection plays specifically in science teaching and learning. Similarly, Vescio et al. (2007) reviewed the research on

the impact of professional learning communities in relation to teaching and learning, and likewise emphasized the key role reflection plays in bringing about change in practice. Many of the narratives here speak indirectly to the role reflection plays in scholarly teaching, however, the following 3 narratives explicitly focus on the role CoPSci has played in encouraging reflective practice.

As a relatively new member to our group, AA talks about the value she sees in CoPSci, and how what it offers in terms of what might be adapted to her teaching in interdisciplinary sciences. She offers a reflection on the concept of reflection, and how it has led to her incorporating reflection into her teaching: students in her classes now do reflective writing as part of their learning.

As an educator without an education background, our CoPSci has given me an opportunity to discuss my teaching practice with others in the faculty of science who share my desire to do better. Learning new things is uncomfortable and sometimes unsettling, and having a group to share those insecurities with has been invaluable. Implementing new methods of teaching or evaluating students seems less risky when I can share and discuss them in a group with people who have experienced similar challenges or have experimented with similar demonstrations, assignments, or lecturing styles. Connecting with other science educators has allowed me to make connections with other subjects so that I can integrate Earth Sciences into a student's interests and course work, and draw parallels that enrich both their earth science and their overall learning experience. Our CoPSci has kept me excited for my own learning and encouraged me to improve my own practice.

On a particularly busy part of term, our CoPSci met to reflect on how the term had gone; what had we done well, and what had gone badly. At that meeting, we discussed the importance of our own reflection and it led to another discussion of how we encourage students to reflect on what they have learned, how they have learned it, or how they might learn more. This discussion has led me to introduce a directed journaling component to my course. So far the journals have allowed me to know before a formal assessment if my students are understanding the material, and helped make the students responsible for directing their own learning through their questions.

Like DG previously, AA also alludes to the excitement and joy in teaching that CoPSci has nurtured.

Below, RC uses "examples" to highlight the role of metacognitive talk with students, as he unpacks an idea that began as a spark at one of our meetings. He also speaks to the role listening has played in helping to form his ideas.

Regular meetings of CoPSci have provided perspectives from a variety of disciplines within the Faculty of Science. Although the learning objectives and outcomes vary between disciplines, common learning barriers between our students exist. Participants of CoPSci discuss these learning barriers and share examples as to how they are successfully overcoming these obstacles. During our discussions I listened to how the other instructors delivered examples within

their class. I came to realize that there is a difference between providing an example and example-based learning strategies.

Providing an example exposes the student to new subject matter or problem set with particular attention to key points and focuses on all students achieving the same end result. Example-based learning provides an opportunity for conceptualization and more in-depth understanding of the subject material. The goal of the example-based learning is to demonstrate the navigational tools for a particular problem or subject matter rather than just the directions to follow to a destination. An example of this is plotting a graph. At the beginning of term many instructors (myself included) post an example of what a “good” graph should look like and discuss the merits of visual aesthetics. We then warn of points being deducted for flaws in their presentation of a graph. This I would define as providing an example. Throughout the term the students will then attempt to copy the example graph in their reports though many will fail to recognize the subtleties of a visually appealing yet scientifically relevant graph. Worse yet is when students apply the same recipe of graph generation on data that are otherwise completely different.

Through our regular discussions it became apparent that this form of providing examples is beneficial when introducing a subject. However, to fully understand the subject the students must internalize the logical method as to how (and more importantly why) the example is defined in such a manner. I have adjusted my delivery of examples, as exercises to develop the tools and knowhow for a given topic. When deciding how to deliver an example or work through an exercise, I contemplate what is the process or critical thinking I hope the students gain. Referring back to the example of generating a graph, I walk the class through the details starting with the raw data. We discuss how the axes are chosen, appropriate scale range, and how best to fit the data, and so on. Using these concepts, the students can then apply these tools to a variety of other examples that do not methodologically match that of the initial dataset. It is as if the students can navigate the problem as opposed to what would have happened had I provided the example, in which case students would have fixated on the destination. I then conclude the graphing session by presenting a graph that superficially fulfills the points of visual aesthetics and have the class critique it. Having gone through the process of generating the graph, the students evaluate and provide critical feedback, thereby validating the internalization of the subject’s subtleties.

I now extend this use of example-based learning during problem-solving tutorial sessions. Rather than just solving the problem as a group, we discuss why we do each step and how the problems can vary. We also discuss what would happen if we changed a step and how the change would carry forward through the problem. This method discourages students from memorizing a recipe to solve a problem, and focuses on understanding the merits of each step. The advantage of this style is that when the students encounter problems that are different (or have a slight twist) they may still proceed through the problem without having seen a similar example. If left to their own, students would treat each question as

unique and separated from all other questions, even though the questions could be intrinsically connected. Example-based learning strategies ties in the key concepts that can be openly applied and extended to new questions.

Another advantage of example-based learning strategies is that they can promote discussion among the students during a tutorial setting. After walking through the details of an example, upon approaching a new question, I pose the question to the class as to how to solve the problem. On most other occasions I receive a quiet room and blank stares, however upon realizing that I am looking for discussion of concepts (and not an exact answer) the class relaxes and a discussion erupts. My most rewarding occasions are when the discussion becomes a debate among the students and I can step back to let the class carry the conversation.

In summary, our regular meetings and conversations have provided a place for the shared instructor experience. To me it is a place where sharing mutual experiences betters the instruction capabilities of all individuals, and allows us to deeply consider our own teaching styles and delivery. Providing an example versus example based learning is just one of the ways in which CoPSci has helped me reflect upon my teaching many on many occasions, and has resulted in me adjusting my teaching style as a consequence.

In this reflection, RC not only addresses the relevance of reflection but also the importance of sharing and of challenging each other to push our current boundaries in our individual teaching and learning environment.

The third of these reflection-centered narratives sees LdG refer to the “weird” ideas she incorporates into her classes as a result of her involvement in the community: ideas that are decidedly alien to her more traditionally research-based colleagues. She concludes by noting the profound impact CoPSci has had on her becoming reflective about her teaching.

I have been involved in CoPSci since I began as an Instructor three years ago. It is well documented that CoPs provide a means for exchange of ideas and experiences that foster personal and professional development (Lave and Wagner, 1991). My experience supports this statement in a multitude of ways. I highlight here what I believe have been the most important benefits of my involvement in this CoPSci.

In our CoPSci, I found support for trying things that I hoped would ultimately enhance learning but that many other faculty found to be ‘weird’.

By way of a number of examples: it is often thought that a teacher’s job is to help their students succeed. Instead, I believe it is my job to help my students fail. In fact, sometimes I work to ensure failure during class activities so that students learn how to recover and use failure as an opportunity for growth. Understanding is deeper when you know not only what will work and why, but what will not work and why.

Similarly, I often don’t evaluate answer correctness. I believe that much can be learned by activities that are not meant to be mastered. Grading solely on the

outcome can undermine the importance of process and can encourage improper methods that achieve the correct answer. Perhaps most importantly, this practice discourages students from original or risky thinking that could jeopardize the final outcome. And isn't this the type of thinking we are trying to cultivate? It is also arguably unfair to evaluate the outcome without allowing sufficient practice, which time often prohibits.

In an attempt to impress upon students the importance of preparing for a hands-on class (i.e. doing the readings and reviewing the activities), I have students teach each other. I believe this method facilitates deeper learning and a sense of responsibility that would not have resulted from the typical solution of assigned readings with reading quizzes and a procedure review at the beginning of each activity. This scenario also mimics the reality in which most students will work after finishing their education where people are often both the teachers and the learners. I was surprised and impressed by the quality of these presentations, which I believe to be a result of both a heightened sense of ownership and anxiety regarding the judgment of their peers.

In addition, our meetings motivated personal reflection of my performance. As teachers, we are aware of the importance of reflection in learning, but I am the first to admit that I don't reflect enough. Reflection takes time and does not result in a physical product so it is easy to neglect. Our community meetings ensured I regularly spent time reflecting on my teaching performance, and it is hard for me to describe exactly how invaluable this has been.

Involvement in CoPSci as key to transforming our classroom teaching practices

A number of the narratives address transformations members have incorporated into their teaching. Here, TR speaks specifically to the ways in which she applied some of the ideas and thinking from our discussions, and her observations on the change (or lack of change) in her students as a result.

Although I had already been a professor for some years, I came from a research-focused department where teaching was an afterthought, so I cannot overstate how valuable the CoPSci meetings were to me while I developed and taught the first two years of a new first-year undergraduate course. The meetings gave me confidence in the classroom. If I had a problem – for instance an overeager contributor to classroom discussions or was puzzled about whether I should pre-release my rubrics – I had a wealth of experience to tap into for answers. Each meeting made me reflect seriously on some aspect of my teaching. From year one to year two, these reflections led to a couple of changes (I hesitate to call them transformations because one of the things I learned from our discussions is that when a course is new incremental change is better, otherwise it'll be hard to tell the difference between the different group of students and the different approaches).

The first was a reframing of a core assignment. There were a series of lectures that I wanted to encourage the students to critically reflect on, so in the first year I

assigned them to keep a journal, with an entry for each lecture, in which they discussed how the lectures affected their understanding of the academic discipline. The thinking displayed in the journals was very shallow and the writing far too casual, with a lot of repetition between entries despite the varied topics covered in the lectures. After discussion with CoPSci, I reframed the assignment as a lecture analysis, and tasked the students with summarizing three key points from the lecture and generating and answering one question arising from the lecture. The entries were more thoughtful and the question period after each lecture more lively in the second year, which I view as a success. However, students have nevertheless found ways of minimizing their work and, consequently, their engagement in the subject. Many would pick the best question asked in class and paraphrase it for their entry. As always, there is room for improvement.

The second change was to better integrate quantitative reasoning throughout the lectures and exercises, rather than having lectures focused on it. It's harder to evaluate the success of this change, as it was more philosophical than practical. In practice, I broke up quantitative reasoning lecture material previously given as a concentrated whole into 5-10 minute chunks and inserted them as examples in other lectures. However, some were hard to place and some content was lost. Thinking quantitatively, I have to admit that there was no measureable difference in how the students performed in the quantitative aspects of the course (no increase in pick-up of quantitative options and no better performance on the quantitative exam questions). However, I think that this approach to teaching the quantitative side of science will only be effective if students see it in most of their first year science courses. This again highlights the importance of groups like CoPSci; only by talking with and learning from fellow science instructors across disciplines is there the opportunity to take coordinated action in applying teaching philosophies like these.

Interestingly, in the above, TR further challenges us to consider a potential concerted effort on the part of CoPSci around specific issues that cross disciplines, such as quantitative reasoning, so student learning around these transferrable skills and understandings are maximized.

Because LS teaches a class of students whose purpose is to serve as mentors in a large first year psychology course, she both takes from, and gives to, CoPSci, through her experiences in both situations. She also discusses how the "structure" of the CoPSci is so important. Building on expanding transformation beyond the group, LS speaks of how she took her insights from CoPSci into her class of mentors, who in turn, worked to transform the first year experience in psychology-neuroscience tutorials.

I have been involved with CoPSci for three years. When I was initially hired as an Instructor and Coordinator of the Introduction to Psychology program, I had only ever taught one-off classes as a sessional instructor during graduate school. I had a lot of teaching-related ideas but no formal training. The CoPSci gave me an informal setting to bounce ideas off of my colleagues, learn the 'language' of the pedagogical/education world, and draw from others' experiences and advice.

One of the components of my position involves teaching a 3000-level course, in which the students in the class serve as mentors in 1st-year Introduction to Psychology labs. The class itself focuses on effective science communication, teaching, and knowledge translation. Students in the 3000-level course are involved in lab development, instructing lab sessions, presenting scientific information to multiple audiences, and teaching their peers about teaching strategies.

Many of the discussions I have in the CoPSci find their way into my classroom. The concepts I've discussed with my colleagues are discussions I in turn have with my student mentors and often then bring up in class. We've had fantastic in-class conversations about knowledge transfer, graph literacy, providing useful feedback, learning outcomes, and much more. Students in the class are both teachers (to 1st-year students) and learners (in the 3rd-year class), which offers a unique perspective for both the students and for me. Students are able to reflect on how they want to be taught, and in turn, try to incorporate those skills into their own teaching. Although we (as faculty) often reflect on our time as students and try to put ourselves in their shoes, these students are living in both worlds at the same time. This perspective leads to incredibly productive class conversations which often drive changes for following years, and provides considerable material for conversation at the CoPSci meetings!

Beyond our conversations, I have also implemented new activities and assessments based upon the approach of the CoPSci. Before each CoPSci meeting, a teaching-related article would be circulated, with the aim of driving critical thinking and discussion at the next meeting. I found the articles extremely helpful and found myself communicating the information to my students (informally) on a regular basis. I decided to incorporate teaching articles into my course in a more formal format the following year through the introduction of "Teaching Presentations". I provided each pair of students with 1-3 short teaching-related articles each week and those students then presented the concepts to their peers. This presentation allowed the presenters to gain experience presenting to an audience and gave the audience practical skill-based information that they could use in their instruction and marking. Throughout the year we cover a number of teaching-related topics including: presentation organization; driving discussion in the classroom; providing written/verbal feedback to students; assisting English as a Learned Language (ELL) students; dealing with disruptive students; and more.

In an informal mid-year evaluation, over 75% of students in the 3000-level course reported that they value the teaching presentations and that the content has helped them to improve their communication and teaching effectiveness.

I mentioned the fact that the CoPSci was an informal setting – I think that this is essential (and likely something that will be echoed by others). The conversation that is generated in a relaxed setting is invaluable. In fact, this relaxed, informal-style conversation is another element that I strive to achieve in my 3000-level course and according to the evaluations, students also find this atmosphere conducive to learning and growing. Students don't feel as though there is a "right"

or “wrong” answer to the questions about teaching and therefore are more confident to add their ideas to the discussion. I think this is similar in the CoPSci group – early on, I lacked confidence in my teaching skills and often questioned whether I was “making the right decisions”. The format of CoPSci made me comfortable with sharing ideas and asking questions and allowed me to learn and grow in a way that I don’t believe I could have, in a more formal workshop or information session-style group.

In addition to the transformation of her teaching through her involvement with CoPSci and the consequential impact on the first year students guided by her more senior students, LS speaks to the importance of the informal learning space we have adopted for meetings of CoPSci.

Casual setting, with loosely-defined but flexible topics for discussion

As LS mentioned above, the value of the informal space should not be underestimated. This is further borne out by EW, who also speaks of the value of CoPSci overall to a seasoned faculty member.

When a new faculty member repeatedly referred to things she was learning at a community of teaching group she was attending, I started asking her more about the group and finally asked if I could join – somewhat sheepishly I remember, since it was a group meant for new faculty members and I had worked in the department for almost 20 years. But how could I resist? There seemed to be numerous discussions on topics centered around teaching practices but which also digressed to such practical issues like where to find the best travel mugs that don’t leak! I have been engaged with this group ever since.

It is not only the discussions on teaching articles that are the most informative, but the opportunity to meet faculty from other departments and discuss teaching experiences in a relaxed setting. Each meeting I listen to ideas from faculty members in Psychology, Earth Sciences, Chemistry, Oceanography, Physics and of course Biology. I am in awe of the efforts newer faculty have made to enhance student learning in their department, which in turn encourages me to initiate changes with my own teaching.

I realized recently that this group had indeed become a community in real sense. It is a safe place to ask for opinions on trying something new or how to fix what isn’t working. It is also a place to share the accomplishments of our students. I recently attended the poster sessions of a third year Analytical Chemistry course taught by a member of CoPSci. Despite my initial hesitation because of my rather ancient Chemistry background, I had such a great time and the students seemed pleased that there was this outside interest in their work. This was a shared positive experience I would have missed out on if I were not in this group.

In attending the CoPSci meetings, I am constantly inspired by my colleagues, their enthusiasm, their work ethic, and their wiliness to share ideas and be supportive. What a great way to have a coffee break!

On Reflection (AMR)

In many ways, these stories speak for themselves: members of CoPSci come together with a shared vision of improving student learning in the sciences. We believe that the sustainability of this community over time reflects what Wenger et al. (2002) discuss as three fundamental aspects of effective communities of practice: the presence of a common domain of knowledge (teaching science), an authentic community who cares about this domain (CoPSci in this instance), and a shared practice around developing effectiveness in this domain (improving the teaching and learning environment). Also evident in these accounts, is that members of this community take this shared vision forward into action, and in so doing, transform the learning environment for their students.

The ability to share and exchange ideas and develop pedagogical knowledge in a safe, respectful and supportive environment is a common theme in many of the accounts, as is the consequential development of confidence that in turn leads to a willingness to take calculated risks in trying new ideas and approaches. These attributes expressed by members of CoPSci are similar to those identified by Wenger et al. (2002), who stress the importance of interactions developed on mutual trust and respect, in which ideas can be shared freely, members feel safe to expose their uncertainties and ask questions, and where listening is an integral component.

The importance of reflection is noticeable either explicitly or implicitly in these stories, and supports what Cox (2004) refers to as the idea of continuous learning and reflection with purpose, as well as the power of community to forge connections and relationships. Several narratives speak specifically to the role CoPSci plays in encouraging and even forcing reflection. In turn, these reflections have led to thoughtful and deliberate changes in teaching. Macpherson and Gurm (2009) talk about the "...hunger for connection and conversation that permeates all physical and virtual spaces..." (p.2), and suggest that institutions of learning become "learning institutions": a number of stories speak to the value of the conversations in just such a manner.

Perhaps not surprisingly, many CoPSci members refer to the importance of diversity within the group, both across the disciplinary boundaries within science, but also across the variety of teaching tasks within the group. Intriguingly, but perhaps not surprisingly, this diversity has led to creative endeavors in the classroom, and a willingness to step outside the box of the norm within an individual's disciplinary experience.

I deliberately set up this community with a less-than-formal structure. The fact that the importance of this informality to the learning was expressed strongly by a couple of members supports the idea that learning can and will happen in less structured community-centered settings. Perhaps it can even be said that being "outside the box" is critical to encourage such creative and divergent thinking and doing around teaching and learning. What message does this also offer for the learning of our students?

On a final note...

These narratives and the messages they share speak to a genuine caring and willingness to connect: to share ideas and thoughts within a community of like-minded peers in an atmosphere of trust and reflection. They reach beyond the small community

to create a motivation to take these ideas forward, improving the learning of our students in the wider community. Throughout their book, Berg and Seeber (2016) stress the importance of joy in creating learning and research environments that generate pleasant experiences, in turn enhancing the learning of all involved, faculty and students alike. We dare to challenge and encourage others to create or find communities that support and drive such joy, so our universities can indeed be realms in which higher learning is truly a pleasure for all involved, creating an opportunity to make a difference in our complex world.

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