Improving Pre-service Teachers’ Adaptive Metacognitive Practices Through Reflective Writing

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A. Abstract

In this study, the use of critical incident reflective writing as a means to engage pre-service secondary mathematics teachers in adaptive metacognitive practices is discussed. This basic interpretive qualitative study uses a sample of 5 incident reports from each of 37 students whose final papers were previously analyzed (for possible total of 185 incident reports). The qualitative data analysis software N-Vivo was used to code each incident using a broad initial set of codes which present evidence of teachers’ personal practical theories (PPTs), a vision of teaching that they would like to see enacted in their classroom, a sense of belonging to their teaching community, their personal identity as a teacher. Findings indicated that pre-service teachers have little sense of belonging or identity as a teacher, two issues that need to be addressed in the student-teaching experience and into the first years of teaching.

B. Introduction

Teaching has been described as “perhaps the most complex, most challenging, and most demanding, subtle, nuanced and frightening activity that our species ever invented” (Shulman, 2004), so it is no wonder that learning to teach is a similarly complex business, one that takes years of practice. Teachers must be able to respond appropriately to the extremely diverse range of social and instructional variables encountered. In this paper, I describe my self-study in which I sought to analyze and reflect on the reflective thinking and writing activities I engage my pre-service teachers (PSTs) to ensure that I am doing all that I can to develop their adaptive metacognitive practices.
C. Context of the study

I have taught a combined mathematics methods-course and supervised a 15-week 180-hour practicum for secondary-mathematics pre-service teachers\(^1\) for over ten years at an urban university in a large city. The first class assignment is to prepare a personal philosophy of teaching, which is revisited in the final class assignment, a reflective paper that outlines what aspects of their personal philosophy have changed since the beginning of the semester, and how the class activities have impacted or will impact their future teaching.

Another element of the class included discussion in class and writing reports about critical incidents encountered in their field experiences. The format of the report has remained the same this entire time, and is:

- What happened
- What was the outcome
- What are the implications for you as a future teacher
- What would you do differently next time.

At the beginning of most class meetings, we discuss in small groups any incidents encountered over the preceding week. I constantly circulate among the small groups monitoring progress and offering insights where appropriate. Each small group picks one incident to report to the whole class, and I act as a facilitator and guide for the large group discussion, trying to ensure that everyone understands the implications of each incident. I learned that this was necessary after my first self-study revealed that many students learned very little from the reports unless they were “forced” to state the implications. During these discussions, I often share a teaching story of my own, a

\(^1\) In the semester following this class, a 15-week full time student teaching experience is undertaken.
practice my students seem to enjoy, and one that is recommended by Pereira (2005). Written critical incident reports are then submitted later and I grade each one using a rubric based on the four parts of the report.

This activity helps my pre-service teachers integrate the two main bodies of research that inform my mathematics education course. The first concerns teaching for understanding, (Carpenter & Lehrer, 1999) and the second, reflective thinking in teacher education (Loughran, 2002). Elsewhere [Goodell, 2006 #815] I describe what issues my students wrote about in their critical incident reports, what they learned about teaching for understanding through their reflections, and what I learned as a teacher educator from that study. In that paper, I found that my PSTs learned about conditions necessary to teach for understanding, as well as the facilitators and barriers encountered when attempting to teach for understanding.

In my most recent self-study paper [Goodell, 2011 #1553] I investigated what influenced my pre-service teachers’ beliefs about teaching mathematics over the course of the semester as evidenced in the final reflective paper each student wrote at the end of the semester. I found that even though the majority of the PSTs cited the critical incident reports as an important activity, the vast majority merely focused on the value of hearing about all the different issues that were going on in other PSTs classrooms, and only 2 from the sample of 37 evidenced any metacognitive thinking about the value of reflection as a practice to be continued past the requirements of the course. I was puzzled by this finding, since my initial theory, based on written feedback from course evaluations, my interactions with the students in my methods class and in their field placements, seemed to suggest that the critical incident reports were highly regarded as a meaningful learning experience by the PSTs. It has always been my hope that reflective writing would improve students’ meta-cognitive skills, or adaptive
metacognition, and that reflective thinking and adaptive teaching would then become an integral part of their teaching practice. However, I now posed the question to myself, have I done such a poor job of ensuring my PSTs come to know the value of reflection? Or, perhaps I have not analyzed the evidence, or even obtained any evidence about how my PSTs value reflective thinking. I decided to examine the potential sources of evidence I might have available to me in the form critical incident reports and final papers collected over the past 12 years for concrete evidence of adaptive metacognition. Thus, my research questions for this study are: (1) what evidence is there in the reflective writing my pre-service teachers complete that they are engaging in thoughtfully adaptive behaviors?; and (2) how can I improve the reflective components of the class and the program so as to foster the development of thoughtfully adaptive behaviors?

D. Literature Review

Adaptive metacognition, according to Lin, Schwartz and Hatano (2005) “involves both the adaptation of one’s self and one’s environment in response to a wide range of classroom variability” (p. 245). It is a concept that has been identified as potentially extremely valuable in helping teachers in the 21st century.

Recent work by Fairbanks et al. (2010) concluded that teachers need to have a well-developed sense of self and a sense of agency so as to be able to be thoughtful and responsive to the diversity of situations in their classrooms. They outline four perspectives that they found to be important. First was the influence of teacher beliefs on their personal practical theories (PPTs). Cornett, Yeotis and Terwilliger (1990) defined PPTs as a systematic set of beliefs that guide teachers’ actions. Levin and He (2008) investigated the source of pre-service teachers’ PPTs and found that 66% of
sources were attributable to either coursework or teaching and observation experience. Fairbanks et al. (2010) conclude that gaining an understanding of teachers’ PPTs may help teacher educators gain a clearer understanding of why some teachers are more responsive or adaptive to certain situations.

The second perspective Fairbanks et al. (2010) discuss is that of the teacher’s vision, which they describe as “the teacher’s personal self-understanding about a commitment to extended outcomes” (p. 164), which in turn allows a teacher to make his or her ultimate goals and ideals for teaching conscious. They conclude that teachers with a clear vision become more thoughtfully adaptive so that they can enact their vision and go beyond what is minimally required of every teacher.

The third perspective of Fairbanks et al. (2010) is the sense of belonging a teacher needs in order to feel supported in enacting their vision. They conclude that teacher education programs must prepare candidates to negotiate the contexts in which they find themselves and be prepared to deal with the complexities of situations in which finding a sense of belonging may not be easy.

The fourth perspective outlined by Fairbanks et al. (2010) is that of teacher identity. Drawing on the work of two parallel categories of research about teacher identity, one concerning power and race and the other developing identity in a community of practice, they point out that identities are performed daily as the teacher plays all the various roles throughout any given day. They argue that to perform as thoughtful teachers requires a strong sense of identity and belief in one’s ability to negotiate situations to effect change when conditions are not conducive to enacting their vision of teaching. Beijaard, Paulien, Meijer and Verloop (2004) stated “that identity formation is a process of practical knowledge-building characterized by an ongoing integration of what is individually and collectively seen as relevant to teaching”, a finding that
highlights the importance of the context in which teachers work, and the shared norms that develop as a result of working conditions and the availability of opportunities for collaboration amongst teachers.

Fairbanks et al. (2010) decided that the terms self-knowledge and agency provide an overarching description of the factors that appear to be critical for thoughtful teaching. Having carefully considered this literature and its implications for my teaching, in this study I examine the ways in which the reflective activities I engage my preservice teachers in foster the development of characteristics consistent with the four perspectives outlined above.

E. Method

For this basic interpretive qualitative study, I used a convenience sample of 332 incident reports from 58 students, and I revisited the final paper analysis (of 37 students) conducted in another recent paper [Goodell, 2011 #1553]. Both of these data sets were entered into the qualitative data analysis software NVivo. I thought for a long time about how to code the data, and I decided that using a broad initial set of codes derived from the Fairbanks et al. (2010) article would be best. Those categories were:

- teachers’ personal practical theories (PPTs);
- a vision of teaching that they would like to see enacted in their classroom;
- a sense of belonging to their teaching community;
- their personal identity as a teacher.

After coding a few critical incidents, it became obvious the personal practical theories were usually discussed in the in the section on implications for the future. Thus, I searched the text for the word “implications” and coded a broad section of text (an entire paragraph in which the work “implications” was found) in a new node.
named “personal practical theories”. Some refinements of this broad search were necessary to account for the word “implications” being used as a section header.

The vision of teaching is often described in the critical incident report section on “what I would do differently next time”. Thus, in the critical incident reports, I searched the text for the words “differently” and “change” then coded a broad section of text (as before) at a new node named “vision of teaching”, again making some refinements to the search.

Some evidence of developing a sense of belonging to their teaching community was found in the final papers where the PSTs described their relationships with colleagues, mentors or other school personnel. For this, I searched the final papers for the word “mentor” used the NVivo capability to include a broad set of synonyms in the search. I coded this text a new node called “belonging”.

I could find virtually no evidence of the development of my PSTs personal identity as a teacher. I will address this issue in the discussion section later in this paper.

F. Results

Personal practical theories were categorized into themes around teaching, classroom management issues and student factors. General strategies such as time management and assessment strategies, and mathematics specific strategies such as the importance of using real-world problems and discovery learning were prevalent. The PSTs also expressed their theories about how to deal with issues around student understanding, motivation, behavior, participation, resistance, confidence and pre-requisite knowledge. For example, Alison clearly stated her new personal practical theories, in the form of what she learned had from her experiences.
1. A teacher must know what are the disciplinary actions that can be taken and use them effectively in helping to control the class.

2. A teacher should have the courage and compassion to forgive and grant students another chance.

3. Design a lesson plan that uses artifacts tailored around student’s interest.

4. Teacher must step down to a personal level to deal with student’s action.

Alison, October 2003.

The PSTs vision of teaching centered around the same categories as their PPTs, teaching, classroom management issues and student factors. For example, Bruce discussed having a sound assessment policy that will provide incentives and encouragements for his students to complete homework and classwork.

I would change a couple things to hopefully better this situation. First, I would give fewer homework problems each night and only grade one homework assignment per week. … Finally, I would adjust the grade weight of homework. Instead of 50% homework and 50% tests, I would consider 25% homework, 10% class participation, and 65% tests.

Bruce, November 2009.

Developing a sense of belonging to their teaching community is difficult for a pre-service teacher who is not part of the faculty. They often feel marginalized since there is little time to interact with other faculty, but a supportive department environment can alleviate their isolation. In his final paper, Adam wrote:

I was also greatly influenced by the faculty at Jones High School. I found them to be very easy to talk to, mainly about classroom management. It was great to be treated as a professional colleague, which I almost am, but still technically am not. They afforded me more respect than I deserved, which I greatly appreciate. In particular, I learned a lot about the classroom and general administration issues from Mrs. Michaels and Mrs. Keene. These two teachers demonstrated high expectations regarding student behavior, and complete professionalism.

Adam, December 2003
There was very little written evidence in either the critical incident reports or final papers that the PSTs could articulate their personal identity as a teacher. However, in one instance, Anthony realized that he was actually the teacher and did have the power to control the situation.

I need to understand that I am still the teacher and if I think things are getting out of hand, then I have the power to end the game. It’s great to do fun activities, but only if the class can handle them.

Anthony, October 2007

Anthony’s comments clearly show that he is still quite unsure of his role in the classroom, a position that all PSTs are in when completing student teaching experiences as a visitor in someone else’s classroom.

G. What I have learned as a Teacher Educator

This self-study has highlighted the importance of the development of teacher identity during the student teaching experience and beyond, something I was previously only moderately interested in. I thought my job was finished when they graduated, but if I truly want to prepare thoughtfully adaptive teachers, I cannot stop at student teaching support, but must continue into induction support as well, for it is then that a sense of identity and belonging truly begin to develop.

However, I have also learned that I need to modify the reflective writing components of my courses to ensure a much stronger focus on identity formation, since clearly what I have been doing is not sufficient. I can do this in the student teaching seminar that accompanies the student teaching field experience undertaken in the final semester of the program. Until now, one assignment has been to record the proceedings of every day in a journal noting what went well, what did not go well, and what could
be improved in future. These journals often degenerate into a dreary blow-by-blow description of each day. Based on the findings of this self-study, I will restructure the journals to focus on the development of their professional identities as mathematics teachers. At the beginning of the experience, they will write three or four goals pertaining to their professional mathematics teaching identity, and then each week, the journal will record their progress toward these goals. At the end of the experience, the final entry will focus on determining the factors that aided them in and prevented them from achieving their goals, as well as setting some goals for their first year in their own classroom.

The importance of developing a sense of belonging has been well researched with high-school students, but very little research has been done with teachers’ sense of belonging (Skaalvik & Skaalvik, 2011). It will be important for me to work to enhance existing mentoring and induction programs and establish new ones where none exist to ensure that our graduates are aware of the importance of and conditions necessary for adaptive metacognition to develop. Fortunately the grants I have to implement the new program allow for a full time staff member to support the professional development and induction of new teachers.

In a previous paper [Goodell, 2011 #1553] I describe how self-study led me to totally transform the entire secondary mathematics and science teacher preparation program to better prepare my students for a more integrated project-based instruction classroom. One of the biggest benefits of this is that I now have a group of colleagues not only at my own university, but also at 29 other US institutions, who are teaching the same courses in the same type of program. I am eager to share the results of this self-study to not only to improve the outcomes of this innovative program, a practice highly
recommended by self-study researchers (Taylor, et al., 2006), but also to impact the further growth and retention of my graduates once they enter the profession.

H. Conclusion

This self-study has informed my role as a program director as much or more than my methods teaching role. While I am pleased to find that the reflective writing assignments I had my students complete were successful in developing their personal practical theories and their vision of teaching, I now know that prior to undertaking this self-study, I had not given the other two perspectives, the development of a sense of belonging or personal teaching identity, enough thought. It is clear to me that these two aspects will develop more rapidly once the PST has a teaching position, which leads me to reflect on how best to ensure that reflective writing is part of what beginning teachers do as a matter of course. Teacher preparation programs are being held increasing more accountable for the impact of their graduates on student achievement outcomes once they begin to teach, therefore we, as teacher educators, will have an increasing role to play in supporting our graduates as they enter the profession.

References


