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A Dialectical Interpretation of Factual Knowledge in Vygotskyan Terms

vs.

Bloom's Taxonomy as Interpreted by the Teaching Staff

at

75th Street Elementary School (LAUSD)

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1. **A Dialectical Interpretation of Factual Knowledge in Vygotskyan Terms vs. Bloom's Taxonomy as Interpreted by the Teaching Staff at 75th Street Elementary School (Los Angeles Unified School District)**

Thesis: Factual Knowledge Exists at a Relatively Low Level of Abstraction

On July 20, 2004 during staff development at 75th Street Elementary School (Los Angeles Unified School District), teachers were told that factual information is not based on abstract information. According to this thesis, factual information is based on concrete basic elements of a content area. Thus, any facts given to the pupils such as $5 \times 5 = 25$ are considered to be statements that do not require much abstraction.

The teachers were told that such factual information, in this case $5 \times 5 = 25$, is the basic building block for other more complex mathematical operations. Thus, factual information is categorized as one of the lower levels of knowledge in accordance to Bloom's Taxonomy. It was further explained that because 5×5 doesn't change (it is always 25), this and other similar multiplication facts are considered to be of low levels of abstraction. This explanation was based on a handout given to all teachers, which was written as follows:

Thesis: Factual Knowledge Exists at a Relatively Low Level of Abstraction

FACTUAL KNOWLEDGE

Factual knowledge encompasses the basic elements that experts use in communicating about their academic discipline, understanding it, and organizing it systematically. These elements are usually serviceable to people who work in the discipline in the very form in which they are presented; they need little or no alteration from one use or application to another. Factual knowledge contains the basic elements students must know if they are to be acquainted with the discipline or to solve any of the problems in it. The elements are usually symbols associated with some concrete referents, or "strings of symbols" that convey important information. For the most part, **Factual Knowledge exists at a relatively low level of abstraction.**

Because there is a tremendous wealth of these basic elements, it is almost inconceivable that a student could learn all of them relevant to a particular subject matter. As our knowledge increases in the social sciences, sciences, and humanities, even experts in these fields have difficulty keeping up with all the new elements. Consequently, some selection for educational purposes is almost always required. For classification purposes, Factual Knowledge may be distinguished from Conceptual Knowledge by virtue of its very specificity; **that is Factual Knowledge can be isolated as elements or bits of information that are believed to have some value in and of themselves.** The two subtypes of Factual Knowledge are knowledge of terminology (Aa) and knowledge of specific details and elements (Ab).

Source: A Handout given to teachers at 75th Street Elementary School (Los Angeles Unified School District) on July 20, 2004 based on a document titled "A Taxonomy for Learning, Teaching, and Assessing- A Revision of Bloom's Taxonomy of Educational Objectives" (name of author or year of publication was not given to the teachers).

In essence this handout (for which the teachers were not given the name of the author or the year of publication) deals with two theoretical postulates. The first one deals with the implication that factual knowledge is based on a relatively low level of abstraction and the second one refers to the **elements or bits of information "that are believed to have some value in and of themselves."** In Section 2 an antithesis is offered against the first postulate and in Section 3 a correction is proposed on the second postulate dealing with the bits of information on an isolated format. I will try to explain why these two postulates are based on a wrong pedagogical focus and thus fail to bring new insights into the art of teaching.

However, let me first explain that the interpretation as given by the teaching staff at 75th Street Elementary School is a very reasonable one based on the current literature of Bloom's taxonomy. Thus, this essay should not be viewed as a critique on the teaching staff, but rather at the interpretation that any other school would have given, especially if we make further research as to what the experts are writing. Let us for example review a chart of the following article, which I retrieved from the internet on Aug. 18, 2006:

Bloom et al.'s Taxonomy of the Cognitive Domain

Citation: Huitt, W. (2004). Bloom et al.'s taxonomy of the cognitive domain. *Educational Psychology Interactive*. Valdosta, GA: Valdosta State University. Retrieved [date], from <http://chiron.valdosta.edu/whuitt/col/cogsys/bloom.html>.

LEVEL	DEFINITION	SAMPLE VERBS	SAMPLE BEHAVIORS
KNOWLEDGE	Student recalls or recognizes information, ideas, and principles in the approximate form in which they were learned.	Write List Label Name State Define	The student will define the 6 levels of Bloom's taxonomy of the cognitive domain.
COMPREHENSION	Student translates, comprehends, or interprets information based on prior learning.	Explain Summarize Paraphrase Describe Illustrate	The student will explain the purpose of Bloom's taxonomy of the cognitive domain.
APPLICATION	Student selects, transfers, and uses data and principles to complete a problem or task with a minimum of direction.	Use Compute Solve Demonstrate Apply Construct	The student will write an instructional objective for each level of Bloom's taxonomy.

ANALYSIS	Student distinguishes, classifies, and relates the assumptions, hypotheses, evidence, or structure of a statement or question.	Analyze Categorize Compare Contrast Separate	The student will compare and contrast the cognitive and affective domains.
SYNTHESIS	Student originates, integrates, and combines ideas into a product, plan or proposal that is new to him or her.	Create Design Hypothesize Invent Develop	The student will design a classification scheme for writing educational objectives that combines the cognitive, affective, and psychomotor domains.
EVALUATION	Student appraises, assesses, or critiques on a basis of specific standards and criteria.	Judge Recommend Critique Justify	The student will judge the effectiveness of writing objectives using Bloom's taxonomy.

If one makes a careful review of Bloom's taxonomy, then one should come to the conclusion that the interpretation as given to the teaching staff at 75th Street Elementary School does coincide with current research, which can be implied from the chart above (Bloom et al.'s Taxonomy of the Cognitive Domain) as given by Huit (2004). Thus, the school director of any school may reasonably postulate that "for the most part, **factual knowledge exists at a relatively low level of abstraction.**"

2. Antithesis: Factual Knowledge is Abstract

According to Vygostyan psychology (Vygotskij, 1978, 1999, 2002), any knowledge is based on a particular level of abstraction, otherwise we would not be dealing with knowledge per se. In my opinion, any concept and any fact such as $5 \times 5 = 25$ is already a generalized interpretation of reality be it at a conscious or unconscious level. To generalize in this sense means to interpret any phenomenon as a general idea valid outside of its immediate context or as in the case of 5×5 , it means to transform any instance of reality into a universal concept. All concepts are general statements of some sort. Thus, "knowledge" per se, even at its very concrete stage or factual domain, **is still based on abstract phenomena** contrary certain interpretations that may be implied based on Bloom's taxonomy.

Unless a pupil is mindlessly reciting a phrase or a fact, then any thought is based on a particular level of abstraction. Therefore, in my opinion a “low level of abstraction” or “factual knowledge at a non-abstract level” in accordance to Bloom’s Taxonomy are terms that become “secondary in nature” in a pedagogical philosophy based on Vygotskian principles. Furthermore, even a fact such as “5 x 5” is a rather complex phenomenon. To begin with, we are dealing with a multiplication fact. That in and itself should warn the psychologist or the teacher that we are dealing with a “generalization of a generalization” in accordance to Vygotskian principles. That is to say, we are dealing with a higher order level of cognition rather than with the supposedly non-abstract or low-abstract levels that may be conveyed in any reasonable interpretations of Bloom’s taxonomy such as the one given by 75th Street Elementary School.

In accordance to the general theoretical framework of Bloom’s taxonomy, it is normal to postulate for example that “5 x 5 = 25” is a prime example of factual information that is supposedly based on a low (or a zero) level of abstraction¹. According to this interpretation, the multiplication facts then may become the building blocks of some new complex insights within the California standards of elementary school education. This, in my opinion, is a rather misleading interpretation of psychic reality. Indeed, according to the Vygotskian principles of thought and language (1999, 2002), a statement such as “5 x 5 = 25” even as a multiplication fact is considered to be a rather complex phenomenon. The idea that factual information somehow reflects a thinking act based on no abstraction or on a low level of abstraction reflects a rather **naïve psychology of child development**, especially if it is used to build a higher form of thinking. That would be the equivalent of building a house on sand rather than on a solid foundation.

Any concept, even in the form of factual information or factual knowledge, is already a generalized interpretation of reality and thus an abstract act of thinking. At some point however, this level of abstraction becomes automatic (that is, it becomes “factual knowledge”) in the mind of an individual.

2.1 The Principle of a Generalization of a Generalization in Accordance to Vygotsky

How should one define a concept according to the theory of Vygotsky? A concept can only be defined within the realms of a semantic system as a special “generalization of a generalization.” Thus, we are dealing with a multi-facet-type-of-generalization in contrast to a “zero-level-of-generalization” in the animal kingdom. Animals cannot generalize because they are incapable of abstracting their visual field at a symbolic level. In other words, animals do not use a symbolic language in order to communicate. In contrast, even children via their mental processes are capable of symbolic language because they are able to find solutions or even make detours in order to solve a problem outside of their immediate visual and perceptual surroundings. Ideas and concepts become the basic tools in order to come up with the best solutions to a particular problem. Animals on the other hand do not have any mental descriptions of time and space relations. Thus, in the case of animal behaviour, we may be justified in speaking about a zero level of abstraction as opposed to the multiple symbolic nature of most human behaviour.

¹ This was in fact postulated during the regular staff development meeting at 75th Street Elementary School, LAUSD on July 20, 2004.

However, in the case of small children, we may indeed be dealing with semi-concepts in relation to the optical constellations of perception. Only true concepts may be reflected in a generalization of a generalization from a **dialectic perspective** because they are based not on their visual and perceptive configurations, but rather on their symbolic value within a linguistic and cognitive system. According to Vygotsky (1978, 1999, 2002), **true concepts may be mediated and this mediation is the true nature of a generalization.**

In conceptual development in accordance to Vygotskian psychology, the field of perception becomes generalized and this generalization becomes itself generalized in the next dialectical level of cognitive development. In other words, any field of perception becomes generalized as soon as a child is able to arbitrarily manipulate the individual objects in his surroundings. In terms of gestalt psychology, what used to be the figure now may become the background and vice versa. Objects become subjective phenomena and thus may be subject to the arbitrary and mediated interpretation of a child who becomes capable of transcending time and space via the use of symbols, especially in relation to human language.

However, at the early stages of conceptual development, objects become generalized in relation to their optical field of reference in a rather semi-conceptual fashion. For example, an **aphasia patient** looking at a clock would describe it not as a clock, but rather as something round with two hands, one larger and one shorter and not with an hour and a minute hand, which would then imply the existence of higher order concepts and ideas. This is the only instance in which we may indeed be able to justify a stage of conceptual development with a near zero level of abstraction, which is different from the interpretation given at 75th Street Elementary School on July 20, 2004 in relation to factual knowledge in accordance to Bloom's Taxonomy.

Interpreting data from a "factual knowledge" point of view in accordance to Bloom's Taxonomy may represent a rather materialistic format of interpreting human development. Teacher should become aware of the very specific stage in which the children exist, because no matter what we do we cannot teach reading to a child who cannot speak (i.e. the case of the six-year old child who speaks like a three year old). Thus, instead of focusing our attention as to the different hierarchical levels of conceptual development, we should emphasize the different levels of conceptual development in which the children interpret their own reality. At the very early stages of child development, we may indeed be dealing with relative low levels of abstraction, but not in the context as presented in the current research on Bloom's taxonomy, but rather within the context of a **dialectic understanding of human development in accordance to Vygotskian psychology.**

At the very early stages according to Vygotsky, that is, at the preschool age or younger, the names of objects may represent concrete attributes. For a very young child to name an object means to give it a specific attribute. A door is just there to be closed or to be opened as a square or rectangular looking thing through which one comes in and out of a place and a house is that particular box-like place where he and his parents live in. That is far from the most abstract interpretation of a door as an entrance to paradise or as an exit into freedom within a poetic or philosophical point of view. Nevertheless, even at the concrete level, the names of objects may be considered to represent "semi-concepts" with a certain level of abstraction, or even "true concepts" depending on the stage of development of a particular child. A round thing with two hands is now viewed as a clock and no longer as something round. **Semantic mediation replaces the pure and direct perceptual experience and meaning becomes a part of our consciousness.** At this level of semantic mediation we are now dealing with a generalization of a generalization according to Vygotsky. In this case

the clock becomes a generalized concept out of a particular optical frame of reference. In other words, the clock has been generalized out of a particular perceptual physical surrounding, which is also considered to be a generalization at a more concrete level. Thus, we are dealing with a first and a second level of generalization or a generalization of a generalization.

However, a concept may also result out of “a generalization of a generalization of a generalization.” This would be the case of a multiplication fact such as 5×5 , which according to the interpretation given at 75th Street Elementary School on July 20, 2004 represents a low level of abstraction. **That is not the case!!!** Yes, there are instances in which we may speak of a particular phenomenon with a relative low level of abstraction, but such a phenomenon is viewed differently in Vygotskian theory. Here we are dealing with a truly cognitive based experience and not with a theory dealing with “factual knowledge” in accordance to Bloom’s Taxonomy. Knowledge of particular arithmetic facts in my opinion implies the existence of a concept, otherwise we could not be dealing with “arithmetic knowledge” per se. **Thus, factual knowledge in some cases, such as “5 X 5,” may exist at a relatively higher level of abstraction.** Thus, the case of the multiplication facts should make this postulate clear: at the lowest level of abstraction, we may indeed be dealing with “some kind of factual understanding or knowledge,” but not necessarily in accordance to Bloom’s taxonomy, but rather with a very perceptual experience or scheme in Piagetian terms. A child, for example, may see three groups of oranges. Here, we are dealing with a generalization of the first order because the child, although he is not able to conceptualize the three groups in any abstract form, is still able to generalize or single out the three groups out of their physical surroundings. For such a child, the three groups of oranges are just there in a particular visual field and do not represent any kind of mathematical relationship. The three groups of oranges are just there next to each other as objects to be eaten or to play with.

However, for the elementary school pupil, the three groups may indeed represent a conceptual idea, such as **a fact of addition**: “4 oranges, plus 4 oranges and plus 4 oranges make 12 oranges put together.” In this case, we may indeed postulate a generalization of a generalization. The first generalization represents the optical field in which a child has been able to single out the three groups of oranges out of their more general physical surrounding. The second generalization may be represented by its arithmetic addition, “ $4 + 4 + 4$,” which can be further generalized into the more abstract levels of a multiplication fact such as $4 + 4 + 4 = 4 \times 3$. This multiplication fact may be further generalized into the next higher level of abstraction such as in some algebraic relationship ($4 \times 3 = 3 \times 4$ $ab = ba$). Thus, algebraic operations may represent a generalization of a multiplication. Likewise a multiplication is a generalization of an addition and an addition is a generalization of the more concrete and perceptually based physical phenomena. This means that by the time that we deal with algebraic operations, we may in effect be dealing with generalizations of a fourth higher order, that is, **“with a generalization of a generalization of a generalization of a generalization.”**

This theoretical perspective should prove the point that the interpretation behind Bloom’s Taxonomy, as given by the teaching staff at 75th Street Elementary School on July 20, 2004 in regards to factual knowledge, is misguided and fails to explain human knowledge of a more factual and/or perceptual nature.

3. The Vygotskyan Predicate: Unitary vs. Elementaristic Analysis

The principles of gestalt psychology, especially those related to the Berlin School of thought (i.e., Köhler, W. (1971) at the turn of the twentieth century brought about a new era of psychological research. According to Wolfgang Köhler, the whole is not just greater, but also different than the sum of its parts. The whole does not exist isolated from its parts and vice versa and the parts not only have to be considered within the context of the other parts in question, but also in accordance to the entire phenomenon in which they appear. Yet, in Bloom's Taxonomy we still read statements that tend to emphasize the parts in an isolated format. The handout on Bloom's Taxonomy given to the teachers on July 20, 2004 at 75th Street Elementary School indicates **“that Factual Knowledge can be isolated as elements or bits of information that are believed to have some value in and of themselves.”** A typical example of this atomistic approach is the tendency to give each level of Bloom's taxonomy a corresponding set of verbs:

1. **Knowledge:** arrange, define, duplicate, label, list, memorize, name, order, recognize, relate, recall, repeat, reproduce state.
2. **Comprehension:** classify, describe, discuss, explain, express, identify, indicate, locate, recognize, report, restate, review, select, translate,
3. **Application:** apply, choose, demonstrate, dramatize, employ, illustrate, interpret, operate, practice, schedule, sketch, solve, use, write.
4. **Analysis:** analyze, appraise, calculate, categorize, compare, contrast, criticize, differentiate, discriminate, distinguish, examine, experiment, question, test.
5. **Synthesis:** arrange, assemble, collect, compose, construct, create, design, develop, formulate, manage, organize, plan, prepare, propose, set up, write.
6. **Evaluation:** appraise, argue, assess, attach, choose compare, defend estimate, judge, predict, rate, core, select, support, value, evaluate.

With such lists, it is hoped that teachers and curricular developers may create a better pedagogy. According to this approach, the cognitive levels may be viewed from the perspective of particular sets of actions (i.e., certain specific lists of verbs that correspond to a particular level of Bloom's taxonomy). Such an analysis in accordance to Vygotskyan theory may be ill conceived. Vygotsky's main method is not to focus on the elements (i.e, lists of verbs), but rather on the units relevant to a particular whole. He warns the researcher that an investigation based on the elements is incomplete. Rather than conforming to the laws and characteristics of the elements, Vygotsky exhorts the researcher to look for units in terms of molecular movements that may also be able to reflect the characteristics of their corresponding whole. In his book, “Thought and Language” (1999, 2002) Vygotsky declares for example that an analysis of water into its chemical elements (oxygen and hydrogen) will not explain the characteristics of water in its ability to extinguish fire because oxygen stimulates the combustion of fire and hydrogen is an inflammable element. So, why does water have the characteristics of extinguishing fire? Well, for sure we will not be able to find out if we were to analyse water into its basic elements, oxygen and hydrogen!

According to the interpretation² of Bloom's taxonomy on factual knowledge as given by 75th Street Elementary School, the basic elements represent a tremendous wealth and because of it, a student could not learn them all relevant to a particular subject matter. That may be true, but more important than such a statement would be to find out how the elements interact with one another in terms of molecular units of movements. What's important for

² The one give to the teaching staff at 75th Street Elementary School on July 20, 2004.

example is not to investigate brain research or develop pedagogical principles, or even design a battery of standardized tests in terms of the amounts of words³ a child has learned or heard up to a particular age, but rather how a child is able to express a concept relevant to a particular social context. Social, cognitive and affective meaning for example is more important than an additive value of linguistic and pedagogical research. It is not the one-to-one correspondence between letters and sounds that is important, but rather the relationship between phonemes within the context of a word, words within the context of a sentence, sentences within the context of a phrase, topic or overarching idea and such an idea within the context of the entire human nature of a child, be it in the affective, social, cognitive or psycholinguistic domain.

However and because Bloom's Taxonomy on factual knowledge may be interpreted as being imbedded into a psychology based on elements and bits of pieces of information (i.e. the targeted list of verbs), its entire frame of reference may under such atomistic interpretations become "anti-holistic" in nature. In the aforementioned handout we read for example that even experts in the social sciences, sciences, and humanities have difficulty keeping up with all the new elements. Such a statement is worth mentioning, but it nevertheless fails to mention any holistic principles of investigation. If the researchers do happen to have problems keeping up with the tremendous amounts of information, then it would be wiser to focus on the molecular or unitary movements of the corresponding facts. To claim that we as humans live in a world with a tremendous wealth of information is not enough. To claim that a scholar has to deal with a million bits of pieces of information is in my opinion a view that reflects an additive piece-meal philosophy which is completely out of focus. Our world view becomes too limited, which may have rather negative consequences:

As our knowledge increases in the social sciences, sciences, and humanities, even experts in these fields have difficulty keeping up with all the new elements. **Consequently, some selection for educational purposes is almost always required.**

Source: A Handout given to teachers at 75th Street Elementary School (Los Angeles Unified School District) on July 20, 2004 based on a document titled "A Taxonomy for Learning, Teaching, and Assessing- A Revision of Bloom's Taxonomy of Educational Objectives" (name of author or year of publication was not given to the teachers).

We end up conforming to an information age delineated into different fields of expertise with a rather negative and fatalistic consequence: instead of transcending a field of knowledge, some of our scholars may end up as one-dimensional specialists. As such, they may become individuals unable to bring all the parts together into a philosophical approach to life. Worst of all, most modern students are no longer capable of mastering and transcending a particular field of knowledge and as such they are no longer masters of philosophy, but rather experts or specialists of a particular field of knowledge. In my opinion, the elements of this materialistic world have managed to master and enslave their very own souls and spirits. In our vanity, we have ceased to view life from the broadest perspective possible, and as such have become captives of our own materialistic paradigms.

³ For example, list of verbs that correspond to the different levels of Bloom's taxonomy.

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