

# **The First Year Secondary Science Teacher: An Illumination of Assessment Praxes, Issues and Concerns**

## **The First Year Secondary Science Teacher: An Illumination of Assessment Praxes, Issues and Concerns**

By

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### **Abstract**

*The following article is an illumination of a first year Canadian secondary science teacher who participated in our action research study in order to view her assessment praxes while teaching introductory science courses. Pat volunteered to be part of our Action Research project and was eager to illuminate her assessment knowledge, skills and attitudes. The account, illuminates not only a first year science teacher who had many issues, concerns, problems and dilemmas to deal with in her first teaching assignment, it also underlines the utility of reflective practice in science education.*

**Keywords:** Secondary Science, Beginning Teacher, Assessment Praxes, Action Research

### **Introduction**

The following descriptions and interpretations concern the actions of a first year secondary science teacher. 'Pat' (pseudonym) was a first year teacher who participated in our study in order to help us illuminate the assessment practices(praxes) of a first year teacher. The school was located in Central Ontario, Canada and housed approximately 800 students from the surrounding region. It is an urban secondary school with a mix of urban and rural students who were bussed each day to and from this location. Pat our first year teacher volunteered to be part of our Action Research project and was eager to move forward and illuminate her assessment knowledge, skills and attitudes. She had just completed her Ontario pre-service teacher training program and joined a small Science department that offered Secondary Science courses in the traditional areas of Biology, Chemistry, Physics, and introductory general science courses at the first and second years of the four year Secondary program. Pat was assigned to teach the introductory courses over two semesters and had two undergraduate degrees, Science (B.Sc.) and Education (B.Ed.). What follows is an account of a first year science teacher who had many issues, concerns, problems, and dilemmas to deal with in her first teaching assignment.

Impetus for this inquiry

This action research study supported a first year teacher and helped us to understand the

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problematic nature of first year science teaching. It allowed committed participants to critically examine their individual teaching practices through reflection (Bolton, 2010) and discussion, both individually and in a small group. Thus, this action research experience was very much a professional development experience (Ryan 2006, 2009), supported by participants.

This study, both unique and necessary, involved teachers who are usually isolated (Ryan, 2006, 2009; Royal Commission on Learning, 1994), and are rarely able to discuss fundamental matters with other educators, unless exceptional measures are put in place at great effort and expense (Fullan, 1992; MacGregor & Ryan, 2009). This inquiry required a series of commitments beyond the normal work-day. Wood (1993) explained:

An additional and often overlooked time problem is one having to do with lack of time for teachers to work together as a team. In many of today's schools it is almost as if someone designed the school day with the express objective of keeping teachers apart...most teachers seldom have opportunities to talk with their colleagues during the day. For that reason it is hard for them to view the school as an entire unit....As with other working people, teachers need time structured into their days to work on their work. (p. 242)

As well, Rosaen and Schram (1997) explained that beginning teachers have “ feelings of isolation and loneliness . . . [due to] the shock of facing multiple demands . . . . [and often fear] the challenge of teaching subject matter for which they are inadequately prepared “ (p. 257). It was hoped that by proceeding with this action research enterprise we could reduce negative feelings while increasing professional development and illuminate first year experiences.

### **Action Research: The Mode of Inquiry**

Why use the action research mode of inquiry? Quite simply, “action research has the potential to improve education as does no educational innovation of the past century “(McLean, 1995, p. 67). Parsons and Brown (2002) add,

Action research has been found to serve not only as a means of improving teaching . . . but also in developing practitioners' flexibility and problem-solving skills . . . and their attitudes to professional development and the process of change . . . . Participation in action research resulted in increased confidence, self, esteem, willingness to embrace research, and liberated creative potential for the educator-turned-action researcher . . . . Action research has been described as a vehicle for improving pre-service . . . [and] has been found to promote a climate of professionalism and scholarship. (pp. 6-7)

Action research is a means, . . . to sort out not only one's values, beliefs, motives, but also to give more attention to the analysis of the experiences of the classroom: ' new perceptions ' may lead to 'altered conceptions and reconstruals' of aspects of the art of teaching. . . . reflection on one's everyday professional world 'seems an important entry to a deeper

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understanding of educational innovation and change'. Through such reflection and reevaluation the teacher may gain a clearer sense of the way in which the past shapes and informs possibilities for action in the present. (Rudduck, 1991, p. 94)

Hence, the action research method of inquiry employed in this study was essential to understanding the problematic nature of the first year of teaching.

### **Method**

Over a period of eight months (September to April) data were collected via supportive weekly tape-recorded discussion groups (30 hours), individual interviews (90 Hours), classroom visitations (22 per participant), daily participant journals and randomly collected documentation. Data, collected through reflection, was in itself a systematic and strategic process. The reflection (Bolton, 2010) process, carried out by all participants, was the analysis, which led to theorising and the transformation of understandings of assessment praxes. Herein we understood,

Reflection is a state of mind, an ongoing constituent of practice, not a technique, or curriculum element. Reflective practice can enable practitioners to learn from experience about themselves, their work, and the way they relate to home and work, significant others and wider society and culture. It gives strategies to bring things out into the open, and frame appropriate and searching questions never asked before. It can provide relatively safe and confidential ways to explore and express experiences otherwise difficult to communicate. (Bolton, 2010, p. 3)

Within the transcripts and journal notes, evidence that supported changes in assessment thoughts and practice was identified by highlighting passages, sorting, cataloguing, coding and arranging patterns, themes and concepts.

### **Data Analysis**

As the data were mounting, I began to skim the collection and commence the task of sifting and sorting data to see if a pattern or theme would surface. Reading over the diaries I made notes on reoccurring topics and further reflection brought to mind key words and concepts such as 'time', assessment development, assessment application, assessment review, change and the like. I use the word 'concept' to describe something that, to my mind, is unambiguous. The key concepts were used to assemble a matrix. I believed that the conception of data analysis articulated by Sagor (1992) suited me best:

Data analysis can be most simply described as a process of sifting, sorting, discarding, and cataloguing in an attempt to answer two basic questions: What are the important themes in this data ? and (2) how much data support each of these themes ? (p. 48)

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My assessment themes became key terms and were used on the horizontal axis of the matrix. These included: What, Why, Who, How, Time, Isolation and Views. The 'What' meant: What do you assess? The 'Why' meant: Why do you assess? The 'Who' meant: Who completes or develops the assessment? The 'How' meant: How do you assess? The 'Time' indicated that some mention or inference was made to time as a constraining feature of assessment praxes. 'Isolation' indicated that some mention or inference was made to teacher isolation as a feature of assessment praxes. The 'Views' term indicated that a view had been expressed repeatedly and strongly.

On the vertical axis, I had sources of data (group discussion, one-to-one discussion, journal, classroom visit, informal communications, and documentation). Each key concept was given a colour code. As the data were skimmed, sifted, sorted and a linkage to the key concept was found, the data were highlighted in the corresponding colour. As well, in each box of the matrix, co-ordinates were noted, such as the date and page number. So, if I were looking for data concerning the 'what' (key concept - horizontal axis) of assessment praxes, I could go down the column to locate the source (group, 1:1, journal, document, visitation, informal note). Located in a specific matrix box would be the source's location by date and page number, thus enabling rapid location and recovery of the information.

### **Pat: Past and Present**

Several images of Pat, as a participant and first year teacher, are described herein which emerged via this inquiry. Pat's images created an identity for her as she strived to increase her knowledge and understanding of assessment, teaching and professionalism. It is through these spoken, written and observed images that rationales are connected to data and emerging themes. The themes and rationales were generated via data collection and analysis in a constructivist manner. Images were reconstructed as new realizations surfaced. This mode informed our bouts of reflection and served as a means of professional learning and much of our work culminates in the final sections where the images of Pat are described as a search for competency and identity as a first year teacher.

### **Preservice: Tensions.**

Pat and I usually met for one-to-one sessions in one of three science laboratories at the school. Since Pat had a copy of the meeting schedule she was 'ready' when she needed to be. I would arrive on time with tape-recorder in hand and we would commence our discussion focused on some aspect of assessment. This scene played out for most of our meetings, yet on a few occasions we were momentarily interrupted by some other staff member who came into the lab to get supplies. I would usually meet her during a preparation period, before class or after class, which meant that the room was quiet enough or empty enough so that our tape-recorder could pick up our conversation without interference. We never had technical difficulties with our tape-recorder and each of us became comfortable with the format. Pat wrote in her journal.

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I was not too crazy about the recording of what I said at first but since I will be hidden behind some pseudonym as well as the school then I guess that's good enough. It makes me feel what I say is important and I don't know if I'm ready for that. (October 30th, p. 17)

This entry struck me as honest and assured me that the data recorded would also be honest, sincere and heartfelt. On most occasions our discussions seemed to go beyond the allotted time because we were both engrossed in our conversation. This always left me with the impression that we didn't have enough time, yet it was probably due to the fact that we had so much to discuss in the area of classroom assessment.

We discussed preservice training and its aim to expose students to theory, methods, and skills. We reflected on our school placement experiences, which provided opportunities to apply preservice learning and we discussed the amount of effort a first year teacher requires (Ryan, 2009). We also discussed the alternative-based preservice program modes, which might include action research (Carr & Kemmis, 1986; Sagor, 1992) and reflective practice (Bolton, 2010; Schon, 1983). As we reflected, it became apparent that Pat had experienced a mix of both alternative and traditional preservice training. I wondered to myself: Was it a consequence of this preservice experience that certain opinions and beliefs developed within Pat? It seemed as though Pat's beliefs and knowledge had come from an earlier stage of her life.

Clandinin (2007) reminds us that teacher knowledge “begins with what teachers already know and enact in their practices rather than beginning with knowledge that needs to be given to teachers” (Clandinin, 2007, p. 15). Hence, there is a need to look at the elements of knowledge that student-teachers bring into a program after all, “teacher knowledge refers to teacher’ narrative knowledge, their personal practical knowledge, composed and recomposed over time and in the contexts of personal and professional knowledge landscapes “ (2007, p. 15). Moreover, these views support the assertion of Wideen et al. (1998) who suggest that beginning teachers enter preservice teacher education with firmly held views about teaching (p. 168).

The notion that graduates of preservice programs may enter the workforce with previously developed beliefs and values concerning teaching is useful to veteran teachers, teacher educators and researchers who might try to work with first year teachers. The preservice experience can then be viewed, by participants, from a highly critical stance. It can be perceived as a less than valuable experience. Indeed, beginning teachers are little influenced by the interventions that occur in preservice teacher education (Wideen et al., 1998, p.168). This may be because the teacher in training often devalues preservice and puts forward critical images of the experience when reflecting upon it, just as Pat noted in her journal early on:

The Faculty 'process' of training teachers is not really valid. It is too subjective; it takes you down a path and asks you what you think along the way during the journey or asks you to reflect at certain endpoints. I didn't have an answer; it was too much reflection and not enough

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reality. I knew what teaching was and what it wasn't. At the Fac. of Ed. we talked about what if, and why and most people turned off. I woke up when I worked in classrooms and had to perform. (October 14th, p. 12)

Pat wanted more practice teaching in preservice. She valued it more than the theory she was exposed to in preservice. According to her, reflection in alternative based preservice programs is an overused practice. This seemed to be a frequent theme for Pat as she reflected on her days as a student at the Faculty of Education at the University of Toronto. During an October group discussion, in response to my question about assessment while in her preservice year, Pat recalled what assessment was like for her.

Pat - OK, if you ran around, too! A lot of it has been very cognitive, very little creativity and, well, group work -- I'd say a lot of people assess group work very superficially. I mean, did you work? Great there you go, you got a 'A'. I mean, if you didn't break any windows, there you go, you got an 'A' in-group work. Assessing group work might be very, very subjective and it depends on how people work. Together, some people can do that and other people can't, I don't know. I just find it fairly subjective in class group work. I found I wasn't assessed that way in University at all. There is no creativity part at all. It was how you communicate and how you can write. It's hard to focus on the assessment. The assessment this year has been interesting because how to word a question and what they comprehend from the question . . . just from the assessment you can tell how the person thinks. I mean, yeah, they wrote something, here's an 'A'. And if you give them less than 60 percent, everyone complains. I'm not very happy with the grade 9 assessment; it's very different than the grade 10. You go from one step to the other so quickly. (p. 1)

I matched Pat's critical responses to the insights of researchers such as Wideen et al. (1998), who suggest that:

Future work [in the area of preservice program development] must systematically challenge myths that underpin most current programs of teacher education and focus on the structures and the ethos that must be created to assist beginning teachers to examine their beliefs and to understand how to support new practices that are consistent with their changed beliefs. (p. 169)

I thought that the points made in this quote were essential to our discussion and I shared these with Pat, who laughed at their accuracy. Pat's assessment praxes closely matched those of her predecessors. However, as mentioned, Pat had been hired close to the beginning of the school year. Consequently, she felt under siege and was attempting to "ground herself" by doing what was easiest, given the multiple demands of the job.

### **Assessment: The First Year**

For most first year teachers, 'survival' is the major priority (Rosaen & Schram, 1997; Ryan, 2009) and, in the bustle of school, efficiency is often key to survival. Pat wrote:

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My job offer came as a bit of surprise since it was getting so close to the beginning of the school year. I only found out what I would teach two weeks before school began. I was in a bit of a panic but with some help from Bob and Jan I am managing. It is nice to see and do what was done in previous years. I plan to add my touches here and there but only when the time is right. (October 19th, p.13)

Pat's extensive use of traditional content-based assessment methods (fill-ins, multiple choice, short answer, essay), can be seen as a search for efficiency. Pat was a caring teacher who ' was doing what worked, ' her approach was authoritative and promoted competition in order to control students because she viewed control as the major issue in school, as do most first year teachers (Schoonmaker, 1998; Webster, 2004). This encapsulation of Pat's practice partially answers the research question: What were participants' initial understandings of assessment and actual practices at the onset of this research?

Pat had many reasons for assessing in this manner, one of which was the fact that there was no opportunity for inservice professional development. With slashed budgets, increased class sizes and political turmoil distracting most educators from the usual tasks, we have put many educators, especially first year teachers, into survival mode. We also must keep in mind that the narrow in-servicing of teachers, without taking into account the total teacher, in terms of age, gender and personal values (Ryan, 2006, 2009; Fullan, 1991), creates problems rather than resolving them. Pat had complained about the quality of the preservice and was not receiving inservice professional development. She wanted a simple answer to our problem under consideration: How can teachers include and conduct credible peer and self-assessment? She wanted something already made that she could copy and use. Pat didn't think she had the time, or expertise to develop, or critically reflect on, new assessment tools. Reflectivity is something that requires time to develop. Many believe it is a skill that develops gradually, over the course of a career (Bolton 2010; Schoonmaker, 1998).

In sum, a teacher is a person who learns from their students and vice-versa. Learning on the job cannot be controlled, it is happening all the time. However, it can be documented and the data used to enhance learning. Indeed, reflective habits need to be nurtured, whether teachers are in their first year or their twentieth year of teaching. Normally, a first year teacher has so little time to reflect that it seems incumbent of educational authorities to provide all beginning teachers with reflective partners, mentors and supporters, who can assist in the process of adaptation and acculturation, and create opportunities (time) for first year teachers to reflect. It could be that the need for autocracy and individualism in all teachers is really an attempt to slow down, not only the first year, but all years. Once slowed down, teaching is easier to comprehend and the educational process is easier to reflect on. This slowing down allows " . . . teachers [to] make more intelligent decisions about strategies " (Schoonmaker, 1998, p. 567). In the absence of critical reflection and collaborative development, traditional methods of assessment and teaching can take over. What this means for Pat is that her transformation is curtailed and diminished because she is busy establishing her initial practices and asking

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fundamental questions related to teacher identity. Until this is complete, change or higher level reflection cannot really be entertained. In short, you need to find out who you are first!

### **Assessment Praxes: Perspective Transformation**

#### **Discussion**

For Pat, our efforts to examine act and reflect caused her, over the course of eight months, to behave in a manner that demonstrated a change in philosophy. She began our study, I believed, in a defensive mode. I saw it more as an issue of trust. Yet, as time passed she began to see our efforts as a 'bottom-up' rather than a top-down' approach to the development of assessment praxes. And by the end of the project, she seemed to be quite proactive and open. Her transformation may have been due to our cultivation of an atmosphere of mutual respect and tolerance of others' views (Elliott, 1991). For example, by April 3rd, Pat reflected:

Getting together with other teachers has been something I usually do after hours. It was a time to relax. I find I am more able to do the same during school because our group lets me do this. I can lean on Jan or someone else while I get rid of my feelings, it's like being married and I'm not yet, but I guess I'm right. In the future I'll try to do more of this, it's been helpful. (p. 40)

From the onset of our study, Pat made it clear that although she was in her first year of teaching and had a basic understanding and appreciation of assessment, she wanted more. Pat understood that our discussions and interactions would impact her perspective and on-going transformation during this study. Our attention came in many forms. For instance, on several occasions I watched her in the classroom while she made changes in her praxes. My attention was general, yet I did have a specific concern, assessment. Pat did not always assess when I visited, hence my observations could be labelled 'general' (Hopkins, 1993), on some occasions. I followed some good advice as I was careful not to move too quickly to judge; I used my interpersonal skills when 'invading another person's space', and I tried to follow my aide-memoire (Hopkins, 1993). On December 10<sup>th</sup>, I visited Pat's class and came away with these impressions.

I was the first person in the class, which was the same one used by Cal, Bob and Jan. As the students began to enter the room I noted the different types of clothing and where each one sat. It was funny, how girls tended to sit with girls and boys with boys, yet it was grade 10. Everyone came prepared to work but as soon as Pat stepped into the room everyone seemed to increase their level of activity, becoming more active and louder. Pat started to talk to various students about different issues such as work not done and poor grades, absences, and work without a name. I saw some students start to cross that behavioural line. I felt my own brow start to furrow. Pat turned, looked at the offenders, and made a quick comment about grades and turned back to the blackboard. The three students did become quiet, but as I was unaware of their past, I don't think I understood exactly what was going on. Pat handed out a worksheet and assigned text pages to read for homework. The remaining time was spent

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working from overheads (copied the ecosphere drawing). The class in general seemed to settle once the tasks were assigned and I left with a good impression of the period. Pat had only a few minutes before the next class so I told her we would talk later. (p. 33)

Following the advice of Hopkins (1993), I gave Pat her feedback within 24 hours, using facts, and welcomed a two-way discussion. After this class observation Pat suggested that this was her good class and they seemed to handle most tasks well. Later in the term, in this same class, she would experiment with more student assessment input. The decision to use this class was, in part, due to her perception that this class was easy to control. I knew what she meant, since I had visited her other two classes and seen that they were behaviourally more challenging. In her 'good' class, I think she appreciated the respect they showed her. They responded well to her behavioural prompts and cues. While in our group, Pat listened carefully and brought forward timely insights as we voiced our individual " . . . ways of looking at and thinking about events and interactions of the classroom as a basis for improvement " (Rudduck, 1991, p.18). For instance, Pat added:

Assessment -- Well we have two choices, either go back to what we were doing or come up with applications to replace past practices. (March 4th, p.3)

Pat's straightforward approach was refreshing and to some extent a beacon for our group. She was eager to change (to engage in action) and mentioned that if someone would "give her the tools" she would "run with it". Pat felt she needed to have someone else provide the assessment tools. I understood this stance to mean that until this happened; little, if any, change was possible. For Pat, being able to find that 'time' to change assessment praxis tended to dictate what was possible and what was not. A lack of time meant her tests were like those of her colleagues, mostly content-based, traditional, and narrow. Yet upon closer examination, Pat's assessment praxes were a curious mix of tradition and alternative modes. On February 4th, I asked her about her assessment activities.

What assessment means are you using in the second term that are new or refashioned from the first term?

Pat - Well the way they work, independently, is not good. So, I'm setting up more group work, seminars, and I have them making web pages that are much more interactive. Because, that's what they want to do, so, that's what I want to do.

T.R. To what extent will peer or self-assessment play a role?

Pat - About the same as first term, but they are more involved.

She explained that she thought her use of many modes, such as peer-assessment and the 'web' (Internet), allowed students more opportunity to demonstrate achievement through involvement. This effort to involve students in assessment demonstrates a change in values, compared to a point early in our study, where Pat mentioned that most students were incapable of completing these types of assessment. As a group we agreed with Pat's initial

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position, yet the group movement was towards these alternative and varied assessment modes, which indicated to me a shift in preconceptions. Pat noted early in our study:

I use a lot of different methods and I don't have time to make my own assessments, so I need to borrow and beg from others. This is, after all, my first year and I'm just organising. (Journal, October 15, p. 3)

Pat was, in the early stages of our study, establishing standards and sorting out targets. This pursuit of self-awareness meant a movement from decisions based on theory to critical descriptions of practice. Her practice now became a place to theorise. Part of that development included her realisation that students could complete more self and peer-assessments. I noted this in my journal on October 17:

Pat is really working at getting all the information she can quickly in order to get ahead. However, I did this too when I started teaching and discovered years later that teaching can never be mastered. Every day is a new challenge and a chance to add to our resource base. Change happens to you when you are least aware of it. It could be a decision to question differently or apply resources differently that reflects a shift in beliefs. (p. 6)

Pat always wanted to be viewed as the participant who was either already doing what we discussed or had already done it in her class. Eventually, she let us see another side of her -- in which she admitted that she, too, needed to collaborate with others more often and involve the students to a greater degree in assessment efforts. Pat added:

I am just saying that if you need it you get it, I have stuff from Bob and others -- Or you find it yourself. I need to get a lot more information on assessment but I like to do this informally. It gets pretty sticky if it's formal. It's the same with the students. If you work with them informally then you get a lot more done. (March 4th, p. 1)

This sentiment contrasts with statements made by Pat earlier in our study, which were less open and more protective. Pat's transformation was mostly interpersonal, as she seemed to trust our group more as the relationship aged. Professionally, Pat became more collegial. Near the end of our study, March 4<sup>th</sup>, I asked Pat about her readiness to share

T.R. Do you exchange resources?

Pat - I have stuff from Bob and others. I'm very independent, if I need it I go and find the answer. I don't like it forced on me. I don't like it because it's not my style.

T.R. What do you mean forced?

Pat - I am just saying, when someone says you have to do it this way or this person will help you, well, you may not be able to work with that person. I'd rather have it informal, rather than formal. Things that get official, get sticky. I get more work done unofficially,

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and, I'll go get assessment tools. If I have a question, and I want an answer, this is who I'll go talk to.

I hoped that our individual and group discussions had caused her actions (change). However, it could be that even our mere presence (peer-pressure) was the cause of her growth. Anyway, during another visit to her class I noted several changes,

Pat was busy setting up a lab (limewater test for carbon dioxide) for her grade nine advanced class when I walked in room 123. I helped her make sure all the groups had the right materials. The task within the lab was to observe chemical change using commonly available substances. A few minutes later several students came in to help. These were her assessors from her grade 11 class. Pat gave them clipboards with pencils and asked them to note who did what. Great, I thought, Pat is delegating and empowering. I asked if these assessors were being graded and Pat said: "no, next time". As the students arrived they seemed very serious (test faces) yet, Pat was quick to explain and show (exemplars) in great detail that they would have several chances to do well. I noted that this seemed to be evidence of an outcomes-based program and not content-based. I was happy for Pat as she moved around the room making suggestions and reminding assessors to help out. The 70 odd minutes flew by even for me and as the buzzer sounded, indicating the end of the period some students seemed frustrated that the period was so short. Pat remarked 'you couldn't please them all'. (March 25th, p. 47)

Pat was, for this class anyway, more of a facilitator than in her usual practice. Pat was looking for students who could not only apply skills but also explain it to an assessor. It was very open-ended and each student had opportunities to demonstrate an outcome. I believe our efforts helped Pat validate her perspectives and solve problems that faced her. Pat explained in her journal,

Listening to other teachers complain is good. It lets me know that I'm feeling the same as others and this gives me a boost that I can run with for days. Meeting is a source of power; a refuelling that gets me over the next hump. (March 12th, p. 39)

In sum, our experiences led to a collegial mode of communication from one that was less so. Our group's ability to mesh allowed the examination of beliefs and dilemmas concerning assessment praxes. Our work eventually led to the limited use of alternative and varied assessment tools. Sometimes our actions remained theoretical and other times they became part of practice. If the research had continued we would have been able to more fully put into practice the modes we discussed and reviewed. Admittedly, we did not overcome the "constraints of overload, isolation, and compartmentalization that are endemic to schools" (Earl and Cousins, 1995, p. 42). To do so, entails fundamental change at the system level; something we hope for in the near future.

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