Teaching and Learning: Analysis of the Relationships

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What is the nature of the relationships between teaching and learning? Is teaching derived from learning? Is learning derived from teaching? Are the relationships between teaching and learning more complex and less straightforward?

Attempts to clarify the relationships between teaching and learning have been made across educational discourse and continue to be made. The analytic trend in the philosophy of education excelled in this matter (cf. Scheffler, 1960; Peters, 1967; Hirst, 1973), trying to explore relationships between teaching and learning relationships through apriori analytic examination of the terms "teaching" and "learning."

The present article seeks to clarify these relationships differently in three ways: (1) by extracting the teaching-derived-from-learning argument from the educational discourse influenced by the cognitive psychology; (2) extracting the learning-derived-from-teaching argument from the educational discourse influenced by philosophy; and (3) exposing the circular relationships between teaching and learning, and the mutual benefit they both derive from this circularity.[1]

Teaching derived from learning

Although attempts to derive teaching from learning are by no means a new enterprise, recently it has been resumed in educational discourse with new momentum stemming from the strong impact of cognitive psychology on educational discourse. Robert Marzano wrote:

> I believe that the "heart of the matter" of any educational reform or restructuring is the relationship between the teaching and learning processes. We know that effective teaching mirrors effective learning, yet as educators we have not mounted a serious effort to organize teaching around the learning process. Instead, we have viewed education as an institution or an administrative system or a set of instructional techniques. We have not examined the learning process and then built instructional systems,

[1] The article is focused on "the heart of pedagogy" – teaching and learning relationships – but the other educational commonplaces are implicitly involved. For instance, the "subject matter" shapes the nature

> administrative systems, indeed, entire educational systems that support what we know about the learning process. We have not built education from the bottom up, so to speak. (1992, p. 1)

Why, according to Marzano, "We have not built education from the bottom up" until now? Because, until now we didn't know enough about the process of learning. Now, due to the appearance of "the mind new science" (Gardner, 1985), we do know enough – enough to base teaching on learning.

Prior to the appearance of cognitive psychology, research on learning was subject to the behaviorist paradigm. Behaviorist psychology tried to base teaching on learning as well, but its paradigm (unobservable phenomena are not legitimate objects for science, or do not even exist; learning should be reduced to observable behaviors; learning is a behavior produced by conditioning) reached a "postmature stage in which the researchers become frustrated with inconsistencies in experimental results and with the inability of the going paradigm or paradigms to answer the questions they really want to answer" (Sternberg, 1990, p. ix).

The decline of the behaviorist paradigm enabled the emergence of the new paradigm. Cognitive psychology "permitted" researchers to open "the black box" – the human mind – and to study and conceptualize its unobservable contents. The new paradigm developed fast and produced fresh knowledge on learning and other cognitive processes. From this knowledge, claimed the cognitive psychologists and their messengers in the field of education, we can derive our method of teaching. Since the cognitive science informs us about the ways children and adults learn, and the aim of teaching is to facilitate and foster learning, teaching should be directed by the theories and findings of the cognitive science.

"Today," Susan Chipman and Judith Segal wrote, "our long-standing aspirations for education can draw upon new resources provided by the recent rapid growth of research into cognitive function" (Chipman & Segal, 1985, p. 5). John Bransford and his colleagues wrote: "The revolution in the study of the mind that has occurred in the last three or four decades has important implications for education… a new theory of learning is coming into focus that leads to very different approaches to the design of

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of learning (learning math and learning to be aware of yourself are different "learnings"), and the "milieu" shapes the aim of teaching (cf. Schwab, 1978).

curriculum, teaching, and assessment than those often found in schools today" (Bransford at al. p. 3). John Bruer wrote in the same spirit:

> To improve teaching and learning in our schools, we will have to apply what we have learned from three decades of research on how human mind works… Cognitive scientists study how our mind works – how we think, remember and learn. Their studies have profound implications for restructuring schools and improving learning environments. Cognitive science – the science of the mind – can give us applied science of learning and instruction… The science of mind can guide educational practice in much the same way that biology guides medical practice (Bruer, 1993, pp. 1-2).

In short, the cognitive science enlightened us about the nature of learning and the conditions for its growth, and all we – the educators – should do from now on is to derive rules for teaching from the nature and conditions of learning – to "built education from the bottom up."

Here are some schematic examples to demonstrate the logic of this derivation or of "building education from the bottom up":

Undermining. *The nature of learning*: people learn well when they're confidence is undermined, when the world disrupts their schemes (concepts and expectations). Undermined people are driven to learn in order to restore the cognitive equilibrium they have lost (cf. Fosnot, 1996). *Rule for teaching*: Teaching should undermine the students commonsense, challenge the beliefs they take for granted, and then help to restore their cognitive equilibrium through learning.

Multiple Intelligences. *The nature of learning*: People learn well when the subject matter matches their intelligences profile (cf. Gardner, 1993). *Rule for teaching*: Teaching should direct its contents to the dominant intelligences of the student (and strengthen his or her weaker intelligences after he or she has gained enough self confidence).

Learning and Thinking Styles. *The nature of learning*: People learn well when the methods of teaching and assessing match their thinking and learning styles (cf. Sternberg, 1997). *Rule for teaching*: Teaching and assessing should adjust itself to the student's thinking and learning styles.

Motivation. *The nature of learning*: People learn well when they are driven by internal motivation (cf. Nicholls, 1989). *Rule for teaching*: The teaching method and its contents should stimulate student's curiosity and learning for the sake of learning.

Zone of proximal development (ZPD). *The nature of learning*: People learn well when the subject matter is at a stage they can reach with the help of another person, when it fits their developmental state (cf. Wertsch, 1985). *Rule for teaching*: Teaching should spot the zone the student is capable of attaining with the help of a teacher and direct him/her there.

Attribution Theories: *The nature of learning*: People learn well when they have productive (implicit) theories of learning, intelligence, development etc. (cf. Dweck, 2000). *Rule for teaching*: Teaching should empower the productive theories of the learners in various ways.

Distributed Intelligence: *The nature of learning*: People learn well when their intelligence is distributed – supported by other people, computer, books, etc (cf. Salomon, 1993). *Rule for teaching*: Teaching should be done in an environment which encourage people think with other people, computer, books etc.

Feedback: *The nature of learning*: People learn well when they supplied with ongoing, informative and formative feedback (cf. Brooks & Brooks, 1993). *Rule for teaching*: Teaching should supply the students with a productive feedback.

Obviously, the above examples do not exhaust all the contemporary cognitive theories about learning and its conditions; they merely demonstrate the logic that cognitive psychologists have projected onto educational thought: cognitive science discovers the nature of learning and the conditions needed for its growth, and educators should derive their methods of teaching from this nature and these conditions, replacing intuition, charisma, tact and other "mystical" sources of teaching with scientific sources .

Based on this agenda Diane Kuhn could write that the time is ripe for changing the division of labor between educators and cognitive psychologists; the psychologists should determine the goals and methods of teaching, and not the educators – as was formerly the case (Kuhn, 1990, p. 7). Some philosophers have contributed to this vision of "building education from the bottom up" and urge educators to give priority to the theories and findings of cognitive science on learning (Doll, 1993, 101). Based

on this line of thought the educational imperative that took hold in educational discourse was: "derive teaching from learning!"

Learning Derived from Teaching

More than a hundred years ago William James warned teachers not to expect that "the science of the mind" would supply them with rules for teaching: "I say moreover that you make a great, a very great mistake, if you think that psychology, being the science of the mind's law, is something from which you can deduce definite programmes and schemes and method of instruction for immediate schoolroom use" (1899/1958, p. 23). Why are teachers making "a very great mistake" when they seek to deduce pedagogical directives from psychology? Jerome Bruner explained:

> One might ask why a theory of instruction is needed, since psychology already contains theories of learning and of development. But theories of learning and development are descriptive rather than prescriptive. They tell us what happened after the fact: for example, that most children of six do not yet possess the notion of reversibility. A theory of instruction, on the other hand, might attempt to set forth the best means of leading the child toward the notion of reversibility. A theory of instruction, in short, is concerned with how what one wishes to teach can best be learnt, with improving rather than describing learning (Bruner, 1966, p. 40).

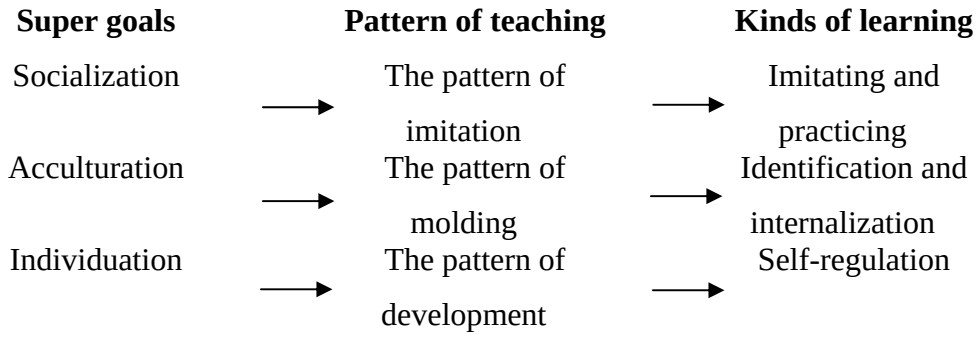
The epistemic structure of a teaching theory, according to Bruner, is prescriptive – tells us what *ought* to be done, while the epistemic structure of a learning theory is descriptive – tells us what *is* happening in the mind when people learn. Since we can not deduce "ought" from "is", we can not deduce teaching from learning.

But Bruner conceived the theory of teaching in a restricted way. A theory of teaching does not just attempt "to set forth the best means of leading the child toward the notion of reversibility," but it sets aims toward which the child should be taught – for instance toward understanding the notion of reversibility.

If the aims of teaching are an essential part of the theory of teaching, then they also determine what kinds of learning will participate in the educational process. Let me elaborate on this crucial point.

Zvi Lamm (Lamm, 1976) argued – and many thinkers have advanced similar arguments (cf. Kohlberg & Mayer, 1972; Fenstermacher & Soltis, 1986; Egan, 1997)

– that education has educational "super goals" – socialization, acculturation and individuation. According to the first, the aim of education is to adjust the students to the society in which they grow. According to the second, the aim of education is to shape the students' minds and characters in the light of the values and convictions of a preferred culture. According to the third, the aim of education is to enable each student to fulfill his or her unique personality. Each educational goal involves a typical pattern of teaching: socialization – the pattern of imitation; acculturation – the pattern of molding; individuation – the pattern of development. *Each pattern of teaching implies and fosters typical kinds of learning*.



That is to say, since the theory of teaching determines what should be taught and why, it determines what kinds of learning will be actualized in the educational process.

Notice, there is one word – "learning" – but there are many kinds of learning. We should beware of reification, of assuming that if there is one word in the language – "learning" – there is only one kind of learning in the world. To learn the processes which take place in the organic cell, to learn how to solve an equation with two variables, to learn to drive a car, to learn to appreciate classical music, to learn to be self-conscious – are different "learnings." Each type of learning involves different and typical mental processes. There is some "family resemblance" between the processes, but it's doubtful whether they have a common essence.

After teaching has determined the types of learning that will be included in the educational process, it might address research in learning and ask for relevant knowledge. In terms of the division of labor, and contrary to Kuhn's vision, the educators – the designers of the teaching and its aims – do the main job, while the psychologists – the experts of learning – do the secondary one. That is, after the educators have decided what and why to teach, they can and should learn from the

psychologists about how to foster the kinds of learning they have decided to cultivate. This will certainly make teaching more effective.

To conclude this section: contrary to the position of psychologists, who maintain that "any theory that presents a view of how children learn or develop implies a theory of instruction" (Wood, 2001, p. 97), the present section claims that each theory of instruction implies a theory of learning, or at least – types of learning that will be developed in the educational context. When teaching determines why and what to teach, it determines the nature of the learning that will be fostered. In other words, learning is derived from teaching.

A Circular Derivation

Zvi Lamm described the relationships between teaching and learning in the following way:

> Learning and teaching are not two sides of the same coin. Learning is a process that takes place in a living organism; as a result of it, the behavior of the organism changes. This process is the object of psychological research. The role of teaching, on the other hand, is to organize the environment in such a way as to enable learning to take place. In order to organize the environment, we must know the conditions under which learning takes place…
>
> Instruction, according to its own logic, may reject certain learning activities (such as indoctrination or conditioning) and approve others (such as learning by discovery or learning based on understanding). Once instruction has approved certain kinds of learning, psychological research into them should dictate the activities of instruction (Lamm, 1976, p. 188, 190).

Lamm relates to the normative constraints that teaching projects on the findings of learning research. But a theory of teaching, as claimed in the previous section, must be more comprehensive – it has to define the boundaries in which the research on learning will be conducted. The "approval" for learning is not given post-factum but pre-factum. The account according to which the research of learning explores learning in general and then submits its findings, to be approved by teaching – teaching adopts findings that are consistent with its moral commitments – is partial and inaccurate. A complete and more accurate picture of teaching-learning relationships is one

according to which teaching directs the science of learning, choosing what kinds of learning to explore, and then receives its findings as if they were findings on learning in general, learning in itself.

Psychologists of learning, certainly educational psychologists, do not inquire into learning in general, as a phenomenon in the world; they inquire into certain kinds of learning – kinds of learning which teaching has chosen to cultivate after deciding what to teach. Some psychologists might believe that they inquire into learning as it is, but they are actually studying the learning of valuable contents – contents that teaching, as the agent of a given society and culture, holds in high regard. For instance, contemporary western society and culture appreciate acquiring skills that could not be appreciated in the past, let alone defined as educational aims: learning to learn ("lifelong learning") and learning to think critically and creatively. As a result, psychologists study the kinds of learning that stem from these preferences: What is the nature of learning whose object is independent learning or critical and creative thinking? what are the conditions needed for their growth? They submit their findings to the educators and "miraculously," the findings relating to learning in general, learning in itself, learning as a uniform phenomenon – match the aims of teaching and support them.

Take for example the findings of constructivism – "perhaps the most current psychology of learning" (Fosnot, 1996, p. 8). The crucial finding of constructivism is that learning is constructing:

> Across a variety of contemporary views of learning, one central idea (some would argue a mantra-like slogan) provides a unifying force acknowledged by virtually all: the acquisition of knowledge is not a simple straightforward matter of "transition", "internalization," or "accumulation," but rather a matter of learner's active engagement in assembling, extending, restoring, interpreting, or in broadest terms, *constructing* knowledge out of the raw materials of experience and provided information (Salomon & Perkins, 1996, pp. 114-115).

This finding of the constructivist research on learning – learning as constructing – "somehow" suits contemporary educational aims, among them learning to learn and critical-creative thinking. When these are the educational aims, the prioritized learning – the type of learning that will participate in the educational process – is

indeed active, creative, and constructive. When, by contrast, the aim of teaching is to produce obedient citizens, learning is imitative, and the findings of the research of learning will most probably not be the same.

The relationships between teaching and learning according to the analysis offered here are the following: Teaching, whose preferred aims reflect the priorities of its societal and cultural context, encourages and rejects certain types of learning (western society and culture encourages, or claims to encourage, active and investigative learning and rejects passive and imitative learning). Thus, learning is derived from teaching, and a *circular derivation* emerges: research on learning, which influenced by societal-cultural-pedagogical priorities, addresses the types of learning derived from teaching (or its aims). It studies them and offers its theories and findings to teaching. Teaching, whose preferences cannot have an empirical basis, relates to these theories and findings as an empirical verification of its preference. It is not aware that the results submitted to it by the research on learning do not apply to learning in general but to specific types of learning which are preferred for ideological reasons. Research on learning, in turn, also believes that it explores learning itself, as an essential process that occurs in the human mind when it learns something, whatever that may be. Research on learning is not aware that it inquires into processes according to the moral-pedagogical preferences of teaching, which are not at all scientific or based on facts or findings. These relationships between teaching and learning are based to a certain extent on self-deception; they persist because they benefit both teaching and learning; teaching and learning emerge as if they were completely scientific: teaching is allegedly based on empirical research on learning, and research of learning is allegedly research of learning as a neutral entity in a world that is not conditioned by preferences, assignments, or approval derived from "arbitrary" normative and ideological priorities.

A Practical Conclusion

This academic-analytic article strives to shed light on the relationships between teaching and learning. Has it any practical implications? Well, it certainly does not direct teachers how to teach in their classrooms, but it does offer an antidote to the contemporary "savior syndrome" (a typical educational expectation "to be saved" by some outside force; see Perkins, 1992, pp. 43-44). Teachers, as well as educators at all levels, hope that new sciences – mainly cognitive science and neuroscience – will

supply their educational endeavors – from teaching in the classroom to national policy – a scientific basis and sound guidance. The logic of this hope was depicted in the first section. A correction to this fashionable expectation was suggested in the second section: education is "ideological business" (Lamm, http://zvilamm-archive.org/bio_heb.html) or "biographical business" (Egan, 1999); it stems from moral and personal stances that lack scientific basis. Therefore, teachers, as well as other educators, should start from their own ethical-pedagogical identities, from the question "who am I as a teacher and educator? What educational values and goals are dear to me?" Education, in sum, is a "top-down" domain, and the top is the pedagogical identity of the teacher or educator, which he or she has to discover and invent. The third section strengthens this line of thought: teaching seeks a scientific basis, but this basis is not in the findings of learning research, but the epistemic, ethical and esthetical beliefs of a certain society or community (cf. Gardner, 1999). If "there is nothing so practical as a good theory," as Kurt Lewin once said, in the domain of education there nothing so practical as a good philosophy.

References

Bereiter C. & Scardamalia M. (1993), *Surpassing ourselves: an inquiry into the nature and implication of expertise*, Chicago and La Salle, Illinois: Open Court

Bransford, J. Brown, A. & Cocking R. (eds.) (2000), *How people learn: brain, mind, experience, and school*, Washington, D.C: National Academy Press.

Brooks J. & Brooks M (1993), *In Search of Understanding: The case for Constructivist Classrooms*, Alexandria, Virginia: ASCD

Brown, J, Collins, A. & Duguid, P (1989), "Situated cognition and the culture of learning," in *Educational Researcher*, Jan-Feb., pp. 32-42.

Bruer, J. (1993), *Schools for thoughts: a science of learning in the classroom*, Cambridge, Massachusetts: Bradford Book, The MIT Press.

Bruner, J. (1966), *Toward a theory of instruction*, Cambridge, MA: The Belknap Press of Harvard University Press.

Chipman, S. Segal, J. & Glaser, R. (1985), *Thinking and learning skills*, Vol. 2: Research and open questions, New Jersey: Lawrence Erlbaum Associates, Publishers, Hillsdale.

Doll, E. William (1993), *A Post-modern Perspective on Curriculum*, New York: Teachers College, Columbia University.

Dweck, C. (2000), *Self-Theories: their role in motivation*, personality, and development, Philadelphia: Psychology Press, Taylor and Francis Group.

Egan, K. (1999), "Letting Our Presuppositions Think for Us", (Idem), *Children's Minds, Talking Rabbits, and Clock Oranges*, New York: Teachers College Press, pp. 71-84.

Fosnot, C. (ed.) (1996), Constructivism: theory, perspective, and practice, New York: Teachers College Press

Gardner, H. (1985), *The mind new science: a history of the cognitive revolution*, New York: Basic Books.

Gardner, H. (1993), *Multiple Intelligences: The theory in Practice*, New York: Basic Books.

Gardner, H. (1999), *The Disciplined Mind: What All Students Should Understand*, New York: Simon & Schuster

Hirst, P. (1973), “What is teaching”, in Peters, R. S. (Ed.), *The Philosophy of Education*, Oxford: Oxford University Press, pp. 163-177.

James, W. (1899), *Talks to teachers on psychology*; *and to Students on some of life's Ideals*, New York: Holt

Kuhn, D. (ed.) (1990), *Developmental perspectives on teaching and learning skills*, Basel: Karger.

Lamm, Z. (1976), *Conflicting theories of Instruction: Conceptual Dimensions*, Berkley, California: McCutchan Publishing Corporation

Lamm, Z., "Ideology and Educational Thought", http://zvilamm-archive.org/bio_heb.html.

Lave, J. & Wenger, E. (1995), *Situated learning: legitimate peripheral participation*, Cambridge: Cambridge University Press.

Lipman, M. (2003), *Thinking in education*, Second Edition, Cambridge MA: Cambridge University Press.

Marzano, Robert (1992), A different Kind of Classroom – Teaching with Dimensions of Learning, Alexandria, Virginia: ASCD

Nicholls, J. (1989), *The competitive ethos and democratic education*, New York: Harvard University Press.

Perkins, D. (1992), *Smart schools: from training memories to educating minds*, New York: The Free Press.

Peters, R. S., (1967) (Ed.), *The concept of education*, London: Routledge & Kegan Paul.

Rogoff, B. (1990), *Apprenticeship in thinking: cognitive development in social context*, Oxford: Oxford University Press.

Salomon, G. (Ed.) (1993), *Distributed cognitions*, New York : Cambridge University Press.

Salomon, G. & Perkins, D (1996), "Learning in Wonderland: What dDo Computers Really Offer Education?", in Kerr, P. (Ed.), *Technology and the Future of Schooling: Ninet-Fifth Yearbook of the National Society for the Study of Education*, Chicago, Illinois: University of Chicago Press, pp. 111-130.

Scheffler, I. (1960), *The language of education*, Springfield, Illinois: Charles C. Thomas.

Sternberg, R. (ed.) (1990), *Wisdom: its nature, origins, and development*, Cambridge, MA: Cambridge University Press, 1990.

—— (1997), *Thinking Styles*, Cambridge, MA: Cambridge University Press.

Schwab, J. (1978), "The Practical: Translation into Curriculum", Wesbury I. & Wilkof N. (eds.), *Schwab, J, Science, Curriculum, and Liberal Education: Selected Essays*, Chicago & London: The University of Chicago Press.

Tishman, S. Perkins D. & Jay E. (1995), *The thinking classroom: learning and teaching in a culture of thinking*, Boston: Allyn and Bacon.

Wertsch, J. V (1985), *Culture, Communication, and Cognition: Vygotskian Perspectives*, Cambridge: Cambridge University Press

Wood, D. (2001), *How children think and learn*, London: Blackwell Publisher.