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Deaf Students' Writing and Authentic Science Activities

by John Albertini and Harry Lang

Can informal writing help deaf students learn science? To answer this question, we analyzed informal writing samples related to hands-on activities in science classes. Our suggestions that teachers use informal writing and hands-on activities is based on the assumption that learning science is a social and culturally situated activity (Vygotsky, 1987; Lemke, 1990; and Wertsch, 1991). According to this view, children learn science by adopting the language patterns of competent users. They explore and find multiple ways of completing a task by working with experts and, given meaningful and engaging contexts, they construct new understandings of science phenomena and gradually incorporate the language patterns of science in their own discourse.

The role of writing in learning is complex and not well understood, even though practitioners have recommended "writing-to-learn" teaching strategies for at least 25 years (Emig, 1977; Fulwiler, 1980; Herrington, 1981). Since the process of writing is physical and deliberate, and since the product must be explicit, educational psychologists, like Vygotsky, believe that writing influences thought. According to Langer and Applebee (1986), constructing meaning through writing occurs in educational settings that emphasize a mutual exploration of interpretations rather than an acquisition of facts. These investigators conducted extensive research on the effect of writing on learning by hearing high school students and concluded that writing could be used productively in three ways: 1) to gain relevant knowledge and experience in preparing for new activities; 2) to review and consolidate what was known or had been learned; and 3) to reformulate and extend ideas and experiences. Langer and Applebee found that writing to reformulate and extend ideas and experiences was most likely to lead to more complex reasoning.

Proponents of writing-across-the-curriculum have argued that increased use of writing in the classroom will improve writing skills and enhance content learning for hearing students (Walker, 1988). Some research indicates that college-aged deaf students can use writing effectively to process and consolidate learning (Meath-Lang, 1980; Meath-Lang, Caccamise, & Albertini, 1982; Albertini, 1993). Regarding hands-on activities, there is a growing body of literature supporting science processes, which mentally engage deaf learners. Boyd and George (1973) studied the manipulation of objects and classification abilities of deaf 10-13 year old students using Science Curriculum Improvement Study (SCIS) and Science: A Process Approach (SAPA) materials. Research on learning styles of college-aged deaf students has shown a significant positive correlation between the participative learning style and academic achievement as measured by course grades (Lang, Stinson, Basile, Liu, & Kavanagh, 1999).

Writing-to-Learn Strategies

In the present study, we explored the use of four writing strategies (guided free writing, end-of-class reflection, double entry, and creative writing) to

Deaf Students' Writing continued on page 3

Notes of Note

Harry Lang has become a member of the Gallaudet University Press Editorial Board. A physicist by training, Lang's newest book, *A Phone of Our Own: The Deaf Insurrection Against Ma Bell*, to be published by Gallaudet University Press in April, 2000, tells the dramatic story of three deaf men – Robert Weitbrecht, Jim Marsters, and Andy Saks – who develop the TTY modem and then enlist the deaf community's resources in their struggle and ultimate victory over tradition, AT&T, and the FCC.

Pat Spencer, Carol Erting, and **Marc Marschark**'s book, *Development in Context: The Deaf Child in the Family and at School*, was published by Lawrence Erlbaum in November, 1999. It includes a chapter by Marschark entitled "Education and development of deaf children—Or is it development and education?" Marschark and Bill Stokoe also had a chapter entitled "Signs, Gestures, and Signs" published in *Gesture, Speech, and Sign*, edited by Lynn Messing and Ruth Campbell (Oxford University Press).

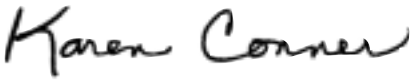
Karen Conner

Instructional Technology in the Teaching/ Learning Process – A Teacher's Perspective

We are all experiencing the effects of rapid changes in technology in the classroom, in the workplace, and in the home. The manner in which information is offered in the educational environment ranges from the traditional lecture to accessing learning opportunities through the "Information Highway." We are constantly reminded of the need for continually upgrading technology in the classroom, as well as the need to prepare our students for a lifetime of learning to remain competitive. At the same time, we see evidence of an increasing number of physically and educationally challenged students and are thus ourselves challenged to meet the cognitive as well as physical learning needs of a wide range of learners.

As a teacher, I am constantly asking myself how to improve what I am doing. How can I meet the different learning needs of all of my students? How can I influence students' attitudes toward learning? Has technology influenced students' learning? Has the use of technology affected the learning process in a positive manner? To what extent does computer-based training and distance learning enhance instructional goals and student performance? Over the years, I have worked with several members of the NTID Department of Research on various projects related to student learning and improvement of the curriculum. I have participated in these activities out of a personal need to learn and grow and to provide a better learning experience for students. As we begin this new century, we have a great deal to learn, particularly regarding the use of technology and how it influences the facilitation of learning. One way to accomplish this is to encourage teachers and researchers to work together on mutual concerns.

The teaching/learning process needs to be strongly valued in our community. Part of our research agenda should be based on instructional issues teachers identify as critical. Teachers and researchers should be encouraged to work together on meaningful projects, and should be recognized and rewarded for their efforts. Only by working together will we be able to promote a connection between teaching and research. Educational administrators need to recognize that we need to reclaim the time we've lost to other activities and renew our commitment to finding the best possible ways to ensure student success. This has to be a shared value among members of our community. Only by working together can we influence the success of our students here at NTID and elsewhere. And by sharing our knowledge with others, we can positively influence the learning process in other educational programs serving deaf students.



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Double Entry
[Passage from Heredity, The Code of Life, Prentice-Hall, 1993]

"The history of genetics began with a monk named Gregor Mendel working in the garden of a small monastery in eastern Europe. Mendel, whose parents were Austrian peasants, was born in 1822. He entered the monastery at the age of 21 and was ordained a priest 4 years later. In 1851, Mendel was sent to the University of Vienna to study science and mathematics. After he left the university, Mendel spent the next 14 years working at the monastery and teaching at a nearby high school. In addition to teaching, Mendel also looked after the monastery garden. Here he grew hundreds of pea plants. Mendel experimented with the pea plants to see if he could find a pattern in the way certain characteristics were handed down from one generation of pea plants to the next.

Deaf Students' Writing continued from page 1

construct meaning in science classes. The authors trained 234 teachers in the use of these strategies in two-day regional workshops.[1] Twelve teachers of deaf and hard-of-hearing students in grades 6 through 11 agreed to participate in a naturalistic study by conducting hands-on activities in their classes and incorporating the writing strategies. These teachers provided a total of 229 writing samples and evaluative commentary. They were paid a small fee for their involvement.

Three research questions guided our analysis of the writing:

1. What does informal writing reveal about deaf students' understanding science?
2. Can the use of informal writing in conjunction with hands-on activities and relevant text materials assist the deaf student in learning science principles and concepts?
3. Under what instructional conditions will the use of writing-to-learn strategies be optimized?

The four writing strategies described in this report are adaptations of exercises used by writers and writing instructors (for example, Elbow, 1973; Zamel, 1992; Fulwiler, 1987). They were used in this project to encourage students to record observations, make predictions, draw conclusions, and formulate questions. According to the Commission on Science Education of the American Association for the Advancement of Science (Gagné, 1993), such processes should be included in science curricula throughout the country.

Tables 1a and 1b on pages 4-5 list the four writing strategies, an identifier for each set of samples, and the science principle or topic of each set of samples. For example, we received 11 sets or a total of 48 student samples of the **Guided Free Writing** strategy. This strategy entailed 1) writing down a prediction (prior to a hands-on activity), 2) recording observations during or after the activity, and 3) drawing conclusions based on the observations. The sample in the left column on page 4 was written during a lesson on static electricity.

Writing a **Double Entry** in a science journal focuses students on a particular segment of text. Here, they are asked to copy a segment of text verbatim on one page of their science journal and then to respond to it on the facing page. Reactions to the reading of the text may take the form of comments, questions, or descriptions of personal experiences. For example, in connection with the growing of "Wisconsin Fast Plants," a class of eleventh graders was asked to respond to a textbook passage on the life of Gregor Mendel. The passage is shown in the left column on this page, and one student's (IR3) response to it is given below.

In an **End-of-Class Reflection**, students are asked to summarize and reflect. Following a science unit on the nearly extinct South China Tiger, one seventh grader listed the "most important points" on a notecard (see left column on page 4).

For the **Creative Piece**, students were asked to create a world in which they assumed the characteristics or perspective of an object. In a unit on simple machines, one student describes

Deaf Students' Writing continued on page 4

Double Entry
[Student Entry]

Gregor Mendel had started to investigate what happens to the genetics in plants, that is almost similar to people. He started to work in the monastery at the age of 21, in 1851 he went to college to study science and math. When he was 25 years old he became a priest. He had worked at the monastery after college and started to grow plants to find out about genetics. He discovered new things but couldn't explain what the do.
1. What does the word monastery mean?
2. In my head, I wonder how many years did Mendel spent at Vienna? It didn't say.
3. Did he ever dreamed of doing this?
4. Did people in Europe or around the world get fascinate at what he had discovered?
5. What made him wanting to do something with science?
6. What did he discovered after the pea plants? IR3

Table 1a.

Type	*Set*	*Science Principle*	*#*	*Type*	*Set*	*Science Principle*	*#*
Guided Free				*End of Class*			
	BB	*Densitity of Liquids*	*4*		*BB*	*Acids and bases*	*5*
	DB	*Mass and Weight*	*11*		*DB*	*Recycling Paper*	*21*
	DB	*Pumpkin*	*4*		*DB*	*Molecules/Materials*	*9*
	MR	*Ozone Depletion*	*3*		*KP*	*Decline of Bluebirds*	*1*
	KP	*Mechanics of Eye*	*1*		*WS*	*Chemistry*	*5*
	GR	*Eye/Refraction*	*3*		*JS*	*Canned Food Safety*	*5*
	WS	*Simple Machines*	*4*		*MT*	*Chemical Changes*	*34*
	WS	*Potato Growth*	*1*		*MT*	*Ozone Depletion*	*10*
	JS	*Worms/Ecosystem*	*6*		*CU*	*Endangered Species*	*15*
	CS	*Electricity*	*6*		*CS*	*Volcanoes*	*3*
	KT	*Growth of Crystals*	*5*				
			48				***108***

Guided Free Writing

[Fluorescent light bulb project]

What will happen when I rub a fluorescent light bulb and plastic bag together?

[1] I think it will light come on or stactic electric-ity or rub it and light on. [Sketch of fluorescent tube and plastic bag with an arrow to the tube with the word, "light"]

[2] Mr. [BR] have a long long and a sack. He hold the light on the back and front and rub back and front to make the light come on.

[Sketch with labels, "bag," "light," and "gas called fluorine"]
[3] You use your bag and hold the light and you rub it and it will shock when you rub it. It is shock the gas with bag and it will light on. BR6

End-of-Class Reflection

1. Put endanger tiger in zoo.
2. Don't go near where tiger life. If you do then tiger will attack you then you will have to shot it. Then tiger is gone. So don't go near.
3. Stop people to poison to animals because tiger eat them then tiger have poison too then it will die. BT6

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himself so that others can guess which simple machine he is:

> *I have long line [length] and short wide [width] And I have sharp middle [fulcrum] of long line and fat wide that looks like board. In the end of board it can go up or down each board goes opposite way. I push board down other goes up across the middle of sharp [fulcrum]. What kind I'm? VR1*

Analysis and Preliminary Results

The data in this study consisted of 229 samples from students including writing, diagrams and sketches; and the teachers' explanatory notes, interpretations, and evaluation of their students' learning through writing. Each author read the samples for recurrent themes related to students' understanding of science, expression of the science principles, and use of the writing strategies. To date, we have read the samples with two purposes in mind: first, to evaluate understanding of the target science principle and second to identify variation in how the strategies were used and whether this variation had recognizable effects on the expression of the science principles.

Based on our readings of the samples to date, we have approximately 13 themes, which are summarized in Table 2 on page 5. Related to our first research question, we note that the writing revealed a variety of ideas and perceptions and, in some cases, misconceptions. In one Creative Writing set, "The Life Cycle of Paper," CA hoped that students would demonstrate an understanding of the growth of trees, the processing of wood into paper, and the reuse of paper through recycling. In words and diagrams (see CA15, Figure 1 on p. 8), the students started their story at different points in the cycle: as a seed, as a tree, or with the cutting down of a tree. The students also revealed an understanding of the variety of ways that paper can be reused through recycling. As an illustration of a possible misconception about tree growth, in the same set, one student wrote, "…six month later grow very tall." (CA4).

One teacher, IR, added questions posing to the strategies in order to examine her students' thoughts on the topic of Gregor Mendel. In this way she was prompting further inquiry. In the Double Entry sample quoted on page 3, the student, IR3, posed questions about the passage and about Mendel himself. In the End of Class Reflections, IR had the students note "Three Things I Learned" and "What I'm Curious About Now." Repeatedly, the writing samples in these science classes revealed opportunities for vocabulary learning as well. The sample from VR1 provides an excellent context for what McDonald calls "vocabulary enhancement" (1986). Given a sample like this one that is syntactically comprehensible and semantically coherent, the instructor's suggestion to substitute the technical term ("fulcrum") for the student's "the middle of sharp" could be straightforward and acceptable to the student.

Regarding optimal conditions for use of these strategies, two complementary themes clearly emerged. The first is the content knowledge of the teacher. One instructor, for example, demonstrated the difference between Coke and Diet Coke by placing a can of each in a tub of water. The writing samples indicated that students made accurate observations (one sank and the other floated) but were vague as to the reason for the cans behaving differently. Apparently, in this lesson on "mass and weight" the notion of relative density was not introduced prior to the activity.

Just as content knowledge and focus play a critical role in a teacher's ability to evaluate student understanding, so does experience with deaf students' writing. Both content knowledge and familiarity with the writing of language learners are required to interpret the Double Entry sample:

> *I believe that electronic has no work for people for example typewriter, langdry [laundry] like that that compound machines is very nice to have. I feel that compound machine sure helps people… I think that people use that compound machine to be lazy. I understand that compound can help using hard thing (ex. life [lift] or push made it easier very little). VR1*

To interpret or evaluate understanding in this sample requires knowledge of the concepts: work, force, distance, and efficiency. It also requires the

Table 1b.

Type	*Set*	*Science Principle*	*#*	*Type*	*Set*	*Science Principle*	*#*
Creative Piece				*Double Entry*			
	DB	*Recycling Paper*	*23*		*WS*	*Simple Machines*	*3*
	KP	*Bacteria/Virus*	*1*		*JS*	*Genetics*	*5*
	MP	*Atomic Structure*	*6*		*KP*	*Vision/Blindness*	*2*
	GR	*Soap Bubble*	*3*				
	WS	*Simple Machines*	*3*				
	JS	*Plant Genetics*	*6*				
	JS	*Worms/Reproduction*	*6*				
	CS	*Gravity*	*6*				
	CU	*Digestive System*	*7*				
			1				
			62				***10***

Table 2. Patterns Emerging in the Inductive Analysis of Writing Samples

What does informal writing reveal about students' understanding of science?
1. Variety of ideas
2. Identifying misconceptions

Can the use of informal writing in conjunction with hands-on activities and relevant text materials assist the deaf student in learning science principles and concepts?
1. Question posing
2. Transfer of knowledge
3. Vocabulary development

Under what instructional conditions will the use of writing-to-learn strategies be optimized?
1. Teacher content knowledge
2. Experience with deaf students' writing
3. Instructional prompts
4. Mid-activity adjustments
5. Follow-up
6. Variety of purposes in writing
7. Timing
8. Establishing a focus

ability to interpret the expressions "no work" and "lazy" as "less effort." Here the students indicate an understanding that a compound machine requires less effort by humans, thus making it possible to do work more efficiently. With "very little" force ("lift or push"), one can move a heavy object ("hard thing").

Conclusions

The analysis we have conducted thus far leads us to conclude that writing samples of deaf students reveal both understanding of science principles and possible misconceptions. Based on extensive examination of the 229 writing samples and the comments of the instructors, we believe that informal writing strategies may be used effectively in conjunction with hands-on activities and reading to stimulate inquiry and develop science vocabulary. Finally, it is clear that successful use of the strategies depends on the teacher's knowledge of the science content and familiarity with deaf students' writing. This investigation is also examining the use of writing prompts created by the teacher, explicitly-stated objectives, and mid-activity adjustments. The writing samples produced in this naturalistic study appeared to provide teachers with immediate indications of understanding; and in many cases, they suggested follow-up strategies and new directions for instruction.

References

Albertini, J.A. (1993). Critical literacy, whole language, and the teaching of writing to deaf students: Who should dictate to whom? *TESOL Quarterly*, *27*, 59-73.

Boyd, E., & George, K. (1973). The effect of science inquiry on the abstract categorization behavior of deaf children. *Journal of Research in Science Teaching*, *10*, 91-99.

Elbow, P. (1973). *Writing without teachers*. New York: Oxford University Press.

Emig, J. (1977). Writing as a mode of learning. *College Composition and Communication*, *28*, 122-128.

Fulwiler, T. (1987). *Teaching without writing*. Upper Montclair, NJ: Boynton/Cook.

Gagné, R.M. (1967). *Science — A process approach: Purpose, accomplishments, expectations*. Washington, DC: Commission on Science Education, American Association for the Advancement of Science.

Herrington, A.J. (1981). Writing to learn: Writing across the disciplines. *College English*, *43*, 379-387.

Lang, H.G., Stinson, M.S., Basile, M., Kavanagh, F., & Lieu, Y. (*1999*). Learning styles of deaf college students and teaching behaviors of their instructors. *Journal of Deaf Studies and Deaf Education*, *4*, 16-27.

Langer, J.A., & Applebee, A.N. (1986). Reading and writing instruction: Toward a theory of teaching and learning. In E.Z. Rothkopf (Ed.), *Review of Research in Education*, *13* (pp. 171-194). Washington, DC: American Educational Research Association.

Lemke, J.L. (1990). *Talking science: Language, learning and values*. Norwood, NJ: Ablex.

Meath-Lang, B. (1980). *Deaf students' perceptions of their English language learning: Rational for an experience-based curriculum*. Unpublished dissertation, University of Rochester, Rochester, NY.

Meath-Lang, B., Caccamise, F., & Albertini, J. (1982). Deaf students' views on English language learning: Educational and sociolinguistic implications. In H. Hoemann & R. Wilbur (Eds.). *Social aspects of deafness*, *5* (pp. 295-329). Washington, DC: Gallaudet University.

McDonald, B. (1986) Composition enrichment: Vocabulary development for second-language learners. *Teaching English to Deaf and Second-Language Students*, *4*, 19-23.

Vygotsky, L.S. (1987). *Thinking and speech* (N. Minick, Trans.). New York: Plenum.

Walker, A. (1988). Writing-across-the-curriculum: The second decade. *English Quarterly*, *21*, 93-103.

Wertsch, J.V. (1991). *Voices of the mind: A sociocultural approach to mediated action*. Cambridge, MA: Harvard University Press.

Zamel, V. (1992). Writing one's way into reading. *TESOL Quarterly*, *26*, 463-485.

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Individualizing Instruction for Undergraduate Learners: Issues and Possible Strategies

by Jeffrey Porter

Some Issues About Teaching

Efforts by undergraduate teachers to support the learning of individual students can be viewed as taking place at the intersection of Astin's (1985) Talent Development model of educational excellence and the incredible learning diversity among undergraduate students. When educational excellence is defined by the "difference made" in supporting progress by each and every student, and when the reality of unique individual learners is accepted as overwhelming the myth of the "average learner," the importance of undergraduate teachers striving to individualize their instructional efforts with students comes front and center.

Individualizing instruction involves orchestrating educational environments to foster the engagement and learning of individual students. Elements of such orchestration include overall course structure and classroom procedures, translation of curricular objectives and course materials into learning tasks, and implementation and ongoing revision of specific teaching and assessment techniques. The goal is to craft an array of alternative teaching/learning paths for diverse students, leading to common curricular outcomes. One can thus view teaching as an act of instructional problem-solving, or "reflective teaching."

Reflective teaching fuels the development of alternative instructional strategies for supporting individual learners. It requires teachers to make explicit for themselves their implicit beliefs and theories regarding how learning happens, what is worth learning, the role of students, and their own role and responsibilities as teachers. It entails constantly holding up such "assumptions-made-explicit" to the test of practice, and revising them based on experience. It means using these evolving assumptions as a frame of reference for interpreting ongoing interactions with individual students—all toward the goal of figuring out how best to support the engagement and learning of *this* student, with *this* learning task, given *this* curricular objective.

There are no precise formulas, no guaranteed prescriptions, for realizing this goal. Instructional problem-solving of this sort is complex, elusive, and idiosyncratic. It depends ultimately on partnerships between teachers and students that are committed to learning success, on "trial and error" experimentation, and on innovation within the teaching/learning process.

Some Issues About Learning

Student learning is an active, constructive, and personalized process. The learner generates new learning based on past experiences, current purposes, and operative ways of thinking. Learning depends ultimately on the student's engagement with the learning task. The student determines the extent and nature of such engagement, and the resulting quality of learning.

Individual learners optimally engage the same learning task with uniquely different affective, organizing, processing, and self-monitoring strategies. The daily experiences of teachers and students working together reveal that such differences among learners are sufficiently rich enough to defy capture by contrived "learning styles" taxonomies; such differences highlight the reality of the individual learner against the fiction of the average learner.

The role of teacher with regard to student learning is supportive rather than direct. The effectiveness of a teacher's instructional approach can be gauged by its capacity for fostering active student engagement with the learning task. Different instructional approaches will be more or less effective with different learners—a practice optimally fostering the engagement of one student with a learning task will not sufficiently support another.

Efforts to tailor instructional approaches in light of the learning characteristics of individual students recognize that optimal academic progress is neither an exclusive function of "student" factors nor "teacher" factors, but an adaptive interaction of both. The goal of individualizing instruction is to foster optimal engagement with the learning task, and thus academic success, for each and every learner. As such, the intersection of Talent Development and learner diversity can be viewed

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not as an intractable problem bordering on an impossible challenge, but as an educational ideal defining what it means to be educationally excellent, and serving as a source of pedagogical innovation and learning enrichment.

Some Insights About Individualizing Instruction

1. Effective learning by individual students is a function not only of how skillfully the teacher complements their ways of learning through tailoring instructional strategies, but also of what individual students bring to the learning task: their motivational deposition to engage and sustain effort, their metacognitive adroitness in monitoring and revising learning strategies to optimize performance, and their willingness to accept ultimate ownership and responsibility for learning success or failure.

2. It teaches that the creation of alternative teaching and assessment techniques for supporting the learning of individual students cannot come at the expense of established curricular and academic standards. This can be an ongoing tension for teachers, arising from deep commitment both to the promise of individual learners and the sanctity of established standards.

3. Identifying and responding to diverse learning characteristics among individual students depends on figuring out how to conduct classes in ways that bring such learning differences to the surface. Once liberated, such individual differences can be used to enrich learning activities with the added implications and multiple perspectives that unique learners bring. Unfortunately, most teaching and assessment strategies common throughout undergraduate education today stifle and ignore, rather than liberate and engage, individual learning differences among students.

4. Individualizing instruction entails identifying and instructionally responding to important learning characteristics of individual students, with the aim of optimally supporting their academic progress. This not only can happen, but many times happens best, in group contexts with other students. Teachers can orchestrate group activities to bring to the surface the incredible diversity characterizing how people learn. Such diversity made visible helps students better understand their own ways of learning, perhaps providing new strategies to model, and lays the groundwork for ongoing focus throughout the course regarding the relative merits of alternative approaches.

5. Many of the approaches and techniques for instructionally supporting the learning of individual students apply across disciplines. Exceptions to this might be math's precise and lawful algorithms, which seem to lend themselves particularly well to computer-based assessment systems for generating individualized sequences of prescribed instructional modules, or English composition and literature, which seem to benefit naturally from writing-intensive activities and from the well-established cycle of student draft-teacher feedback-student revision. But overall, it appears that the challenge of tailoring instruction to support individual learning is largely discipline-neutral, with teachers across disciplines having much to offer and learn from one another.

6. Figuring out how to support individual students in engaging a particular learning task is a problem-solving process greatly enhanced by the insights and shared experiences of fellow teachers. Reflective teaching is diminished when it happens in isolation, deprived of a network of teaching colleagues working on similar problems in their own courses and committed to supporting and learning from one another. Reflective teaching is nourished when it is embedded in such networks.

7. It trivializes the significance of teaching to view efforts to support the academic progress of diverse individual learners as basically rifling through a pedagogical "bag of tricks" until one is found that works. Ultimately, it is not about how many "pedagogical tricks" you possess. It is about your guiding assumptions regarding learning and teaching, and your caring commitment to and belief in the promise of the individual learner. It is about framing your instructional efforts with some "first beliefs": that the particular learning task at hand is worthwhile, that the students you work with have promise to generate significant learning for themselves, and that your role as teacher is to care about and help fulfill that promise. This is what gives meaning to, and legitimizes the choice of any particular instructional technique.

Reference

Astin, A.W. (1985). *Achieving educational excellence*. San Francisco: Jossey-Bass, Inc.

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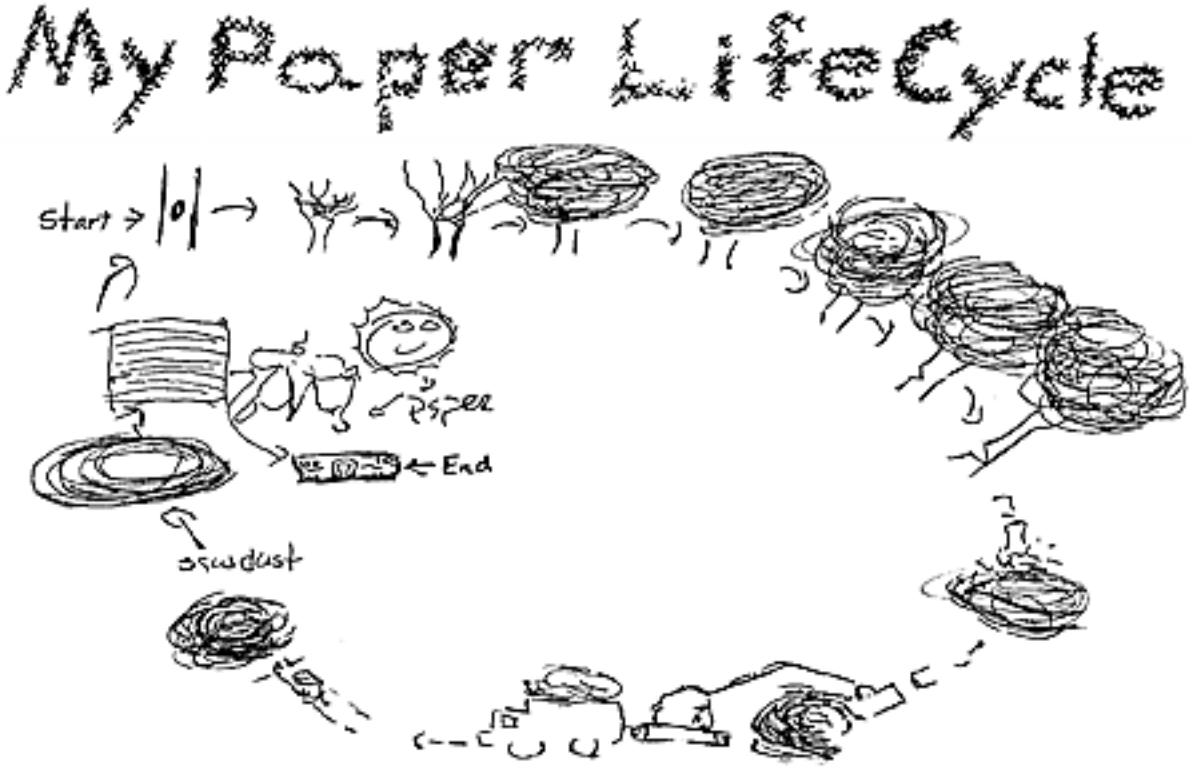
Writing of Deaf students can reveal a variety of ideas and perceptions and, in some cases, misconceptions. In one creative writing set, "The Life Cycle of Paper," a student, CA 15, diagrammed different points in the cycle. See article Deaf Students' Writing and Authentic Science Activities, *on page 1, for a discussion of the creative writing set.*



IMPLICATIONS OF NTID RESEARCH

FOR DEAF AND HARD-OF-HEARING PEOPLE • NTID RESEARCH BULLETIN

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In 1993, the National Technical Institute for the Deaf established the Center for Research, Teaching and Learning. A primary mission of the Center is to "foster advances in teaching and learning that enhance the academic, professional, social and personal lives of people who are deaf or hard of hearing." Among its other functions, the Center both conducts research relevant to that goal and supports research conducted by colleagues from across NTID.

As part of our collaborative efforts, the Center regularly undertakes the collection and dissemination of relevant research findings from across NTID. Included for each publication is a description of the implications of the research findings the author thinks will be most relevant for NTID's audiences.

Lang, H.G., Stinson, M.S., Basile, M.L., Kavanagh, F., & Liu, Y. (1999). Learning styles of deaf college students and instructors' teaching emphases. *Journal of Deaf Studies and Deaf Education, 4*, 16-27.

Six learning style dimensions of the Grasha-Riechmann Student Learning Style Scales were examined with 100 deaf college students. Six corresponding scales of teaching emphases were administered to these students' 16 instructors. Student mean scores were higher for dependent, participative, collaborative and independent dimensions than for competitive and avoidant styles. For instructors, the mean scores for teaching emphases were higher for collaborative, dependent, participative and independent dimensions. The similar patterns of results for students and teachers suggest a correspondence between the learning styles and the teaching emphases.

Implications:

The correspondence between teacher and student ratings may reflect common perceptions and common experiences on how teaching and learning occur in the classroom. The expectations of teachers and students are likely to be compatible, which may facilitate instruction in the classroom. Teachers should experiment on an increasing basis with strategies that involve all students, including questioning techniques that lead to each student responding, and other hands-on/minds-on activities. Since students vary in their preferences, a wise teacher will also offer a variety of teaching approaches during a course to allow all students to learn through their preferred styles and effectively strengthen other styles.

Clarcq, J.R., & Walter, G.G. (1997). Supplementary Security Income payments made to young adults who are deaf and hard of hearing. *JADARA, 31*(2/3), 1-9.

This project assessed the impact that educational level, age and gender have on receipt of SSI payments. The Social Security Administration matched a data file of 7,196 deaf individuals to national records of individuals receiving SSI benefits. Twenty percent of the individuals in the data file received an average SSI benefit of $342 in October, 1995. The study found: 1) The more education an individual has, the less likely she or he will draw on SSI; 2) Those who attend college and subsequently drop out receive SSI benefits at a rate similar to those who never attended; 3) as an individual ages, she or he draws significantly less

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SSI benefits; and 4) a significantly larger percentage of females than males received SSI benefits at all age levels.

Implications:

Public policy supporting postsecondary education of deaf individuals yields earning benefits in excess of educational support costs and reduces long term dependence on Federal SSI payments. All able deaf students should be encouraged to access postsecondary education by educators, vocational rehabilitation and other social service professionals.

Berent, G.P., Samar, V.J., Kelly, R., Berent, R., Bochner, J., Albertini, J., & Sacken, J. (1996). Validity of indirect assessment of writing competency for deaf and hard-of-hearing college students. *Journal of Deaf Studies and Deaf Education*, *1*, 167-178.

Indirect tests of writing competency (e.g., tests with multiple-choice items) are often used for a variety of educational, programmatic, and research purposes. Although such tests may have been validated for use with hearing students, it cannot be assumed that they validly assess the writing competency of deaf and hard-of-hearing students. This study used a direct measure of writing competency, the Test of Written English (TWE) to determine the validity of two indirect measures of writing competency. With the TWE, students write an actual essay, which is then scored by professional raters. Results of this study suggest that the validity of indirect writing tests for deaf and hard-of-hearing baccalaureate-level students is weak.

Implications:

The demonstrated low validity of the indirect writing tests examined in this study suggests that indirect writing tests in general are inappropriate for use with deaf and hard-of-hearing baccalaureate-level students. With indirect writing tests, invalid testing could result in a student being inappropriately denied acceptance to a particular college or program, being placed in the wrong course or program of study, being inappropriately passed or failed in a course, not graduating on time, graduating without requisite writing skills, or not qualifying for a certain job. Therefore, direct writing tests should be used with these students.

If you would like to obtain information in an area beyond what you see listed, you can write to the first author of closely related papers, c/o NTID. If you are unable to obtain one of the publications on this sheet from your local library, you may send this form to: Educational Technologies Resource Room, National Technical Institute for the Deaf, 52 Lomb Memorial Drive, Rochester, NY 14623-5604.

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____ *Clarq, J.R., & Walter, G.G., Supplementary Security Income payments made to young adults who are deaf and hard of hearing*
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