

*While working at SCORE, a computer-based, learning center, I have seen a broad range of students from low to high achieving, grades pre-K-6. I observed and worked closely with Johnny who spent three hours a week at our after-school center. I was surprised to hear from his parents and teachers that he was unmotivated in school. At SCORE, Johnny was among the most enthusiastic students!*                      --Lia Woo

*I taught Amy in my first-grade class at a large, inner-city elementary school. Amy was one of twenty English Language Learner students. As the year progressed, Amy was not making similar growth in reading and writing as the other students. Amy's decline puzzled me.*                      --Nina Weber

### Learning Problem:

K-3 students with less defined fine motor skills (difficulty grasping a pencil and writing in defined spaces), compared to their grade requirements, willingly participate in writing activities using multimedia but can be reluctant to participate in writing activities without using the computer. This problem can escalate. What starts as tears and frustration can lead to lack of motivation and low self-confidence. These changes can affect academic performance. This individual developmental problem may be intensified by environmental factors.

### Background of the Problem:

The following stories of Johnny and Amy are examples of students with underdeveloped fine motor skills for their grade level. Both have experienced frustration which has contributed to their lack of participation in traditional written work as well as teacher and parent concern for grade retention.

Johnny is a third grade student who was recommended to repeat third grade mainly because of his incomplete, incomprehensible written work. His teacher and parents observed that it was difficult for Johnny to hold a pencil, write neatly, and complete assignments within the specified timeframe. Johnny was often frustrated while working individually on written assignments in class and at home. He expressed the feeling of not being able to write fast enough to keep up with his streaming thoughts. However, when Johnny had the opportunity to work on computer-based curriculum, he did not frustrate to type words. In fact, on a computer-based curriculum he was working at a fifth grade level in reading and writing.

Amy is a first grade student who was recommended to repeat first grade because she could not keep up with the pace of the class in her written assignments. During individual writing activities, Amy would get out of her seat and not complete the assignments. For Amy, writing the correct letter was difficult. On her homework assignments, her mother would dash the letters so that Amy could trace them. In this way, her letters were comprehensible but this process was agonizing for Amy. Amy's

mother would report to the teacher that Amy would spend hours on a homework assignment on which other students spent 20 minutes. As a result, her motivation to do work at home and in class declined. However, Amy often requested to use the computer for activities that incorporated drawing lines and typing of letters.

#### Current Practices:

Students are assessed and evaluated based on their written output in a specified amount of time. These assessments and evaluations have a strong influence on whether the student can progress to the next grade level. The schools in which Amy and Johnny attended were both California public schools. These schools had implemented the practice of writing assessments that would become part of the student's permanent record. Students were given the same writing prompt three times a year and scored on a rubric. Each grade level used a different prompt. In this way, a student's progress, or lack thereof, could be seen.

In the case of Johnny, his frustrations with writing led to further testing and a decision to explore how Johnny could succeed in his learning environment. For Johnny, retention was not the solution.

This was not the case for Amy. After examining Amy's first grade writing assessments, the second grade teacher strongly believed that Amy would not be able to keep up with the second grade work. This, in addition to discussions with Amy, her first grade teachers, and the principal, led to her parents decision to retain Amy

Most of the written work in Amy's and Johnny's classes needs to be completed by the individual student. Often, students need to complete an assignment before going to recess or must complete the assignment at home. Writing is integrated within the different subjects (social studies, science, math, reading, and art). The types of written activities vary in difficulty and in length according to grade level-- ranging from copying from the board, tracing, fill in the blank answers, creative writing, and informative writing.

Johnny and Amy are two students among many. Their less defined fine motor skills prevent them from writing to their capabilities on paper-pencil activities. They have the ideas and the verbal articulation but their current learning environment does not foster their abilities. Because most of their subjects require them to write, others perceive Johnny and Amy as not performing well and easily distractible. However, their teachers have observed that Johnny and Amy are not distractible when they are involved in a multimedia environment. Johnny enjoyed the program Writer's Express that prompted the user to create an interactive story. Amy particularly enjoyed the software KidPix which allowed her to creatively express her ideas in a picture and type in words that related to her picture.

#### Inquiry Process to Resolve Problem:

Our goal is to create an environment in which K-3 students with less defined fine motor skills required for their grade level participate more fully in written activities. In the preliminary investigation, we will attempt to identify the current barriers and their consequent implications that students with less defined fine motor skills face. We will gain a better understanding of these barriers by interviewing the teachers who work with students with less defined fine motor skills and the parents of these students.

Example questions for teachers:

1. How would you describe Johnny's fine motor skills, specifically his ability to grasp a pencil and write within a defined space?
2. Which, if any, types of written assignments does Johnny complete within the specified timeframe?
3. How would you describe Johnny's behavior when he is unable to complete a written assignment within the time allotted? How often is this behavior seen?
4. How would you describe the average fine motor skill level of the class? Are Johnny's fine motor skills below average, average, or above average?
5. Are there any strategies that you have found effective to motivate Johnny to complete a writing task?
6. What types of writing activities does Johnny particularly like? Dislike?
7. Do your students have access to computers? At home? In the lab? In the classroom?
8. How does Johnny enjoy the computer? What are some activities he enjoys?
9. How is Johnny's motivation and perseverance when he works in groups on paper-pencil assignments?

Example questions for parents:

1. How would you describe Johnny's fine motor skills, specifically his ability to grasp a pencil and write within a defined space?
2. Can Johnny clearly write a letter? A word? Sentence? Paragraph?
3. How would you describe Johnny's motivation to write?
4. How would you describe Johnny's motivation to write on the computer?
5. Does Johnny enjoy reading? Silently? Aloud?
6. Does Johnny feel more engaged in the learning process when he is involved in groups?

After speaking with teachers and parents, we should have an idea of the scope of the problem for various K-3 students. The next phase of the investigation would involve observing and recording behaviors and interactions within the current learning environment. It would be necessary to observe these identified K-3 students working on pencil-paper assignments and computer assignments on both individual and collaborative tasks. Our observations will provide some insight into which medium (multimedia or

seatwork) and learning environment (individual or collaborative) students with less defined motor skills will be most engaged.

#### Design Proposal Based on a Situative Approach:

The current design of learning environments allows students with less defined fine motor skills, who work alone, to get frustrated and stop working when faced with challenging paper-pencil assignments. However, we believe that over time students with less defined fine motor skills will be able to participate more freely in the writing process if situated in both collaborative and multimedia learning environments.

Based on the constant interaction within a collaborative learning environment, a student with less defined fine motor skills will not be as likely to get frustrated and stop working. One reason for this is ultimately the group is responsible for producing a completed assignment that reflects their collective knowledge. As Bellamy states, "Part of the power of collaboration appeared to be increased self-assessment of work because it was being subjected to peer assessment." This group interaction will encourage students with less defined fine motor skills to develop coping mechanisms. Greeno et al. explains the situative perspective, "This view emphasizes how people's very identities derive from their participatory relationships in communities."

Collaborative learning environments can create a setting in which the strengths of each individual will be valued. An expectation within this community setting is that all members contribute. These contributions can take many forms which highlight other skills besides writing. For example, students can have roles in the group such as facilitator, recorder, and presenter. Another possible outcome is that students who have frustrated in the past because of their inability to complete an assignment will now be among a community of learners in which the project will be completed. Hopefully, these identified students with less developed fine motor skills will transfer their success experiences in collaborative groups to their individual work.

Multimedia learning environments can provide K-3 students with less defined fine motor skills with a variety of opportunities to engage and contribute to the group. Greeno et al. states in reference to a situative view, "Learning situations also present different opportunities for participation to different individuals." The scaffolding approach embedded in many multimedia environments can aid students, particularly those uncomfortable with paper-pencil writing activities. In fact, in the classroom, multimedia programs, even those intended to be used independently, often transform into a collaborative experience. (Hativa & Lesgold, 1996) Perhaps multimedia coupled with collaborative work will act like a scaffolding mechanism that engages students like Johnny and Amy in writing activities. According to Hativa & Lesgold the outcome of a specific multimedia program can differ from the initial expectation. Therefore, careful implementation will be needed to ensure that the learning goals are addressed.

In order for the collaborative learning approach to be effective in classrooms with students with less developed fine motor skills, it will be necessary to work with teachers

to decide on appropriate writing activities that involve cooperation and various media. Therefore, the teachers will play an integral role in designing successful, collaborative learning environments. Students will need to work with their teachers and their peers in order to create an atmosphere that is conducive to collaborative work. Given the nature of the situative approach, teachers will need to feel comfortable with a change in their role and reflect upon its ramifications. Teachers hopefully will take on the role of a facilitator, guiding students through the writing process. In turn, parents, students, and administrators will hopefully embrace this change. In order for this new learning environment to be effective, teachers must understand a re-definition of thinking and knowledge as "...situated in a particular context of intentions, social patterns, and tools." (L.B. Resnick, Levine, & Teasley, 1991; J.M. Levine, Resnick, & Higgins, 1993)

#### Summary:

From our case studies of Johnny and Amy, we observed that multimedia engaged them to write. Multimedia became collaborative, allowing students to interact with the computer, the teacher, and/or their peers. We believe that with the application of the situative perspective, students with less defined motor skills won't frustrate as easily during their written assignments. During the implementation of our design ideas, observations and assessments need to be conducted periodically. In this way, we can make further recommendations to ensure that the learning environment maximizes the potential for students with less developed fine motor skills.

#### References:

1. Bellamy, R.K.E. 1996. "Designing educational technology: Computer-mediated change." pp. 123-146 in Bonnie Nardi (ed.) *Context and Consciousness*. Cambridge, MA: MIT Press.
2. Greeno, James G., Collins, Allan M. and Lauren B. Resnick. 1996. "Cognition and Learning." pp. 26 in Berliner, David C. and Robert C. Calfee (ed.) *Handbook of Educational Psychology*. New York: Simon & Schuster Macmillan.
3. Hativa, Nira and Alan Lesgold. 1996 "Situational effects in classroom technology implementations: Unfulfilled expectations and unexpected outcomes." pp. 131-171 in Kerr, Stephen T. (ed.) *Technology and the Future of Schooling*. Ninety-Fifth Yearbook of the National Society for the Study of Education, Part II. Chicago: University of Chicago Press.