

THE CONSTRUCTIONIST MIRROR - HELPING TEACHERS FIND THE LEARNER INSIDE

Gary S. Stager, Dr. Douglas Clements, Dr. Linda Polin, Di Fleming, Marian Rosen²

THE CHALLENGE

Gary S. Stager

Educational Consultant

One of the challenges of teacher renewal is the process of moving teachers along the road from traditional models of instruction towards the constructionist model of creating a rich learning culture for all students. We must provide numerous vivid opportunities for the professional educator to experience their own learning and reflect on their personal construction of any new knowledge gained. Ongoing staff development activities and immersion-based whole learning institutes can be an effective vehicle for encouraging collaborative problem solving, thinking about thinking, and most importantly for allowing the teacher to fall in love with his/herself as a learner and with learning.

Extensive teacher development experience suggests that it is often easier to empower a traditional teacher as a learner than it is for them to become self-confident in their role as teacher in a constructivist setting. Minimizing this chasm between learner and teacher is critical to the formation of rich cultures of learners. Many teachers are dependent on the creation of a "constructionist mirror" designed to illuminate this gap. The panel members in this session will share their ideas as to how we may help teachers unify the often disparate views of themselves as teacher and learner.

THROUGH THE LOOKING GLASS

Dr. Linda Polin

Associate Professor of Education - Pepperdine University

When Alice ventures through the looking glass she finds a world that is familiar and yet different. Objects and occasions are recognizable: queens, knights, cats, tea parties, jury trials, croquet matches. However, on this "other" side of the looking glass she finds them to be very different in meaning, function, and procedure. At first a confused Alice fights experience with logic, but as it proves an unreliable tool, she eventually adopts a more adventuresome and inquisitive approach to her experiences. Along the way she encounters characters who are slightly more competent than she at making sense and progress in this world. They help her out, mostly by pointing out clues, asking provoking questions, sharing tools, and reflecting with her. Her adventures supply opportunities for her to tinker with her understanding. Well before the end of her adventure she shows a sufficient depth of understanding to be selected Queen of the microworld she is visiting.

I think this is a good description of and prescription for teacher development of a particular kind. I am interested in moving teachers from the instructionist logic of their curricular drawing room to the constructionist adventures of slightly unfamiliar microworlds. I will share a few experiences (tasks) that I think successfully take my graduate students (K-12 teachers), through the looking glass, and describe their reactions.

TEACHERS' PERSPECTIVES ON MATHEMATICS

Dr. Douglas Clements

Associate Professor of Education - SUNY Buffalo

Teachers' perspectives on mathematics helps determine the classroom environment she or he creates. In the words of Richard Skemp there are "...two effectively different subjects being taught under the same name 'mathematics'" (1976, p. 22). One subject, instrumental mathematics, consists of a limited number of rules without reasons. The other, relational mathematics, is knowing both what to do and why. It involves building up conceptual structures or schemas from which a learner can produce an unlimited number of rules to fit an unlimited set of situations. As Skemp continues, "...what constitutes mathematics is not the subject matter, but a particular kind of knowledge about it" (p. 26). Mathematics to Skemp is a system of concepts that becomes organized at increasingly higher levels of abstractions.

To learn these concepts, students need examples, such as meaningful applications of arithmetic operations such as subtraction. Such concepts, once learned, serve as meaningful examples for higher level concepts. Rote, or instrumental learning, actually blocks later learning because students do not build the necessary mental structures that support higher-level concepts.

Most teachers and teachers-to-be believe that instrumental view. They believe that mathematics is a fixed, static, and narrow subject. They believe that understanding mathematics means memorizing the rules and using them to find answers to problems. That is not surprising, given that these beliefs are formed for the most part during the teachers' own years of studying mathematics in school. They conduct classrooms in which the beliefs are formed anew by their students. Some do profess beliefs in relational understanding of mathematics. But it is difficult even when we embrace new ideas not to interpret them through our old mindsets.

Teachers who are successful share one characteristic: They reflect on their own practice, questioning whether it is consistent with a relational understanding of mathematics.

Logo experiences for teachers and Logo extensions designed for integration with their mathematics curricula, provide one efficacious mechanism for providing teachers' reflection on mathematics as a discipline and as a subject to be learned, by themselves as well as by their students. Examples will be provided from an NSF-funded project to integrate Logo into the mathematics curriculum for teachers and their elementary school students.

THE INSTRUCTION TRAP

Di Fleming

Head of Middle School - Methodist Ladies' College, Australia

Teachers are very good at telling stories about their teaching, but few have good stories about their learning. Educators need to focus on how learners learn rather than how teachers teach through self reflection and exploration of their teaching and learning style. Successful teachers frequently employ egocentric, theatrical methods which "raise the dead daily" in the classroom. Today, teachers need to move from instruction of students to construction where the learning is student and teacher centered.

Teachers experience difficulty finding the learner inside because they often associate this with childhood. We need to rekindle the "child inside" so as to relate to students and their insatiable appetite to learn by building on their existing understandings.

Traditionally, teachers have seen their professional world through subject centered eyes which I believe has become a major barrier to teacher self awareness. "It is endemic in school thinking to suppose that learning is facilitated by a process of micro-dissection of a domain of knowledge into dozens or hundreds, of thousands, of fragments of knowledge that will be strung together as curriculum."³

Technology in the classroom will ultimately free teachers from their instruction trap. At Methodist Ladies' College, we have found that student and teacher use of personal computers has changed substantially the role of the teacher and the understanding of learning. The implementation of personal computers has changed a teacher centered classroom into a learner centered environment. An environment where both the teacher and the student explore the learner inside.

Footnotes:

² Panel Members: Gary S. Stager - President & Educational Consultant: Schools for Our Times; Dr. Douglas Clements, Associate Professor of Education: SUNY Buffalo; Dr. Linda Polin, Associate Professor: Pepperdine University; Di Fleming, Head of Middle School: Methodist Ladies College; Marian Rosen, Teacher: Ladue, MO Schools and Logo Action Research Collaborative Researcher

³ Harel I. (1991) *Children Designers...* "Foreword by Seymour Papert." p xii (Norwood, NJ: Ablex Publishing Corporation).

Gary S. Stager - President & Educational Consultant: Schools for Our Times

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