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AUTHOR Stewart, Margaret E.; Palcic, Ronald A.  
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ABSTRACT

A study examined the role of audience in preservice mathematics education students' writing experiences. Subjects, students in two mathematics education classes taught by the same teacher, completed writing assignments explaining the principles of mathematics to elementary school pupils. Students in one class wrote to actual students, serving as pen pals and math mentors, while students in the other class wrote to imaginary students. Subjects completed questionnaires at the beginning and end of the semester on their writing attitudes and their attitudes about the writing assignment. Selected students from the top, middle, and bottom of each class were interviewed. Preliminary results indicated that: (1) at the end of the semester, students in both classes felt more creative, witty, energetic, and enthusiastic while writing and less rushed, angry, frustrated, and stupid; (2) the decline in anger and the increase in energy were sharper in the group that wrote to real students than the group that wrote to the imaginary students; (3) students characterized their previous experience of college writing in general negatively; (4) for some students, the reader-writer relationship was characterized by a pretense of objectivity covering the reality of partiality; and (5) students who wrote to real pupils expressed different emotions than those expressed by students who wrote to imaginary pupils. Findings suggest that it is wise to vary the real audiences for whom students write. (RS)

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Margaret E. Stewart, Department of English  
Ronald A. Palcic, Department of Mathematics  
Washburn University  
Topeka, Kansas 66621

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Margaret E. Stewart, Department of English  
Ronald A. Palcic, Department of Mathematics  
Washburn University  
Topeka, Kansas 66621

### Writing to Learn Mathematics: The Writer-Audience Relationship

Working with the students in two mathematics education classes, we sought to learn more about students' experiences of writing, in particular the role of audience in that experience. We discovered that students' perceptions of writing are very much conditioned by the relationships within which they write.

Our study focused on two mathematics education classes, both taught by Ron Palcic. The students, all of whom were prospective teachers, did writing assignments explaining principles of mathematics to elementary school pupils. Group 1 wrote to actual pupils; they were penpals and math-mentors to real kids. Group 2 wrote to hypothetical pupils but turned in the results to the professor. Group 2 resembled many composition classes today, where the instructor asks the students to write as if to one audience or another while the real reader remains the instructor.

At the beginning and end of the semester, the students in both groups filled out questionnaires on their attitudes toward writing in general. They also completed questionnaires on the specific writing done for this course. The results of the questionnaires indicated that students' experience of writing had improved by the end of the semester: the students in both classes felt more creative, witty, energetic, and enthusiastic while writing and less rushed, angry, frustrated, and stupid.

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However, the decline in anger and the increase in energy were sharper in Group 1 than Group 2.

Margy Stewart also interviewed six students from the top, middle, and bottom of each of Ron Palcic's classes. All six students valued the writing assignments highly. One student said, "I never had a math class where you had to use a lot of writing; you know, usually you use numbers....With the numbers you understand how, but with the writing you understand why." Another commented, "He [the professor] can say it, and it's 'Oh, yeah, that's how you do it,' but if you do it [the writing] yourself, you're not looking off of what he's done. It's coming out of your own head, not his."

However, they characterized their experience of college writing in general negatively. All six asserted that college writing was a matter of psyching out the professor. One of the top students said he liked writing but not for college: "I'm very perfectionist and I want to get straight A's. If I know what a professor wants, I will write exactly what they want, and it's not your own, whereas I enjoy writing for myself." A less accomplished student said, "When I start out, I'm thinking, 'What do they want?'" Along with that question, she said, come feelings of "anxiety," "tension," "inhibition," and "anger." "It's frustrating," she said. "You sit there and stare at a blank piece of paper and you know you have to put something down, but you don't know what." The already difficult task of finding

something to say in the material and in herself was complicated further by her perceived need to read the professor's mind. The resulting challenge was overwhelming to her: she could not write and negotiate this tricky relationship at the same time.

For some students, the reader-writer relationship was characterized by a pretense of objectivity covering the reality of partiality. "You can't tell me professors aren't biased," the top student said. "I try to do well on the first assignments and get A's on those--after that they give me A's no matter what I do. I've even written papers for other students, and they get B's or C's, but still it's my work. It makes you wonder if they [professors] even read the papers." However, the same student said that the "pressure" of trying to please a professor can be "inspiring," while a student who struggled just to pass her classes said that she enjoyed writing for professors "if I'm informing [them] about something they didn't know or something they're trying to figure out. Then I think maybe I'm helping them in some way." All of the students were more preoccupied with the relationship than with the writing itself, and all said that they routinely procrastinated with paper assignments.

When Margy Stewart asked the students in Ron Palcic's Group 2 about their experience of writing to hypothetical pupils, they commented upon the value of the writing and of the class, but they also stressed the emotional complexity of the task. "You're thinking about adults, you know, a professor that's going to read

this, but you're trying to write to a child. But you know he's going to be reading it, so it makes it a little harder," one student said. Another commented, "When I wrote for him, I kind of didn't do it for a third grader, but I tried to, but I don't think I achieved that....It would be easier just writing to a third grader, instead of having someone looking over your shoulder and telling you, you know, this is not right or something like that." For some of the students, that complexity added enjoyment to the assignment. "It was just hard to imagine him being a little kid...a snot nosed little brat [laughter]. I kind of got a kick out of that, so I said, 'Dear Ronnie' instead of Ron to make it lighter and more enjoyable...to make it more fun." Another said, "Yeah, it was funny, in the sense that he was the third grader. 'Dearest Ron,' you know. He lets you be creative." But other students backed away from the complexity altogether, refusing to address the hypothetical pupil at all. They treated the hypothetical pupil as someone to write about not to, saying things like, "To explain this problem to a third grader, I would use an illustration...."

For the students who wrote to real pupils, very different emotions accrued to the writing experience. They talked about feeling "amused," "interested," "kind of happy," and "energetic." "I put more energy into it because there is a real person," one student said. Another commented, "A teacher tends to criticize you and your energy level drops. You feel like you didn't do it

right. But with the kid, if you accomplish something it makes you feel a whole lot better and you get a burst of energy." A third said, "I get excitement out of doing the [penpal experience.] It's really neat. It's been a real earth-shaking and great experience."

Part of the excitement came from feeling that their words were useful and meaningful to the person on the other end. "I don't see [this writing] as a burden at all because I know that child is really going to enjoy this, and they're going to be really excited about it; that may be the high point of their day," one student said. According to another, "You get this feeling of real satisfaction, real joy that they're understanding it; they're going to be reading this. You hope that you're helping them, so you feel all bubbly and excited, joyful to see what they're getting out of it." For some students, this experience of writing for an eager audience contrasted with their experience of previous academic writing. "When you're writing to your professor, you know they're not going to get all excited about reading something that you wrote," one student commented. "When I'm writing to the penpal I feel more useful," another student said. "I'm writing to help them, to do something for them. And when I'm writing for a professor, I'm doing this for me. I want to do good for myself, too, but when I'm doing something for somebody else it makes me feel better about myself than just when I'm doing it for myself. It's like giving

Christmas presents. You feel better when you give something than when you receive something." The anticipated reaction of the audience--excitement or disinterest--seems to color the writer's experience as well.

The students who wrote to real kids found that procrastination disappeared. "I usually reply immediately," one said. Another explained, "When you're writing for a professor, in a way you think that you have to get this done and you kind of find other things to do, so you kind of put it off....Writing to a little kid, he's not looking for your mistakes, he's not looking for your grade, he just wants you there to explain things to him and just tell him something. He wants to hear about you, you know. It's not just looking for errors and stuff like that. It's less threatening, I guess."

However, some of the best students felt that this non-threatening writing relationship put constrictions on what they could learn, because they were, after all, writing to third graders. "I didn't learn anything about math. It's not increasing my intellect whatsoever," a top student said. But a less confident student, when asked about "writing down" to her audience, answered, "To be perfectly frank, I wasn't writing down all that much." She explained that as a returning student, she was unsure of her writing skills. "I know their teacher wants to have someone helping them not only with their math but they are really paying attention to their paragraphs and their punctuation

and stuff like that. And I think, Oh, man, I don't even know when I'm supposed to...gosh, when should I start a new paragraph? Can I do it at least as good as the little third graders are doing, because writing is something I haven't used for years." Instead of feeling that she was writing down to the students, she felt that she was writing up toward her concept of what a good role model should be.

Students like her, with little experience or confidence in writing, brought to the penpal relationship great doubt in the efficacy of the written word. They were used to relying more on body language, facial reactions, speech, and demonstrations. "It's hard to write and not be able to see her reaction," the returning student said. A traditional student said, "It's kind of hard to just put it down into words, because it's not like he's there that you can explain it, because you're not there to show him." For such students, the process of receiving replies to their letters was instructive. "It's really neat to get their response and how they feel," one said. "When you're writing to a child, you know, I get an answer back from him; I get letters saying that if he didn't understand something, he'd tell me," a nineteen-year-old woman added. "It's just like you're communicating," another explained. For such inexperienced writers, the realization that their writing actually worked--that it was in fact communication--was an illuminating and

heartening discovery, one that led them to be less guarded in their relationship with the written word.

Though the penpal relationship meant freedom from professor-pressures, it was not pressure free. According to one student, "[Writing to a child] is such a big responsibility. I feel like, you know, I better make this right and I better choose properly because they are going to believe what I write. You don't want to let that child down; I mean they are looking up to you." Another said, "With a hypothetical child, you can just be guessing. With a penpal you really have to know what you are saying. You can't give them the wrong information."

This sense of responsibility led some of the weaker students to a greater involvement in their class. Several sought out Ron Palcic for extra advice. "There was one [question from a kid] I had to try to figure out," one student explained. "It was a negative plus a negative. I remember having to pinpoint the answer. How do you explain this? Mr. Palcic gave me an idea of how to explain it, so it was easier." She added, "Math isn't my best subject--this makes it more fun. It makes me more interested in teaching." An older student said, "In class, I listened to a lecture and thought, 'Oh, this is what I needed to do; I wish I'd known that before writing to the penpal.'" She said she asked Ron Palcic for further help and learned more about both math and teaching.

Within the penpal relationship, writing helped students discover their own creativity. "We had just learned about lower level learning, place values, chip scaling, stuff like that, and I just got real creative. God, you know, I'm just going to explain this to the child," one student said. Another doubted her creativity at first: "I think, Golly, I have no imagination. That's one thing about teaching, I think, Oh, man, I have no imagination. How am I going to be able to be creative?" But she discovered that "it's actually pretty easy to think of stuff to write about." She was especially proud of a math question she invented, with "a story to it and everything."

At the end of the semester, Ron Palcic had both classes write to hypothetical pupils. The students in Group 2--who had written to hypothetical pupils all along--took the assignment more seriously than did the students in Group 1, who had just finished writing to real children. One Group 1 student said, "Who cares--no one is going to get anything out of it," and another commented, "Well, I don't get emotionally excited about it. This is not real." Their reaction raises the question of just what the transfer effects are from one writing relationship to another.

We're still crunching numbers from this experiment. But even before the statistical analysis is complete, we can conclude that the particular relationship that writing is part of conditions and limits that experience to such an extent that we

would be wise to vary the real audiences for whom our students write. The next time we look with distaste at a stack of papers waiting to be read, we should ask how much of that distaste the students already anticipate, and how much of it permeated their experience of writing those papers in the first place. We might then design at least a few assignments in which our students write to audiences who find their words inherently meaningful. Our work indicates that a variety of audiences can help students discover and begin to realize their full potential.