



**MEDIATED LEARNING  
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Mediated Learning Experience:  
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## Refael Feuerstein

### Introduction

This issue focuses on the relationship between mediated learning, in its various forms, and teaching. Professor Carl Haywood, who collaborated for many years in the research and implementation of mediated learning concepts, develops and summarizes in his article the principles of the Mediated Learning Experience as formulated by Reuven Feuerstein. He emphasizes that the teacher's role is not limited to transmitting knowledge, but rather involves mediating ways of thinking, constructing meaning, fostering the ability to generalize, and strengthening the learner's sense of competence.

Professor Yaron Schur and Dr. Shira Farby present Schur's innovative concept of "Attentive Teaching" — an approach that seeks to transform learning into a personal, dynamic, and reflective process in which the student does not merely absorb information, but actively constructs understanding and develops an inner world of meaning.

Professor Alex Kozulin and Meirav Hadad reveal in their study an important and thought-provoking finding: while many teachers naturally demonstrate sensitivity, intentionality, and empathy toward their students, they do not spontaneously mediate transcendence — that is, they do not naturally lead students toward generalization, transfer of principles, and expansion of thinking beyond the immediate task.

Today, as we stand at the threshold of a new era — the rapidly growing integration of artificial intelligence into education — the relevance of the principles of Mediated Learning Experience becomes more critical than ever before. We must ask ourselves how the principles presented in this important issue intersect with the new challenges facing education in the age of AI.

Although the articles do not directly address this contemporary challenge, they naturally raise an essential question: what are the implications of these ideas for students living in a world where knowledge is immediate, accessible, and at times even appears to "think" on their behalf?

The direction I would like to suggest is that Mediated Learning Experience is more essential today than ever for the development of a thinking human being. The central educational challenge posed by the age of AI is preventing what might be called "the laziness of the mind."

Precisely because technology can provide rapid and efficient answers, we must cultivate in learners clear, critical, flexible, and profound thinking.

Even in the age of artificial intelligence, the human mind must remain sharp, creative, and discerning. For in the end, AI is — and will remain — a tool. Human beings will still need to define the problem, refine the challenge, ask the right questions, exercise moral and human judgment, and know how to guide and utilize algorithms effectively. For this very reason, the principles of Mediated Learning Experience do not lose their significance; on the contrary, they become foundational for shaping independent, thoughtful, and responsible individuals in a rapidly changing world. These are, of course, only preliminary reflections, and I believe we will need to continue exploring in much greater depth the relationship between Mediated Learning Experience and the world of artificial intelligence. As technology continues to develop and penetrate more deeply into our lives and educational systems, we will need a more profound examination of the role of the human being, of human thinking processes, and of the unique place of mediation in shaping consciousness, moral judgment, and genuine learning.

*From the MLE archive.*

The following paper by H. Carl Haywood was originally published in 1987 in *The Thinking Teacher* newsletter. Although nearly forty years had passed since the date of the first publication, many of the issues discussed by him remain quite relevant to the current discussions about mediated learning and cognitive modifiability. Not everyone will agree with Haywood's claim that "*Intelligence itself is relatively constant, and efforts to change it by education yield only modest increases as a result of substantial investment*", and that intelligence should be distinguished from the basic cognitive functions, which "*must be acquired (i.e., are not genetically 'given'), and are acquired through learning*". However, even when we do not agree with all of Haywood's claims, we hope that contemporary readers find his arguments engaging and stimulating for further discussion.

Alex Kozulin

### **A Mediational Teaching Style**

H. Carl Haywood

The mediational teaching style is a direct derivative of Feuerstein's Theory of Structural Cognitive Modifiability. It is an application by teachers in classrooms of principles of adult-child interactions, referred to as "mediated learning experiences" (MLE), that are thought to be essential for the adequate cognitive development of children. Such interactions typically take place between children and older members of their families, such as parents, grandparents, older siblings, and other caretakers. These interactions have the function of "mediating" the generalized meaning of the world to the children; that is, they help children to understand that events, objects, and persons have meaning beyond themselves, that the universe has predictable structure, that understanding that structure helps one to know what to do in a wide variety of future situations, that it is possible to make explanatory rules that help one to organize observations, and that it is essential to test the applicability of such rules in a wide variety of circumstances. The intermediate-range goal of MLE is to acquire the fundamental cognitive functions that underlie the ability to learn effectively across many and varied content fields.

#### **The Role of MLE**

The role of parents in their children's cognitive development represents a major difference between the developmental theories of Piaget and those of Feuerstein (Arbitman-Smith, Haywood, & Bransford, 1984). Piaget gave scant attention to the role of child-rearing agents such as parents, grandparents, and teachers (Haywood & Wachs, 1981), but in Feuerstein's

view, such persons play a central and critical role (Feuerstein & Rand, 1974). In fact, Feuerstein has maintained that adequate cognitive development is not possible without some degree of MLE provided by parents and/or other caregivers. He has presented a schematic diagram showing his idea of the “proximal” and “distal” etiologic conditions that lead to either adequate or inadequate development of the most fundamental cognitive functions (Feuerstein, Rand, Hoffman & Miller, 1980). According to this scheme, the various conditions that have traditionally been thought of as “causes” of inadequate cognitive development, such as poverty, neurological impairment, emotional disturbance in the child or parents, and low educational levels of the parents, are presented instead as correlates or “distal etiologic conditions.” That means that even though inadequate cognitive development is found more frequently when those conditions are present than when they are not present, the conditions themselves do not cause inadequate cognitive development.

Instead, the “proximal” (immediate) source of inadequate cognitive development is a lack of adequate MLE. The correlation arises because those distal etiologic conditions, or correlates, are often, but not necessarily, associated with inadequate MLE. Feuerstein et al. (1980) have contended that when MLE is sufficient for individual needs of particular children, adequate cognitive development will be the result, and that when MLE is not sufficient, inadequate cognitive development, and the syndrome of “cultural deprivation” (see discussion below) will be the result. Thus, Feuerstein et al. (1980) have suggested that adequate cognitive development can occur in spite of such “distal” conditions as poverty, neurological impairment, mental retardation, emotional disturbance, and low educational levels, when there is adequate mediation of the most fundamental cognitive functions in children by more competent older persons. Further, they have suggested that inadequate cognitive development may occur in spite of favorable circumstances with respect to these “distal” conditions, that is, in favorable economic circumstances and in the absence of neurological impairment, mental retardation, emotional disturbance, and low educational levels, when MLE is not sufficient to meet the individual developmental needs of particular children.

The condition of poverty is a good example of this correlated relationship. Haywood and Stedman (1969) have noted that over 80 percent of all mildly mentally retarded children come from “poor” families, so one might be tempted to conclude that poverty causes mild mental retardation. At the same time, these authors also noted that only 10 percent of children from poor families are ever identified as mentally retarded. If 90 percent of families in which the condition of poverty is present produce children whose intellectual functioning is above the

cutting point for the diagnosis of mild mental retardation, then it would be quite illogical to argue that poverty causes mental retardation. It is also true that 10 percent of children from poor families do get identified as mentally retarded, and that is more than three times the prevalence of mental retardation found in the population as a whole. Thus, while poverty does not cause mental retardation, it is clear that the social circumstance of poverty may contain some elements (positive or negative) that bring about a correlation (in this case, a greater likelihood of occurrence) with mental retardation. The position of Feuerstein et al. (1980) is that the correlation is brought about by the fact that adequate mediated learning experience is less likely to be provided, for a variety of reasons, when families are economically and socially deprived than when they are economically and socially secure.

It is clear, then, that “adequate” MLE is a critical condition for adequate cognitive development, according to Feuerstein’s position. That being the case, one might well ask, “How much MLE is enough?” The answer is that it depends on the individual needs of the child. Haywood (1989; Haywood & Switzky, 1992) has made a sharp distinction between “intelligence” (native ability, relatively fixed and constant, largely genetically determined) and “cognitive processes” (modes of logical thought, must be learned, can be taught, highly modifiable through teaching), and this distinction can be helpful in understanding this relationship. Feuerstein et al. (1980) have suggested two ways in which basic cognitive processes are acquired: (a) through “direct exposure” learning, that is, they can be learned without external mediation through children’s direct successive encounters with environmental events; (b) mediated learning experience, that is, through the mediation (by adults) of the generalized meaning of those events. Every child, no matter how “intelligent,” must acquire the basic cognitive functions in order to think logically, perceive the world in structured, orderly, and reasonable ways, know how to learn, and apply his/her intelligence to new learning and problem-solving situations without further need for mediation. Children who are genetically (or otherwise) destined to have relatively high intelligence may acquire a larger proportion of their basic cognitive functions through direct exposure learning than do children of initially lower intelligence, and further may require less frequent, less repetitive, and less intense MLE in order to acquire their basic cognitive functions. On the other hand, children who have relatively lower intelligence, or who have special handicapping conditions such as limited vision or hearing, may learn less through direct exposure to environmental events, thereby demonstrating a greater need for MLE, and further may require more frequent, more repetitious, and more intense MLE in order to acquire their basic cognitive functions. The

developmental question with such children is not whether they can acquire important thinking modes and processes, but *how much mediated learning experience*, of what kinds, over what period of time, will be necessary in order for them to acquire these processes. To the extent that such MLE is available, the cognitive development of these children will be more nearly adequate than it would have been with less MLE. Failure of either group of children to get adequate MLE will result in inadequate cognitive development, the “syndrome of cultural deprivation,” a greater discrepancy between their performance and their potential than would have been necessary with more MLE, and less effective learning of both academic and social content than would be potentially possible for them.

Feuerstein has often referred to the “syndrome of cultural deprivation.” One must be careful to distinguish his use of this term from the widely understood definition of the 1960s. Between 1960 and the early 1970s, American developmental psychology and early education were characterized by enormous optimism about the possibility of raising intelligence through education, especially early education, and by the notion that some cultures and subcultures were inherently “depriving” with respect to some of the necessary components of “good” childbearing environments. Children who were reared in such cultures and subcultures were seen as “culturally deprived,” meaning that their cultures had deprived them of essential developmental experiences, and that it would be somehow necessary to “compensate” for those lacks. Feuerstein has maintained that such a notion of cultural deprivation is false and misses the essential point. He asserts that every culture and subculture that has been around long enough to warrant the name contains all the social elements that are essential for adequate cognitive development. In the vast majority of families, these elements are transmitted to the children through a broad set of processes that he calls “intergenerational cultural transfer” — the passing of a culture’s essential elements from one generation to the next— that relies heavily on MLE as its chief tool. It is when environmental events interrupt that transfer, that is, when children are somehow denied the benefits of their own culture, that the children can be regarded as “culturally deprived.” Thus, culturally deprived children, rather than having been denied essential developmental events by their cultures, have instead failed to receive those events even though all essential elements are present in their cultures. It is the failure to get adequate mediation of culturally characteristic ways of perceiving and organizing the world, thinking about thinking, and defining and solving problems that constitutes the syndrome of cultural deprivation. The optimistic side of this view is that, since all the essential elements are present within one’s culture, deficiencies in their transmission can be made up by

subsequent mediation. That often becomes the role of teachers.

### **Summary of the Role of MLE**

It is possible to summarize the important points about MLE from a combination of Feuerstein's Theory of Structural Cognitive Modifiability and Haywood's transactional perspective on the nature and development of intelligence. (Haywood & Switzky, 1992; Haywood, Tzuriel & Vaught, 1992.) The following list contains the essential points.

1. Intelligence itself is relatively constant, and efforts to change it by education yield only modest increases as a result of substantial investment.
2. Intelligence alone (defined as "native ability") is not a sufficient condition to provide for effective perception, thinking, learning, and problem solving.
3. There is a finite number of fundamental processes of thinking that, combined with certain affective, motivational, and attitudinal factors and particular habits of intellectual work, constitute "basic cognitive functions" and are necessary for effective systematic perceiving, thinking, learning, and problem solving.
4. The basic cognitive functions must be acquired (i.e., are not genetically "given"), and they are acquired through learning.
5. Cognitive learning is of two kinds: direct exposure to environmental events and mediated learning experience (MLE).
6. Some MLE is necessary for all children, but the amount, quality, intensity, frequency, and duration of what is needed for adequate cognitive development will vary as a function of individual differences in children (e.g., genetic intelligence levels, sensory integrity, emotional stability, and environmental support). When MLE is inadequate to children's individual developmental needs, the result is inadequate cognitive development, the "syndrome of cultural deprivation," and relatively ineffective academic and social learning.
7. When MLE is adequate to children's individual developmental needs, the retarding effects on academic and social learning of such conditions as poverty, mental retardation, emotional disturbance, and low parental education levels may be significantly offset. The result is a higher level of cognitive development and relatively more effective academic and social learning.
8. Providing MLE is an essential role of parents, grandparents, and older siblings in the process of intergenerational cultural transfer. This process is repeated in every culture, and all cultures have within them the essential elements of adequate cognitive

development of their children. Failure of transmission of culture-characteristic modes of thinking constitutes the syndrome of cultural deprivation.

9. When some aspects of cognitive development have not been stimulated adequately through MLE, it is possible to mediate those aspects at later ages through carefully constructed teaching. In other words, opportunities that might have been missed by parents can be picked up by other teachers.

10. The mediational processes can be described and replicated, and these processes constitute an identifiable and important style of teaching: the mediational teaching style.

### **Qualities of Mediated Interactions**

According to Arbitman-Smith, Haywood, and Bransford (1984), "Mediating the learning experiences of children...includes, but is not limited to, such functions as stimulus selection (helping children to reduce the number and complexity of available stimuli by attending selectively), focusing on relevant aspects of a stimulus complex, repeating exposure to important stimuli, perceiving and understanding similarities and differences, sequential relationships, dimensionality, antecedents and consequences, commonalities in experience, and such operations as comparing, categorizing, relating past, present, and future, and grasping the concept of generalizability of experience to new situations". In addition to those rather broad functions, mediators:

1. Supply the information that may be needed to learn relationships or to find solutions.
2. Ask questions, i.e., elicit rather than give answers;
3. Guide children's learning by arranging and directing sequences to experiences in a developmental fashion;
4. Bring about the induction of explanatory rules by calling attention to similarities among isolated events;
5. Guide the deduction of applications of rules;
6. Build the confidence of the children by communicating belief in their competence as thinkers.
7. Maintain a *metacognitive* emphasis, i.e., focus attention on the children's own thinking processes and encourage them to do so.

In doing these things, mediators make use of several quite specialized strategies, including *process questioning, bridging, challenging (requiring justification), teaching about rules, and emphasizing order, predictability, system, sequence, and strategies.*

### **Criteria of Mediated Learning Experience**

A teaching style is concerned not only with *what* one teaches but primarily with *how* one teaches it. Every interaction between an adult and a child has some potential for being a mediated interaction, that is, for being generalized beyond the content of the immediate situation. Whether or not a given interaction will be useful in promoting the cognitive development of children will depend upon the quality of that interaction. Feuerstein has suggested a number of criteria of mediated learning interactions. From this list I present the first six criteria and suggest that they are the most important. Every interaction can be examined to determine to what extent it reflects each of the six criteria. Awareness of these criteria will encourage parents and other teachers to try consciously and deliberately to construct their interactions with children in such ways as to reflect these criteria.

**Intentionality** - In mediated interactions, the mediator intends to use the interaction to produce cognitive change in the child. Content situations (e.g., need to know color names, wish to understand how birds fly) thus become vehicles for the teaching and learning of concepts and principles of thought, which produce cognitive change in the child.

**Transcendence** - The mediator tries to produce structural cognitive changes in the child, i.e., changes that transcend the immediate situation. An event could be seen as only an isolated event, but a mediational teacher will give such an event a transcendent (generalized) meaning by attempting to relate the event to previous and even future events of a similar nature, and thus to extract a generality (explanatory rule).

**Communication of meaning and purpose** - mediators do not have cognitive or strategic secrets from children. It is important to let the children know why one is doing any particular activity, i.e., in order to produce structural cognitive changes in the children. Mediators communicate both the immediate (content) meaning of events and their generalized relationship to other events (e.g., “Why do you think it is important for us to do this? Yes, so we will have a plan, and know what to do as we go along!”).

**Mediation of a feeling of competence** - Children’s feelings about their own competence as learners are extremely important. Mediators communicate about this in two specific ways. The first way is to reward appropriate responses, especially process-oriented responses, with acceptance, acknowledgment, and praise. The second is to be certain that the children

understand exactly what aspects of their behavior were good and should be repeated. Thus, a mediator does not stop at saying “Good!” when a child has done well, but might say something such as “Good! You made a plan, so now you know what to do as you go along.”

**Regulation of behavior** - Children, especially young children, often require some regulation of their behavior in order to demonstrate their cognitive competence. A very common source of errors in intellectual work is impulsive responding, i.e., giving answers before one has had time to examine the questions and the possible solutions. A good mediator helps children to inhibit their impulsive responding and thus to improve the quality of their responses. Another manifestation of the need for regulation of behavior is the inability or unwillingness to respond, even when the mediator knows that responses are available to the children. Good mediators help children to “unblock” available responses, to be willing to give answers, by creating an affectively safe and expectant environment.

**Shared participation** - Mediators convey the attitude that they and the children are engaged in a shared quest for structural cognitive change in the children. Each has an identifiable and separate role, but each is a participant and shares in a “We’re in this together, and you can count on me to do my part” manner. The interaction, then, is not one-way, and while it is directive, it is neither authoritarian nor patronizing.

Mediated interactions differ demonstrably from non-mediated interactions in several ways. First, of course, mediated interactions are characterized by the criteria discussed in the preceding paragraphs. Second, mediated interactions are strongly process-oriented; that is, the dialogue between child and adult is focused on generalizable processes of thinking and learning rather than on answers to immediate problems in immediate situations. Third, mediated interactions display mediators’ confidence in children’s ability to learn and apply appropriate thinking modes and strategies. In contrast to many kinds of non-mediated interactions, mediated ones constitute true dialogue, that is, a “two-way street” in which information is sought by each participant from the other, and the unique role of each participant is recognized. These distinctions are both conceptual and empirical. At the empirical level, Dale and Cole (1988) carried out a systematic comparison of CCYC (Haywood, Brooks & Bums, 1992) and DISTAR (Becker, Engelmann, & Thomas, 1975; Becker, 1977), the latter a content-oriented curriculum whose teaching style is substantially behavioristic. The two curricula differ

markedly in concept and approach, but these authors asked to what extent they differ in actual implementation; i.e., they wanted to know to what extent observers could distinguish the two approaches on observational criteria. First, they developed 14 categories of teacher and child behavior on which the programs were expected theoretically to differ. Observers were trained and made their observations according to strictly prescribed protocols. There were significant differences on 9 of their 14 categories, all in the expected directions. DISTAR exceeded CCYC in frequency of: eliciting verbal imitation, eliciting unison responding, limited response questions, “labelling” questions, and immediate correction (reinforcement). CCYC exceeded DISTAR in frequency of process presentation by the teachers, process generalization, process questions, and open-ended observation questions. The researchers commented that “It is certainly true that the difference between the programs is clear virtually immediately on entering the classrooms.” Thus, there is evidence that teachers who have been well trained in the mediational teaching style do indeed behave in their classrooms in ways that are conceptually consistent with the requirements of that teaching style, and that their classroom behavior is visibly different from that of teachers trained in a different teaching style.

### **Unique Character of Teacher-Mediated Interactions**

What teachers do by way of mediation of cognitive functions in classrooms is indeed a way of compensating for inadequate MLE in home situations, but the two are not the same. That is to say, when mediation takes place in home and family settings, and is done by primary child-rearing agents, it is of a different quality than when it is done in classrooms by teachers. Some of the differences should make it possible to realize a more efficient gain from the classroom procedures.

1. Since the efforts of teachers occur later than do the primary efforts of parents, the children are more competent, presenting a developmentally more complex set of abilities, habits, attitudes, and expectations as well as a richer accumulation of experience. This important difference means that teachers may move at a more rapid pace, that they can draw on a richer and more varied store of familiar experience in the children (to which they can bridge cognitive concepts), and that the children themselves can be counted on to participate more actively and confidently.
2. Family mediators rely upon naturally occurring situations as opportunities to mediate, but classroom teachers, having many children to whom they must mediate at once, typically construct their own opportunities to mediate. The contrived situations used by classroom

teachers allow the teachers to control the parameters of mediational situations, to set clear mediational goals, and to sequence the children's cognitive learning in developmental ways.

3. Family mediators, relying on naturally occurring situations, use relatively "concrete" situations and must make the effort to extend the meaning of these in cognitively generalizable ways. Classroom teachers, using contrived and structured situations, go more directly to representational thought; in fact, their "bridging" is done frequently to other "concrete" or real-life situations when the same cognitive functions are required or useful.

4. Classroom teachers make use of the social situation of having many children of similar developmental age at once, while in families, there is rarely more than one child of a given developmental level. The presence of other children can be a powerful advantage in the mediational process, since the children sometimes understand other children's examples and experience more readily than they understand the experience of adults, and there is a certain amount of social facilitation in the learning process. Of course, these same phenomena can work to the disadvantage of classroom teachers to the extent that the social interactions are negative or destructive.

5. In general, classroom mediation is more structured, more clearly teacher-directed, more focused upon specific cognitive goals, and more concentrated (in the sense that similar cognitive functions are being emphasized throughout the day in a cognitive classroom) than is true of family mediation.

### **The Most Useful Mediating Mechanisms**

I have suggested earlier five mechanisms of mediational teaching that are used frequently and that are thought to be especially useful in helping children in classroom settings to acquire developmentally important thinking processes. These mechanisms are discussed here.

**Process questioning** - This is the single most frequently used mechanism in a cognitive classroom. Teachers ask many questions, and their questions are very often of a process nature. This means that they ask "how" questions: "Yes, but how did you know?" "How else could you do that?" "What must you do first, and how can you find out what to do next?" This mechanism is extremely important as a *metacognitive* tool, i.e., it helps to focus children's attention on their own thinking processes and encourages them to engage in similar "small conversations" with themselves.

**Bridging** - This is the process whereby teachers encourage children to think of different applications of the thinking processes and strategies they have been discussing. It is *cognitive functions* that are bridged. Content may also be bridged, but in a cognitive curriculum, the bridging of cognitive functions is more important. Thus, if one is teaching “comparing on multiple dimensions,” a teacher might ask the children to nominate other situations (than the ones introduced in the lesson) when it is important or helpful to compare on more than a single dimension. It is probably true that the learning of a concept or principle of thought does not take place merely in the verbalizing of the principle (although there is evidence that that helps!) but in the children’s successive attempts to apply the principle in a variety of different situations and applications. Because we as human beings are capable of representational thought, actually trying out thinking principles in varied real situations is not completely necessary; we can “try out” applications symbolically, by imagining them and by discussing them. The following principles should govern the use of bridging as a mediating mechanism:

1. “Bridges” should be *elicited* from the children, not told to them (although some “pump priming” is often necessary).
2. Bridges should be to events and circumstances that are familiar to the children.
3. Bridging examples should be simple and straightforward, not complex and logically tortured.
4. Bridging examples should be elicited in several domains of experience, especially other school contexts, home situations, and peer group interactions.

**Challenging, or requiring justification** - At first glance, this mechanism might seem to have the potential for decelerating participatory behavior in children. Good mediational teachers establish the habit of challenging both correct and incorrect responses. Challenging must be accompanied by the rule of accepting as many of the children’s responses (the “Yes, but...” mechanism). One might say, for example: “Yes, you are right, it could be that way. You could also look at it another way, and maybe find an even better answer.” Challenging a correct answer conditions the child against the expectation that a challenge by the teacher means that their answers are wrong. A “correct” challenge might be: “Yes, that’s right. How did you know that should be the answer? Why is it better than this one? What would be wrong with this one? Could you show me/tell me how you thought about that and found the right one?”

**Teaching about rules** - This is a critical aspect of generalizability. The idea, of course, is that if one can make an applicable rule, one will know what to do in future similar situations. The children themselves should be asked often to generalize: “Can we make a rule about how to do this kind of problem? If redbirds have feathers, bluebirds have feathers, eagles have feathers, grackles have feathers, and sparrows have feathers, can you think of a rule about birds? Does it apply to hawks? To penguins?” In addition to such rule-making, mediational teachers should ask the children to comment often on the general utility of rules: “Would it help us to have a rule here? How? How could we make one? Who can tell me two different times when we need to have rules in order to know what to do?”

**Emphasizing order, predictability, system, sequence, and strategies** - This one is quite important but perhaps a bit more difficult to define in operational terms. The general attitude of mediational teachers should be that there is order in the universe, that events are predictable if one understands the rules and has enough information, that events, objects, and even persons are arranged in systems, that the order in which one looks at or does things is important, and that problem-solving is often primarily a question of finding the most effective strategy. These attitudes are mediated throughout a CogEd day, beginning with planning time and ending with summary time, both of which serve to emphasize the orderliness and predictability of the universe as well as the satisfaction of placing events in agreeable sequence. Within any interaction during the day, these elements can be injected into a discussion on almost any topic.

There are as many specific ways to mediate cognitive functions to children as there are good mediators. In fact, good mediators use their own personalities and the feedback they get from the children to regulate their behavior and to select mediational strategies, rather than memorizing particular mediational sequences and using those over and over with children.

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## **Attentive Teaching – Creating a visible understanding and conceptual change**

Yaron Schur<sup>1</sup> and Shira Farby<sup>2</sup>

The learning experience occupies a central part of our lives: we spend thousands of hours learning in formal education during varying stages of our lives. Many learners feel that teachers did not see them or their individual skills (Gardner, 2004). The Attentive Teaching tackles the need to enable students to be active and to achieve a visible change in their understanding of concepts or texts in all subject matter and at all ages. Attentive Teaching helps them feel a sense of belonging, to be visible in the class, to solidify a sense of efficacy *en route* to building personal and class understanding. In this process, many communication channels on the learned subject are created in the class. The learning and visible change processes enable students' personal growth and feeling of competence.

As part of Attentive Teaching, visual representations, especially drawings, but also AI visuals, are used as a teaching language, accompanied by written and oral explanations. The visual language comes in addition to oral and written and mathematical languages. The visual representation enables each student to create and express their personal understanding and to link general ideas to their unique world and it is an in-depth means of learning. Through visual representations, learners can observe the learned subject from a general point of view while linking it to their personal world and can express their unique points of view in mediated interactions. The learners are seen and are also exposed to their peers' visual representations and written explanations and they all participate in the class discussion, thus expanding their own understanding and becoming partners in creating the class or group understanding.

The understanding process can enable students to experience visible personal conceptual changes in a long-term experience, while creating visual representations and explanations of the learnt topic or text at the beginning and the end of the learning process – dynamic learning. The understanding process can also be based on Thinking Journeys involving imagination and multiple perspectives allowing comparison processes.

Keywords: teaching methods, mediation, understanding and expression, creativity in teaching, language and education

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Attentive Teaching emphasizes three classroom goals:

1. Constructing unique visible understanding at an individual and class level (learning).
2. Mediation for collaboration and responsibility in constructing understanding and attentive evaluation (teaching).
3. Creating visible changes in the learners' understanding using observation and imagination (conceptual changes).

### **Constructing unique visible understanding at an individual and class level (learning)**

Attentive Teaching (Schur, 2025) connects Feuerstein's MLE with the constructivist approach, to enable students experience conceptual change processes in subject matter teaching in the classroom. Mehta & Fine (2019) emphasize the need for a meaningful deeper learning in American schools and say that it is rare to see a school where it really occurs. They describe their disappointment in observing classroom teaching in schools that had reputation of being "leaders in the field" of good teaching and learning, but in reality, they "so dimly resemble its reputation" (ibid. P. 2). The challenge is for classroom teaching to engage the students and enable them to create meaningful understanding (Perkins, 1998).

The constructivist approach to learning states that learning is an individual process, and all human beings construct their learning in unique, individual ways (Amin & Levrini, 2018), making it impossible to learn in place of others. Therefore, students experience learning processes in their unique ways. Understanding is considered as conceptual change, meaning the process through which learners revise or replace their existing conceptions with more scientifically accurate understandings. Foundational work by Posner et al. (1982) established that effective teaching for understanding focuses on facilitating this shift, enabling learners to progress from initial, often naïve conceptions to more advanced conceptualizations within a given domain.

Reuven Feuerstein was a great believer in the ability of human beings to change their cognitive abilities. His belief was not directed specifically on the child in front of him. His mediation related to finding ways to enable her to experience meaningful cognitive change. He looked for small changes to explain how cognitive processes would enable the child to solve the given problem or task set before her. Feuerstein's Mediated Learning Experience (MLE) (Feuerstein et al., 2006) is relevant to two main challenges facing current classroom teaching. On the one hand, the changing era demands students to be able to cope with the constant change of our age, meaning that they have to be able to continue learning throughout life. Experiencing meaningful changes, even small ones, enables children and adults at any age to change their feeling of competence and know that they can improve their ability to learn. At the same time, classes nowadays are composed of students that come from a variety of backgrounds, and teachers need to be able to listen to the variety of voices of the class. MLE gives educators the tools to listen to the cognitive difficulties of students in the class and to enable students to use strategies for tackling the different assignments that they have to face.

Feuerstein's focus on change processes made him concentrate on the cognitive processes of students. As he rightly emphasized, it would be much easier to enable mediatees to change, if mediation were to focus on the cognitive processes. In order to enable students to experience cognitive change he tried as much as possible to use tools that did not include the need for content knowledge. Feuerstein et al.

(1991) claimed that content knowledge posed a much higher degree of difficulty of change in comparison to a content free context.

Attentive Teaching connects MLE with the constructivist approach to learning. Meaning, it facilitates the learners' unique, individual construction of understanding in line with constructivist principles (Schur, 2025), but it adds the MLE principles to the teaching process. In so doing, it sets the mediator's role in fostering a classroom discourse that supports each student's personal meaning-making across subjects and ages. Attentive Teaching emphasizes how individual learning and knowledge construction are expressed in the class learning process, while collaborating with the teacher and class peers. Attentive Teaching enables the teacher-student dialogue to become authentic learning (Liebman, 2013); learning with a high degree of involvement of the learners and teachers.

Attentive Teaching shines the spotlight on the where the learner stands at present. Expressing their personal position enables a dialogue with students about their point of view of the learned topic or concept, while at the same time being respectful of and promoting the other viewpoints expressed in the class and to the knowledge needed for understanding the subject matter. Enabling each learner to become "visible" contributes to their level of understanding and feeling of competence. During the understanding process, the learners express their internal worlds, and become active partners in shaping the teaching; they do not regurgitate what they heard from the teacher, but rather forge their own path on the way to individual understanding that is constructed by a combination of individual creation together with listening to the other learners' understanding and with the teacher's mediation. The teacher pays attention to each individual's point of view and mediates by asking questions that lead to deeper understanding of each student. The classroom discourse allows the multi-faceted expression of all the individuals' understandings that gives rise to the class's unique understanding of the learned subject.

Understanding occurs when the learner's internal personal world becomes connected to the learned subject. This is achieved when students create visual outputs with an accompanying written and oral explanation, enabling them to express their personal world and how they understand the learned subject. Obviously, the standard of the drawings or the AI visuals is unimportant. It can be schematic yet still express what the learner wishes to convey. An active and engaged learner will have deeper and more meaningful learning and understanding.

Incorporating a visual representation, a drawing or a computerized or AI visual, into the process allows learners to express their understanding in a different way than they do in writing (Bloom, 2000). Observing the learnt concepts or topics allows the learners to relate to them as a whole that encompasses details. The teacher can see in a glance what the learners had to say on the learnt topic. It is important that the students explain in writing what they drew because it gives a description of the point of view of the learner on the learnt topic. The mediated discourse on the visual representation of each student relates also to the written explanation and to the oral participation of the learner of their products and ideas. The mediation is done in the classroom, and the other students are encouraged to participate and

add their points of view. The discourse is always respectful and relates positively to the products and the ideas of the students.

The learners become aware of how their understanding has changed, both on an individual level and as part of change in understanding experienced by the entire class. The changes in understanding are visible in the visual representations and explanatory texts that change during the learning processes. All the learners in the class are actively involved in the learning processes.

### **Mediating for collaboration and responsibility in constructing understanding and attentive evaluation (teaching)**

Reuven Feuerstein emphasized that in itself, an action does not necessarily lead to learning, and certainly not to understanding of what has been learnt: “Repetitive actions that are not accompanied by thinking and understanding processes may be enjoyable, but do not necessarily create learning” (Feuerstein, 1998, p. 40). If learners are to experience learning and achieve understanding, there has to be a mediated interaction, which is a discussion about the learned subject while having the opportunity to view the world the learner is connecting to. Feuerstein (1998, p.44) noted that “A mediated interaction makes sense of a person’s meeting with the world”. Feuerstein's Mediated Learning Experience – MLE, is designed to enable people connect and interact with the world around them, even when the information or situations they encounter requires different levels of thinking or understanding (Feuerstein, Feuerstein & Schur, 1997)

The mediated interaction is fundamental to Attentive Teaching. The teacher leaves his or her planned place and moves toward the learners. This is an essential part of Attentive Teaching, even if it may lead to the teacher abandoning the original lesson plan or parts of it, since it gives her a better opportunity to enable the students to go through meaningful understanding and enable them express their imagination, understanding, feelings, points of interest, level of writing, sense of confidence when speaking to others, the ability to react appropriately and actively listen. The teacher mediates and the learners influence theirs and their peers’ understanding, creating open communication in the class. Attentive Teaching teaches students and their teacher to really pay attention and to delay offering corrective feedback.

As an “attentive teacher”, the teacher first has to decide what is the core aspect of the subject he wishes to teach, and then to take note of the learners’ place in relation to this subject and to mediate for them so that they will experience a change in their understanding. The teacher attentively listens to this process and then practices a two-fold mediation. First – listening to and making individual reference to each learner’s place in relation to the learned subject, and second – offering relevant tools and knowledge to the students of the class to enhance their understanding. It is important to focus on the learner during the lesson, since personal attention to his or her place makes them feel that their voice is important.

In order to teach for understanding teachers have to be bold and attentive at the same time. Teaching for understanding requires that students change their initial understanding of

concepts. Experiencing change processes is not easy for students. It involves emotional confusion and sometimes resistance to the teaching offered. The emotional processes that involve also curiosity and a willingness to learn new knowledge are called ‘uncertainty processes’. These require students to leave their comfort zone and experience meaningful learning, whilst going through these uncertainty processes. Therefore, it is important to mediate with a combination of empathy and assertiveness.

### **Creating visible changes in the learners’ understanding using observation and imagination (conceptual changes)**

Learning for understanding takes a long time and it is complex. A concept has to be studied over a period of time to be understood. Each concept or subject is made up of many layers and different components that have to be observed from diverse viewpoints. Creating understanding is not limited to a single lesson, it lasts over a time period to enable learners to embark on a thinking journey to link what they have learnt in comparison with different worlds. The process of changing understanding is an empowering, yet not always easy, experience for learners. They experience curiosity and knowledge expansion but also emotional uneasiness and sometimes even opposition to the subject matter. Within the framework of Attentive Teaching, uncertainty processes are important. While causing a lack of confidence and doubts, uncertainty also leads to curiosity and a will to learn. At the appropriate level, uncertainty processes are important for generating learning for understanding (Schur 2015).

Attentive Teaching enables learners to create spaces of learning. Marton et al. (2004) claim that to understand a certain topic, it has to be examined in different situations which are then compared. They say that creating variations of a subject or concept and then comparing its different aspects and contexts is necessary for understanding it. For example, daytime appears differently on Earth’s surface and on Moon’s surface. Comparing the two will enable the learner to understand what are the invariant aspects that define the concept, and what are the other aspects that are unique to the appearance in one or another context.

The visibility of the understanding processes enables an evaluation which is connected to the ongoing teaching and learning processes. As the learners express their personal understanding in the different lessons over time, the teacher can observe how an individual process of learning and understanding of the learned subject is constructed. This process is then analyzed to evaluate the extent to which the learners have changed their understanding of the subject. A table is constructed relating to different levels of understanding that can be drawn out of analyzing the students' drawings and explanations of the learned concept (Gal, Schur, Nevo & Gan, 2022).

## 1. Dynamic Learning

Dynamic learning refers to observable understanding processes of concepts, texts or surroundings relevant to the learned subject. It is dynamic in the sense that the learners represent the concepts visually more than once and the comparison of these representations shows change. Learners are able to experience conceptual change (Yeheili, 2021) in all subjects. In Attentive Teaching, the learners create their personal viewpoint on the learned subject with visual representations and written and oral explanations. If, after they have studied the subject, the learners repeat their observation, then it is possible to see their personal conceptual changes and changes in perspective that they experienced. This process is called “dynamic learning”.

This idea of "conceptual change", holds for all subjects, in every field, and at every age. Students do not come to the learning process as blank slates; they come with initial perceptions that are relevant to their knowledge and their worlds, and as they learn they may possibly change their understanding of the learned concepts. When the learners express their viewpoint visually and verbally several times during the learning process, their change in understanding can be observed. The teacher can see the students' realistic place relative to the learned subject, as well as their place on the journey toward a scientific perspective of this subject. The learners become aware of these processes and the teacher can simultaneously mediate at two levels – to individual students and to the class as a whole.

## 2. A Thinking Journey

A Thinking Journey is a sequence of several mediated interactions, some of which may involve dynamic learning processes, that allow the learners to experience the learning of a concept from various viewpoints with the aim of enabling conceptual change and expanding understanding of the learnt subject. According to Carey (2009), conceptual change happens when learners change their point of view of the learnt subject. She describes this change of perspective in a drawing that appears on the cover of her important book. The drawing portrays a man pulling his shoelaces and getting up in the air, which allows him to view the world from high above. Carey calls this process "bootstrapping", and it also applies to the similar process that is enabled by conducting a Thinking Journey. The idea is that in one's mind, one can change the position where one views a relevant environment, and this change of position enables the learner to change his perspective on the learnt subject and thus facilitates the process of conceptual change.

On a Thinking Journey, the learners leave their static observation point and embark on imaginary thinking journeys to different viewpoints that are relevant to the learnt subject. These imaginary journeys help the learners compare different viewpoints. Using higher order thinking skills, the learners write a story that incorporates the conceptual understanding with their personal aspects. Each learner connects to the subject in a different manner and processes it in their unique way. The learners come across interesting and unfamiliar places and walk around these locations together with their peers. Feelings are involved in the Thinking Journey. During the journey, they process emotions that arise when they draw and write their story, thus expressing their surprising and exciting encounters. Gopnik (2009)

emphasizes the power of imagination. She claims that going to a specific city through the use of the mind is very similar to really being physically there. So using the imagination to go to a certain environment is a meaningful experience and also an exciting one.

### **Implementation of Attentive Teaching in subject matter**

Attentive Teaching is based on systematic use of mediated interactions focusing on the learnt subject matter. The series of mediated interactions can construct dynamic learning or a thinking journey. Attentive Teaching is used as an integral part of the regular teaching and learning processes. The students express their individual points of view on the learnt subject by creating a personal product which includes a visual representation and a written explanation. The second phases in which each student is sharing his personal place allows others to see his place relative to the learnt subject. As the teacher and the peers listen carefully to the ideas of each student, they can connect them to ideas of other students and to the scientific understanding of the learnt subject. Each mediated interaction can focus on understanding a text or a topic that is connected to the curriculum.

Attentive Teaching enables students to change their understanding in any subject matter at any age. Some papers showed the results of researches done in English teaching, physics teaching, in Jewish studies, and in environmental studies:

Attentive Teaching can be a means to learning foreign languages, where the use visual representation can be the bridge between the mother tongue and the additional language learnt at school. Once learners have produced a visual representation, it is easier for them to express themselves in writing. Also, sharing with others enables them to express themselves in the learnt language. Attentive Teaching allows the teacher to construct flexible teaching and learning processes that connect the learners with the learnt subject. Schur & Farby (in press) show a change in the understanding of novice English teachers on what English teaching is. The conceptual change is observed in comparing their visual representations of what English teaching is at the beginning and at the end of a course on professional identity (dynamic learning).

Schur, Guberman & Ovsyannikov (2025) examine the Attentive Teaching of refraction in high-school physics. Each student experienced an individual, visible conceptual change. They also expressed their emotional processes while learning refraction in visual representation and verbal explanations.

Schur & Guberman (2024) examine the process of constant change in the approach to teaching Jewish studies of veteran teachers. The teachers experienced a thinking journey of studying multiple Jewish texts using mediated interactions. These accumulative experiences enabled them to change their approach to teaching and learning.

Gal, Schur, Nevo & Gan (2022) examined the levels of understanding of Masters students of environmental education in specific field trips aimed at teaching the concept of social-ecological systems. The students experienced a thinking journey in three different field trips that enabled them to change their understanding of the learnt concept. In the article, we developed a table of 5 levels of understanding of the basic concept based on analysis of the

drawings and the explanations of the students. The article showed the conceptual changes of specific students and that of the whole class in the processes of learning in the field trips.

## **Science Teaching**

Attentive Teaching started in science teaching, focusing on astronomical thinking journeys in the process of teaching physics in middle-schools – Thinking journey to the moon (Schur, 1998) and for high-schools and matriculation exams – thinking Journey to Mars (Schur, Brand & Yair, 2002). Several papers demonstrate thinking journeys as means for conceptual changes of physics concepts: Understanding the Earth concept through comparison with the concept of the moon (Schur, Skuy, Zietsman & Fridjhon, 2002): Understanding the concept of weight and gravity through comparing the moon and the Earth environment and also the environment inside a satellite (Schur & Galili, 2009: Stein, Galili & Schur, 2015). Learning the day-night cycle, through comparing the thinking journey on the moon with the experience on Earth (Schur, Galili & Shapiro, 2009).

Two detailed examples that were not published before will be presented; one relates to Attentive English Teaching and the second to conceptual understanding in science teaching:

### **1. Attentive English Teaching: visible understanding of a poem**

Many of the insights regarding the application of Attentive Teaching to English teaching come from teaching courses to English teachers, for which we developed a teachers' handbook on Attentive English Teaching. We taught an extensive, 120 hours course for leading English teachers in high schools in East Jerusalem with the support of the Jerusalem Foundation, and a national course for English teachers funded by the English inspectorate at the Ministry of Education. The teachers got a certificate of counselors of Attentive English Teaching.

The ultimate goal of Attentive English Teaching is supporting the language acquisition process by teaching for understanding. Understanding in this context is achieved by using practices which encourage the students to create their points of view. In order to promote spontaneous and creative language production, teaching goals should start with prioritizing fluency over accuracy and content over form. Only once we have learners interested in expressing their ideas in English, can we address language errors and formal aspects of the language to increase accuracy.

The Attentive English Teaching approach offers the teachers in the field practices which are a good match for the recent changes to the discipline of teaching English as a foreign language. English has become the lingua franca for inter-cultural communication, and learners around the world aim to use English in an authentic context for communication more than anything else. In accordance with this trend, the framework of the Common European Framework of Reference (CEFR) has become dominant in foreign language education worldwide.

The CEFR framework advocates an action-oriented approach to language teaching and learning, where learners are encouraged to use the language productively, and teachers are

encouraged to practice language activities like mediation and interaction in addition to supporting language reception and production activities

In the following section, we present products from a course of Attentive English Teaching to high school English teachers in Israel. The English teachers experienced a 30 hours course, where they learnt English Attentive Teaching as students and taught their students in their English classrooms. These examples offer a taste of the teachers' experience in the course. The course was taught as a workshop, where each lesson was a mediated interaction, and each participant created a visual product, usually a drawing, explained it in writing and shared her ideas with the other participants. The course was conducted via zoom, in order to enable English teachers from all over Israel to participate.

### **A Mediated Interaction on the idea of mediation in English teaching, using an English poem**

The following poem was presented to the English teachers who participated in the course:

#### **Purple / Alexis Rotella**

*In first grade Mrs. Barta*

*Said my purple teepee*

*Wasn't realistic enough,*

*That purple was no color*

*For a tent,*

*That purple was a color*

*for people who died,*

*that my drawing wasn't*

*good enough*

*to hang with the others.*

*I walked back to my seat*

*Counting the swish swish swishes*

*Of my baggy corduroy trousers,*

*With a black crayon*

*Nightfall came*

*To my purple tent*

*In the middle*

*Of an afternoon*

*In the second grade Mr. Barta  
Said draw anything:  
He didn't care what.  
I left my paper blank  
And when he came around  
To my desk  
My heart beat like a tom tom.  
He touched my head  
With his big hand  
And in a soft voice said  
The snowfall  
How clean  
And white  
and beautiful*

### **Expanding the meaning of the poem**

The poem is related to a process of mediation. The teacher in the first grade did not let the writer express her creativity. She connected the purple color with death. The teacher frightened the student from any kind of creativity in the classroom. The encouraging mediation of the second-grade teacher surprised the writer and enabled her to see her inner beauty and also to understand that one can see whatever she creates in a positive and encouraging way.

The poem was a means to discuss with the English teachers the idea of mediation. The teachers were asked to give examples from their experiences to mediation processes. The participants presented their products and shared their ideas with their peers. They referred to the poem in a new light. Expanding the experiences of mediation to their own experiences as English teachers and as students.

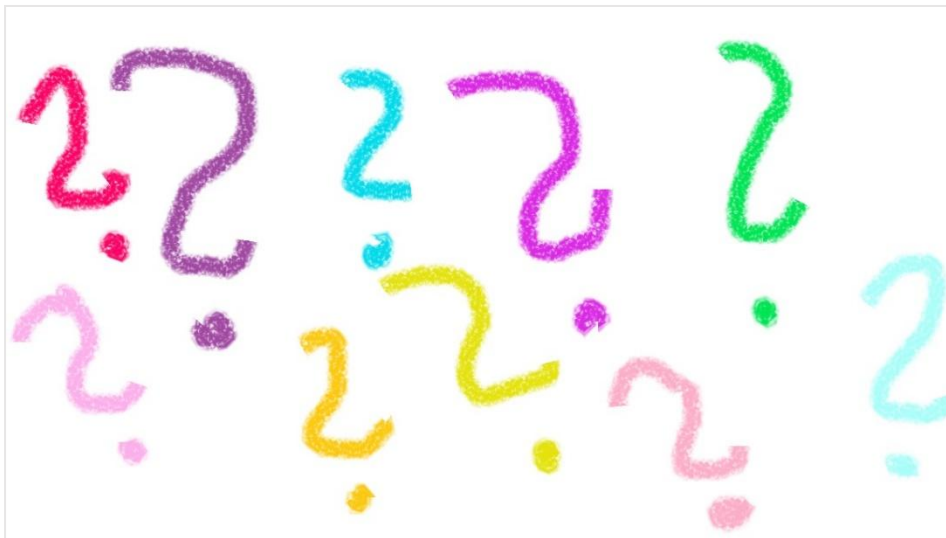
## The classroom assignment

The English teachers who participated in the course analyzed the poem in class and were asked to:

1. **Think about an experience of mediation of a visual representation as a student or a teacher. Write it down.**
2. **Draw it.**
3. **Explain your drawing in writing.**
4. **Upload your drawing and writing to the shared presentation.**
5. **Share your idea/product with the other students.**

Two examples of visual products and written explanations from the 15 teachers who participated in the course are presented below. They show the variety of the experiences that the English teachers created, explained and shared:

a. Tamar

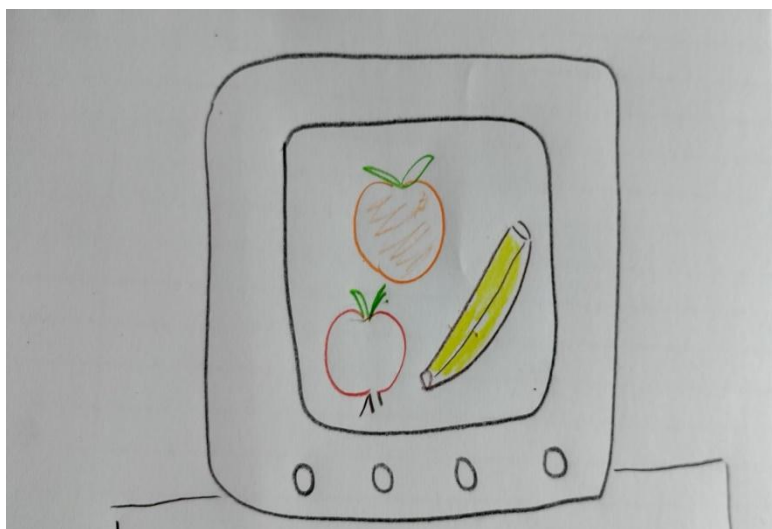


**Figure 7: Tamar shares her experience of the importance of asking**

Tamar explained her experience:

*I asked my weak 7th graders to draw the most fun activity or event they took part in during the Passover holiday. It was the first stage of a speaking activity in pairs .All of the students were engaged in the drawing activity. One of my weakest students drew a very elaborate picture and since she knew it was a set up for a speaking activity, she kept asking me for the words she didn't know and " how to say this/that." I could see that she was enjoying the activity and realized it motivated her to take part in the speaking activity ,something that that she's never done before .*

b. Alexandra



**Figure 8: Alexandra shares her experience as a learner**

Alexandra explained her experience:

*When I was in 7th grade ,my home economics teacher offered me to stay after class and make dried apples with her in the convection oven .She told me to bring some fruits from home ,so that we could make them. I felt very special being able to do something extra that not everyone was offered. This is my interpretation of my teacher’s mediation. She let me experience things that others did not have a chance to.*

The two teachers referred to their experience of mediation, as did all the other participants of the course as well.

Tamar described her experience as a teacher working with the whole class implementing a mediated interaction, including a drawing assignment. The whole class was engaged. She was surprised by the motivation of one of the weakest students of the class who wanted to participate and had a lot of questions, for example, asking the meaning of words she did not know. The drawing of many questions marks with many colors expresses the inquiries of her students which shows their motivation and engagement in learning. In her explanation, Tamar referred to one specific student who was engaged in the assignment and wanted to express her ideas, though she lacked the vocabulary. Her inner motivation for self-expression spurred her to ask the teacher many questions. Tamar, the teacher, was favorably impressed by these questions, and she referred positively to the experience of applying a mediated interaction in class.

Alexandra chose to share her experience as a student. Her teacher enabled her to experience a unique assignment that gave her the feeling of competence, as being important to the teacher. The teacher was attentive to her world and designed the assignment accordingly. The teacher asked Alexandra to prepare the products (fruit) for their joint work, and they both stayed to work together after class.

**Collaborative construction of understanding what mediation is in English teaching**

The poem describes two possible approaches to teacher mediation, and the teachers who participated in the course could construct a shared understanding of what mediation is from reading the poem, interpreting it, and listening to the different experiences of mediation inspired by the poem and shared by their peers. The examples they gave of experiences as students or teachers enabled transferring the poem's description of early school years to the experiences of English teaching at high school. The poem became relevant to their worlds as teachers. The participants could learn from each other, as the examples were broad and creative.

### **Active participation and use of the English language**

The participating teachers were impressed by their experience during the course in creating visual representations and verbal (written and oral) explanations in English in each lesson. They repeated this experience with their students. One could see that the sheer repetition of creating visual representations for various experiences enabled them and their students to express themselves more freely in English both in writing and in speaking. They learnt the idea of mediation and its possible implementation in their English teaching. After the creation of the visual products and the classroom discourse, the teachers reflected on possible implementations in their English teaching.

## **2. Understanding the Earth concept through a Thinking Journey to the moon**

One of the central goals of scientific and technological education is to teach students scientific literacy. Scientific literacy is expressed by the learner's ability to use scientific knowledge, concepts, and ideas to describe and explain phenomena. In Attentive Teaching, learners facing a significant learning challenge can meet this challenge by combining two processes. First, they concentrate on the learning challenge and produce visual representations and verbal explanations. Second, they use observation processes and imagination to achieve understanding. The individual learning processes of the different learners can be observed by the teachers at each stage of the learning.

The participants in the following experience were three learners: two in third grade, and one in first grade. Yaron Schur had three, ninety-minutes' group meetings with them. The goal was to enable the learners to construct their ideas of the Earth concept.

Three mediated interactions constructed the Thinking Journey (TJ) to the moon and back that enabled the learners to consider from a variety of points of view their understanding of the familiar environment on Earth and compare it to their experiences during their imaginary journey on the moon.

### **First mediated interaction: An imaginary observation of Earth as seen from the moon**

The TJ began with observing a picture of Earth which was photographed from the environment of the moon. This picture is one of the most influential images ever photographed and was taken by Apollo 8 astronauts, on Christmas Eve, 24th December 1968. The astronauts were so excited and emotional to see Earth with black space as a background that they read out the biblical verses from Genesis that described the creation of the world. They were the first humans to orbit the moon. Galen Rowell, one of the most famous

landscape photographers stated in Life magazine that “this is the most influential environmental picture ever photographed” as part of the magazine’s special edition of the 100 photographs that changed the world.



**Figure 9: A photograph of Earth taken from the Apollo 8 spacecraft that orbited the moon in 1968**

The visible part of Earth that is illuminated by the sun is experiencing daytime. The remaining part of Earth’s round surface is experiencing nighttime and is not visible at all.

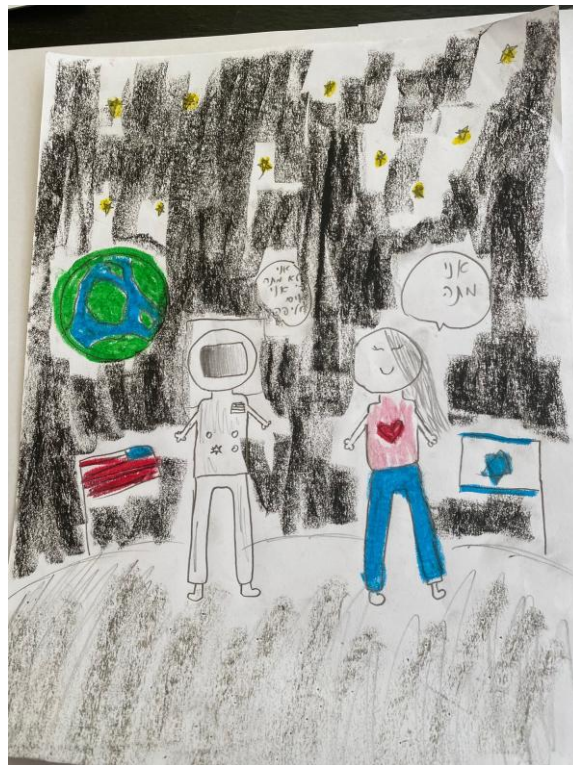
After discussing what they saw in the picture, the learners were asked to observe it, draw what they saw, and give a written description of their drawing. They drew the Earth as seen from the moon, emphasizing that it was observed surrounded by the black background of outer space. They were surprised at the similarity between Earth and moon. They were unsure where we stand on Earth. The two third-graders claimed that we stand inside Earth and illustrated their perspective using a basketball. According to Nussbaum (2001), their perspective is at level 2 of 5 of understanding the concept of Earth. The first grader claimed that we are standing on the top part of Earth so that we do not fall off it, relating to Nussbaum's level 3. This perspective fits Nussbaum’s (2001) explanation about how children understand the concept of Earth. A scientific understanding of the Earth concept (levels 4 and 5) is related to learners’ ability to make a link between gravity and people’s position on Earth and to think about the direction in which objects fall on Earth.

### **Second mediated interaction: The learners take a walk on the moon**

In this mediated interaction, the learners took an imaginary walk on the moon. They first looked at a few photographs of astronauts standing on moon noting the hills and boulders on

its surface. The learners saw that the sky is black<sup>3</sup> even in daytime, that Earth is visible from the moon's sky and they also saw the American flag that the astronauts placed on moon's surface. The learners observed the moon's surface, its hills and boulders, as described in the photographs (Schur, 1998). They discussed the possibility of the existence of life on the moon, given the absence of air and water that are necessary prerequisites for life, and they also noted the silence on the moon because of the absence of air. During the mediated interaction, the scientific aspects such as the environmental conditions on the moon and the traces that the astronauts left behind on the moon which demonstrate gravitational pull on the moon were discussed. The learners were also shown technological devices such as the astronauts' space suits. They discussed the purpose of these suits which enabled the astronauts to remain in an area with atmospheric pressure, to breathe, cool down, and regulate their body temperature, especially during the day.<sup>4</sup>

At this stage, they were asked to write a story about an Earth's Day on the moon from one astronaut's point of view. They were asked to add a drawing and a written explanation of the drawing to their story.



**Figure 10: Second mediated interaction: N's (3rd grade) drawing of a walk on the moon**

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<sup>3</sup> When a person stands on the moon, he is pulled downward by gravitational pull on the moon. The downward direction is the moon's surface. The opposite direction in the moon's sky, which is also black in daytime because there is no air (atmosphere) on the moon's surface.

<sup>4</sup> Daytime on the moon lasts for about two weeks, and when it ends, the temperature on the moon reaches 130°C. The astronauts landed on the moon at the start of its daytime and remained on the moon's surface for a maximum of the equivalent of three days, according to the time on Earth; therefore, they encountered temperatures which were less extreme.

N. drew herself twice, once wearing 'Earth' clothes (a T-shirt with a heart drawn on it). In her speech balloon she wrote "I am dying". The second instance she drew of herself is wearing a space suit, and in the speech balloon she wrote "I am not dying; I am wearing a space suit". The figures are standing on the moon, and no other features or details are given about the moon. The moon's sky is black and full of stars, even during the day, and the two figures are standing on the moon. Earth is seen in the sky. N. drew the Israeli and American flags.

The most noticeable feature of N's drawing is the sense of challenge she felt. In her drawing, she describes herself as an astronaut standing on the moon and taking a high risk. Her space suit protects her and enables her to breathe in this atmosphere that has no oxygen and no atmospheric pressure. If she does not wear it, she will die. In her drawing, N. refers to scientific and technological issues that enabled her to produce a visual representation of the moon, without showing any details about its surface so that she could walk on it in her imagination. Her drawing emphasizes her observation of the moon's sky and of the dangers that astronauts put themselves in.

In contrast, in her written explanation, N. reveals her personal world and the experience of a 9-year-old girl who went on a TJ to the moon. On the moon, she did not find anything that was familiar to her from her daily life on Earth, and she stressed the things she did not see on moon that she is familiar with on Earth:

I am walking on the moon. And I don't see anything. I don't see houses, I don't see shops, I don't see vapors and the sea. And I want to climb up all the mountains. There is not much for me to do here because there are not any playgrounds or something like that. But it is real fun being here. And I was really surprised to see the moon. I will really miss my parents, that I won't be able to walk around with my father. But I am glad that my friend [who took part in the meeting] came with me, and I wore a space suit. What is really strange is that I know that if I take off the spacesuit, then I know I will die, and that won't be fun at all.

N's personal world is expressed in her description of her time on the moon. She wrote that she didn't see anything on the moon, meaning that she did not see anything that she was familiar with from life on Earth, neither houses nor stores, and not even playgrounds. She wrote that her father was not with her, but nevertheless "she is having fun" because her best friend is with her. She is wearing a spacesuit that protects her. N's imagination has a central part in her story about her walk on the moon. She emphasizes her experience of walking with her friend in a challenging place. The moon is something totally different to anything she is familiar with on Earth.

T. is N's third-grade classmate. Her drawing is similar N's. T. drew one figure standing on the moon wearing a spacesuit. The Israeli flag is placed on the moon, the sky is black, and stars appear in it. Earth is visible in the sky. T. emphasized that Earth seems to be small when seen from the moon. She stressed her inability to hear when walking on the moon.

Z. is a first grader. She also drew a figure on the moon wearing a spacesuit. Like the previous drawing, she also drew a black sky with stars shining in it. Earth is visible, but it is

not round; it is in a phase like in the photograph which was shown to the learners in the first mediated interaction. The two older participants did draw Earth as a perfect circle, like the globe. Z. also drew the mountains seen on the moon. She wrote: “I saw tall mountains, I went down in order to climb up the mountain, and I really did go up it and I saw large boulders on the mountain. I saw the sky. It was a pretty color – blackish purple.”



**Figure 11: Second mediated interaction: First-grader Z’s drawing of a walk on the moon as an investigator**

### **Third mediated interaction: The return to Earth**

In the third mediated interaction, the learners returned to Earth, to their familiar surroundings, back to their home. Their assignment was to describe their return to Earth after having spent six months on the moon. They were asked to return to a place they like. After writing their description, the learners were asked to draw it and explain their drawing. They emphasized their experience of returning home after spending time on the moon, and their excitement at doing so. At this stage, the goal of the mediated interaction was to reinforce the experiences of the TJ, and for the teacher to listen to the process experienced by the learners. The main emotional experience was the return to their familiar and beloved environment. The mediation emphasized the comparison, the intensity of returning to a familiar place as compared to staying on the moon for six months.

All three learners felt a sense of relief on their return to Earth. They referred to the special conditions on Earth, that they were able to breath freely without having to wear a spacesuit, and that they were happy to return home, to their familiar environment. For all of them, returning home was a special event, they all referred to meeting their parents and siblings once again. They especially stressed their conversations with their fellow participants on the TJ as compared to their friends who remained on Earth and didn’t experience this journey.



**Figure 12: Third mediated interaction: N’s drawing of her return to earth after having spent six months on the moon**

N. drew herself three times in the drawing, each time with a different speech bubble containing a statement. The first figure states that she is holding the spacesuit and not wearing it, because she does not need it on Earth. The second figure states “At long last, I can finally breathe”. She describes being on Earth as a special experience and being able to breathe freely is now special. The third figure has a broad smile and says: “Home, grrreeeeaaattt”. She was very pleased to return home; she missed her parents while she was on the moon. She emphasized her emotions. In her written explanation, N. wrote: “I drew parts of everything I wrote down, that I am returning home, that I am about to land on Earth, that I can breathe and remove my spacesuit.” The other two learners also drew their return home and their reunion with their parents with hugs and kisses; this experience was very meaningful for them.

N. also drew the spaceship that she used to return to Earth, and the Earth itself. She had an extraordinary experience. N’s two friends also emphasized their special experience on the moon. It was something different, something special. T. wrote: “I told everyone about my experience on the moon ... they all asked me whether I had been on the moon, and I told them that I had.” Z. wrote: “I told all about what I saw there, and they listened carefully and enjoyed it.” Investigating what they saw on the moon was a special experience for all three learners. In their stories, they stressed that their friends were very interested in their special experience on the moon, an experience that none of the others had.

When returning to Earth, all three students used bright colors in their drawing and showed their happiness to return to an environment in which they could breathe freely. N. showed the missile that brought her home to Earth and Earth itself. T. emphasized her reunion with her friends, the unique adventure they experienced, and the curiosity their friends showed when she returned to Earth. Z. also emphasized meeting up with her friends again and that they listened to her and enjoyed hearing about her special story.

## **Attentive Teaching and Mediating Processes**

The young learners experienced three mediated interactions during an Attentive Teaching process. In each interaction, they described their point of view using a drawing and an accompanying explanation. Looking from the moon, they observed Earth, walked on the moon as investigators, and returned to their familiar environment on Earth. With the guidance of the teacher to express their personal viewpoint through drawing and writing, they underwent an empowering process of individual understanding in each of the mediated interactions. The teacher's mediation began by designing the actual TJ and continued with giving the learners the space to express themselves. Scientific concepts were explained as questions arose while the learners were preparing their drawings and explanations, as well as when the learners were observing the photographs of Earth as seen from the moon and of the moon's surface (Schur, 1998). The mediation was personal for each learner, with the participation of the other girls, and helped them deepen their understanding. Each learner had to explain her personal understanding of the subject in a supportive and understanding atmosphere shown both by the teacher and her fellow learners. This enabled each learner to deepen her understanding and give a more comprehensive description of her experiences. In this study, the development of learners' conceptual understanding was examined in each of the mediated interactions, but the main increase in understanding was seen in the accumulative process of the entire TJ. The connection between Earth and the moon was something new to the learners, who had not previously thought about the many similarities and differences between these two planetary objects. They created a space of learning in their thinking which is the basis for understanding. The main purpose of such a space is that understanding is achieved through comparison (Marton & Tsui, 2004)

### **To see the learners**

This learning process enabled the students to express their individual viewpoint on the learnt subject, and they each experienced their personal unique learning process. Their personal world came to the fore in the way that they referred to the journey to and the moon and back to Earth. In some respect, the learners emphasized similar viewpoints of understanding. They noted the black sky on the moon, Earth as seen from the moon and the spacesuits that are vital for survival on the moon. Being on the moon was a new experience for them, and they referred to several physical components: Z. showed the boulders on moon's surface, T. emphasized the quiet, and N. referred to the sky and atmosphere. However, N. also gave a wide-ranging description of her everyday environment on Earth which cannot be found on moon. Also, she really wanted her father to accompany her as she walked in this special, unfamiliar environment, but was satisfied to be with her good friend T. All learners each showed a far broader viewpoint than simply focusing on the scientific aspects. They saw themselves as investigators coping with dangerous challenges on the moon and returning to Earth safely. They incorporated their personal world into the learning experience, told their friends about their journey, and described parts of their daily world they are familiar with on Earth that could not be seen on the moon, such as shops.

### **Observation and imagination on the path to understanding**

The TJ experience enabled the learners to combine a change in knowledge and understanding with an individual, emotionally meaningful experience of returning home. The learning experience opened up the new world of the moon for them and gave them an opportunity to visit and walk around it. This was their first encounter with a celestial body, and it enabled them to experience their regular daily life in a new light. When they embarked on the TJ, their learning was constructed from their imagination combined with observation: first, they observed Earth from the moon; then, they had an imaginary walk on the moon; finally, they imagined a return to their familiar surroundings on Earth. By using their imagination, the learners reached a different and exciting observation of their familiar surroundings on Earth. They were surprised that Earth appears to be so small when observed from the moon, and also by the fact that the moon is a tangible body that one can stand on. They learnt that our familiar daily reality on Earth is very special in that we are able to breathe freely without having to wear spacesuits.

### **The language of drawing and the verbal language at a young age**

The language of drawing is a natural way for young learners to express scientific perceptions. In the above examples, we showed that each learner used a drawing to express her understanding of the subject during each of the three mediated interactions. Through the drawing, the learners were able to present and explain their individual viewpoint. The accompanying explanation added an extra dimension of understanding and a personal perspective to the learning. With the combination of drawing and explanation, the mediator was able to discern each learner's scientific and individual perspective in each of the mediated interactions. This combination gave the learners the opportunity to express their thoughts about the new scientific knowledge they were exposed to, and also about their comparisons between the new reality they encountered and their familiar surroundings on Earth. They concentrated fully throughout the learning process. They were happy to produce their drawing and written explanation without fear of spelling mistakes. The written language enabled them to expand on what they had drawn and to explain aspects not included in the drawings, such as N's world of experiences.

### **On the path to understanding a broad subject**

The learners did not reach a full scientific understanding of the moon's environment, nor did they achieve a full understanding of Earth's environment when they returned after their imaginary lengthy stay on the moon. During this learning experience, they took their first steps in becoming familiar with a new and unfamiliar subject – the moon. They were very excited about returning to their familiar surroundings on Earth. It is important to note that learning should be considered an ongoing experience (Carey, 2009; Bloom, 2000). The current study describes the first meeting which aimed to arouse the learners' interest and curiosity ahead of future meeting with the broad, fascinating subject of astronomy and an understanding of Earthly phenomena as compared with other celestial bodies. The TJ described here emphasized an initial acquaintance with the moon, and as a result, creating a

change in understanding familiar surroundings on Earth. This was achieved through the TJ and through the comparison with distant and unfamiliar worlds.

### **Brave teaching for understanding**

Often teachers find it hard to disconnect from their own point of view of the learning process. Their focus is usually on the content, the concept, and its ingredients. Often this point of view makes it difficult for the teacher to connect with her students because their alternative knowledge, cognitive skills, and uncertainty processes take them to a very different point of view of the learnt concept. Teaching for understanding involves processes of change for the students. It is not easy to change, and this applies also to the changes of conceptual understanding. Students have their own unique ways of resisting change, which are a part of a mechanism to cope with uncertainty processes. By referring to uncertainty processes directly, mediators are able to connect with the real worlds of students. The mediator should have empathy for the uncertainty processes that the learners go through.

In many knowledge exchange processes, both the teacher and the learners stand on firm ground. There is no need to change, and the goals of teaching are very clear. But teaching for understanding requires the students to go out of their egocentric points of view and to experience change. The same challenging assignments enable learners to experience meaningful learning and uncertainty processes, resisting the change processes and being attracted to it. Teaching for understanding requires being brave, because one has to take risks in order to enable students to get out of their comfort zone and to experience change processes. One can learn from Reuven Feuerstein the need to construct unexpected, mediated interactions as a means to enable students to experience meaningful learning.

### **General conclusion**

To sum up, the Attentive Teaching approach provides teachers with an opportunity to create attentive mediation to achieve understanding in subject matter teaching and learning. Research in diverse subject matter teaching and learning shows the development of understanding and individual conceptual changes as they happen in classroom teaching. Attentive Teaching is about teaching and learning in a communicative way that enables learners to grow as creative individuals who also listen attentively to others in regular subject matter teaching and learning. This pedagogy places the emphasis on students creating individual products which are related to the learnt subject and on the teacher listening and personally mediating individual students while teaching a variety of subjects. The learners experience a learning process in which they express their unique voice, listen to their peers in a deep and respectful manner, and participate in shaping the understanding in the classroom. Attentive Teaching enables learners to achieve meaningful dialogue as their understanding of the learnt subject changes. The classroom discourse enables the students to express their ideas freely. The teacher designs the mediated interactions relevant to the subject learnt in the current class. They engage in mediated dialogue with the students that present their ideas. All the learners in the classroom experience are partners of the teaching and learning processes that occur. The attentive teaching process involves cognitive and emotional processes. The use of visual representations and explanations enables individual, visible conceptual changes that take place in regular classroom teaching of subject matter.

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## **The Question of Spontaneous Mediation**

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### Theoretical background

The notion of human mediation appears in the writings of Reuven Feuerstein twice: Once as one of the two main forms of human everyday learning, and the second time as a methodology of classroom instruction. While writing about child development and everyday learning, Feuerstein & Feuerstein (1991) emphasized the difference between direct learning that includes the stimuli and the learner, but does not include any human mediator, and a mediated learning situation that includes human mediators who place themselves between the stimuli and the child. Feuerstein claimed that mediated learning is universal in the sense that it exists in all cultures and is spontaneously enacted by the majority of parents in their interactions with their children. However, not all interactions that include a stimulus, a child, and a human mediator qualify as mediated learning, and Feuerstein elaborated the list of criteria of mediated learning that allows one to distinguish between generic interaction and mediated interaction.

Feuerstein identified three criteria of mediation as universal in the sense that all three should be present for the interaction to be considered as leading to the mediated learning experience (MLE). These criteria are: Intentionality/Reciprocity, Transcendence, and Mediation of Meaning.

Intentionality is associated with the mediator's intention to produce cognitive change in the child. By focusing on the child's state of attention, problem-solving strategies, mistakes, and insights, the mediator infuses the situation with a sense of purpose and intention. While intentionality is associated with the mediator's own initiatives, reciprocity reflects the mediator's sensitivity to the child's responses. The mediator is expected to be very attentive to the child's reactions to the mediator's initiatives and actions. Moreover, the criterion of reciprocity also includes active support of the dialogical interaction between students and their mentors.

Transcendence reflects the mediator's ability to lead the child beyond a specific task or situation. The mediator identifies the general aspects of a given task and transfers them to other situations, sometimes distant in time and space. Mediation of transcendence plays a major role in turning learning from concrete and fragmentary into systematic and conceptual.

Mediation of meaning responds to the child's (often silent) question: "Why do we do this?" Mediation of meaning is about motivation. What is the motive of our actions? Why do these actions take place at a specific time and in a specific form? The mediators emotionally emphasize the relevance and importance of issues that they discuss with children.

Beyond the three universal criteria of MLE, there are additional criteria that are more contextual (Feuerstein and Feuerstein, 1991). Some of them might be very important in a certain context, while not so important in another. For the sake of the future discussion about MLE in educational contexts, we will present here two of these "contextual" criteria: the mediation of the feeling of competence and the mediation of the regulation of the child's behavior. Mediator enhances the students' feeling of competence not only by acknowledging and praising their correct answers but also by providing an elaborate analysis of why the students' answers are correct. This form of mediation is particularly important when students are not completely aware of their own problem-solving process. By providing not only the praise but also the analysis, the mediator enhances students' reflective and metacognition abilities. Mediation of the regulation of behavior responds to two problems demonstrated by many children: impulsivity on the one hand, and "blocking" on the other. By inhibiting the impulsive responses of some children and "unblocking" the problem-solving process of others, the mediator significantly improves the learning situations.

For the present discussion, it is essential to emphasize that Feuerstein never questioned the existence of parents' and mentors' spontaneous mediation. To act as a spontaneous mediator, however, does not mean to be aware of your own mediating activity or being able to analyze it into the constituent criteria of mediation. Feuerstein observed:

*"The so-called primitive mother, whose mediating capacity may be extremely potent, may not be able to formulate the rationality or specific intention underlying her mediated interactions...Between the two extremes of explicit and implicit intentionality is a continuum of awareness. However, the degree of awareness does not necessarily affect the efficiency of the mediated learning experience."* (Feuerstein et al., 1980, p.22).

In other words, some parents and mentors are very efficient as mediators, though they have never studied Feuerstein's criteria of mediation, and are not even aware that what they do is mediation.

Feuerstein's discussion of teachers' mediation in the classroom was cast in a somewhat different way (Feuerstein et al, 1980). It started with the analysis of the educational situations characterized by the emphasis on "what" (curriculum), at the expense of "how" (didactics). Moreover, according to Feuerstein, the prevalent didactic methods were still

dominated by memorization and repetition, instead of developing students' cognitive and problem-solving skills. In this context, Feuerstein proposed to change the role of a teacher from that of a provider of information to that of a mediator who develops students' cognitive and metacognitive abilities. Unlike the above case of a mother as a spontaneous mediator, the classroom teacher-mediators were expected to mediate deliberately and with full awareness of their mediational activity.

*Mediation is an educational process in which the teacher intervenes in a deliberate and informed manner between the student and the learning content, rather than allowing random exposure to stimuli. The mediator selectively chooses which stimuli to present, shapes the manner of their presentation, and creates awareness of the thinking processes involved in the acquisition of knowledge. Beyond transferring content, mediation develops the learner's cognitive structures, thinking tools, and metacognitive abilities that enable him to learn independently and cope with new challenges.* (Feuerstein & Feuerstein, 2002, p.179).

So, Feuerstein and his followers assumed that specialized training is required for turning teachers into teacher-meditators. Indeed, already in an early study of Dale and Cole (1988), the performance of teachers trained in the MLE approach proved to be different from that of teachers who used a behavioristic approach in delivering the content-based curriculum to children with special needs. Teachers' and children's performances were observed and evaluated with the help of a list of 14 categories. The research identified significant differences between these two groups of teachers in 9 out of 14 categories. The MLE-trained group demonstrated a greater amount of process presentation, process generalization, process questions, and open-ended observation questions. The authors concluded that teachers who were trained in the mediational teaching style indeed behave in their classrooms in ways that are conceptually consistent with their MLE training and that this behavior is visibly different from that of other teachers. In the same vein, Silverman and Waxman (1988) reported that in-service teachers who received Feuerstein's MLE training started posing more conceptual questions and, in this way, engaged their students in higher-level dialogue. The same study also demonstrated an advantage of teachers-mediators versus other teachers in deploying decision-making strategies.

The lack of spontaneous mediation on the part of teachers can be gleaned from the study of Bliss et al (1996). Though the authors did not use the Feuerstein criteria of mediation, but rather the concept of scaffolding, there appears to be a considerable overlap between these constructs when it comes to the observation of teachers' activities in the classroom. Scaffolding presupposed teachers' close attention to students' problem-solving

process, teachers' willingness to turn the teaching situation into a more interactive one, and providing students with contingent help. By observing teachers' classroom performance, the authors looked for the signs of spontaneous scaffolding, but did not find many of them. The authors reported four major reasons for the lack of sufficient scaffolding: 1. Teachers used the directive teaching strategies that precluded scaffolding; 2. The initiative was given entirely to students themselves and thus left no place for teachers' scaffolding of students' activities; 3. Teachers and students talk, but there is no real interaction; what took place was pseudo-interactions or bypassing; 4. Conditions for scaffolding were present, but they were not noticed by the teacher, and thus, the scaffolding failed to take place. In other words, not many teachers become spontaneously engaged in what we would call a mediated learning activity.

The difference between the performance of MLE-trained and non-trained mentors can also be found in a study by Tzuriel (2021, pp.326-327). It was shown that not only professional teachers could be trained to become teachers-mediators, but also students involved in a peer mentoring project. Several groups of 9th-grade students were trained to become mentors of their 7th-grade peers. Some of them received MLE training with various cognitive tools, while others were trained in non-mediational mathematics tutoring. The results clearly demonstrated that students who were trained in MLE indeed demonstrated a typical mediational approach in the tutoring of their 7th-grade students, while those who were trained in non-mediational methods did not demonstrate mediational skills. The Tzuriel (2021) study is exceptional in that it evaluated the teaching style of not only those who have been trained in MLE, but also those who might demonstrate teaching mediation spontaneously, without special training.

The question, however, remains how often professional teachers who have never been trained in the Feuerstein mediational pedagogy spontaneously display features of mediated learning in their teaching practice. So, our study aimed to respond to the following research questions:

1. What will be the level of spontaneous mediation by the primary school teachers who have never been exposed to Feuerstein's MLE theory or methodology?
2. Will there be a difference in the level of spontaneous mediation between teachers with special education training vs. regular classroom teachers, and if yes, which parameters of MLE will show such a difference?
3. To what extent such background characteristics as teachers' age, level of academic training, and professional experience impact on their level of spontaneous mediation?

## Methodology

30 primary school teachers participated in the study: 15 of them were classroom teachers, and 15 were “inclusion” teachers who worked with children with special needs integrated into regular classrooms. The absolute majority of teachers (n = 28) were female; 7 teachers had an M.Ed. degree, and 23 B.Ed. degree. Professional experience of teachers varied widely from one year to more than 20 years (mean 10.2 years, SD 7.89).

Classroom teachers taught the entire class of primary school students; the number of children in the classes ranged from 19 to 30. Special education teachers taught small groups of students with learning disorders, with a number of children per group ranging from 1 to 4. All lessons in the 1<sup>st</sup> to 5<sup>th</sup> grades were dedicated to the issues of language and reading. The first author observed 5 lessons of each teacher.

The level of mediation was rated using the MLE Rating Scale of Lidz (1991). This scale rates each one of the 5 criteria of mediation displayed by teachers or other mentors: Intentionality/Reciprocity, Transcendence, Mediation of meaning, Mediation of the feeling of competence, and Mediation of the regulation of behavior. Each criterion is rated on a scale from 0 to 3. Score 0 indicates the absence of mediation; score 1 indicates mediation that is inconsistently present; score 2 indicates consistent mediation; score 3 indicates consistent mediation with elaboration (see Appendix A). In addition to scoring mediation, the observer also summarized the content of the lesson as presented by the teachers.

The project was approved by the Institutional Ethics Committee and by the Office of the Chief Scientist of the Ministry of Education (as required for any research project that takes place in public schools).

## Results

Table 1 shows the teachers’ average MLE score (of 5 lessons).

Table 1. Average MLE scores of the classroom teachers and “inclusion” teachers

<b>MLE criteria</b>	<b>Classroom teachers</b>	<b>“Inclusion” teachers</b>
Intentionality/Reciprocity	1.99 (SD 0.05)	1.97 (SD 0.07)
Transcendence	0.52 (SD 0.5)	0.63 (SD 0.6)
Mediation of meaning	1.89 (SD 0.21)	1.91 (SD 0.17)
Feeling of competence	1.17 (SD 0.19)	1.92 (SD 0.18)
Regulation of behavior	1.96 (SD 0.11)	1.92 (SD 0.5)

There is a strong and statistically significant ( $p < 0.05$ ) difference between mediation according to the criterion of Intentionality/Reciprocity and that of Transcendence. Both classroom teachers and “inclusion” teachers demonstrated a high level (1.97/1.99 out of 3) of Intentionality/Reciprocity and a very low level of Transcendence (0.52/0.63). Moreover, teachers in each group are quite similar in their display of Intentionality/Reciprocity (standard deviations are low) but differ in their display of Transcendence (standard deviations are high). So, the first conclusion is that teachers who have never been trained in Feuerstein mediation methodology spontaneously demonstrate a high level of mediation of Intentionality/Reciprocity but a very low level of Transcendence.

The second research question is related to the possible difference in mediation demonstrated by classroom teachers and by “inclusion” teachers. Only in the mediation of Feeling of Competence, there is a statistically significant difference ( $p < 0.05$ ) between the two groups in favor of “inclusion” teachers. This difference will be elaborated on later in the discussion section. It should be mentioned that while teachers demonstrated a relatively high average level of spontaneous mediation (close to 2) in all criteria except Transcendence, practically none of them showed the maximum level of MLE (score 3).

The third research question was about the possible impact of teachers’ background (age, level of academic training, and professional experience) on their quality of mediation (see Table 2).

Table 2. Teachers’ background and their level of mediation.

	Age over 35	Age below 35	Experience: more than 10 years	Experience: less than 10 years	Degree: M.Ed.	Degree: B.Ed.
Average MLE score	1.63 (0.25)	1.55 (0.1)	1.72 (0.22)	1.51 (0.14)	1.63 (0.23)	1.58 (0.19)

Older teachers, teachers with M.Ed. degrees, and teachers with more than ten years of experience demonstrated higher average levels of mediation. A multiple linear regression was performed to examine the contribution of formal education level, age, and years of seniority to the overall mediation level score. These background variables included in the model explained about 41% of the variance in the total score of the mediation. When examining the

level of formal education as a predictor variable for the total score of the mediation level, a positive and statistically significant coefficient was found.  $\beta = 0.255$ ,  $SE = 0.069$ ,  $t = 3.68$ ,  $p = 0.001$ . This finding indicated that teachers with a master's degree demonstrate a higher level of mediation compared to teachers with a bachelor's degree, after controlling for age and years of seniority. The impact of age or experience proved to be statistically non-significant after controlling for other background parameters.

## Discussion

The goal of this research was to clarify the issue of spontaneous mediation by teachers who have never been exposed to Feuerstein's MLE theory or methodology. The results indicate that both classroom teachers and "inclusion" teachers demonstrated a high level of mediation of Intentionality/Reciprocity. The MLE criterion of Intentionality/Reciprocity is expected to capture the following features of the interaction between teachers and students: The teacher's ability to engage students and keep their attention; clear goal orientation; sensitivity to students' responses; and the teacher's ability to modify the lesson presentation in response to students' performance. The observed teachers showed the majority of these features in their classroom work. At the same time, it seems important that practically no one of them demonstrated the highest level of Intentionality/Reciprocity (score 3), which requires conveying a more general principle that can be internalized by students and helps to develop their self-regulation. In other words, the observed teachers demonstrated positive empathy toward their students and the ability to keep their attention, but failed to mediate more general principles that promote the students' self-regulated learning.

The above-mentioned lack of higher-level elaboration in Intentionality/Reciprocity might come from the same source as the very low Transcendence scores. The MLE criterion of Transcendence captures the mentors' ability to move beyond "hear and now" in their teaching, to formulate more general cognitive and learning principles, and help students to transfer these principles to various tasks. It appears that all these features were mostly absent in the observed teachers' performance. In this context, it is important to recall that Feuerstein positioned generalization and transfer of cognitive principles at the center of his system of cognitive education:

*"To apply the gained insight and to extract the function, operation, or principle from its task-bound context is a skill that must be practiced. Students must be assisted to arrive at the generalization of operations that enables transfer to other situations"* (Feuerstein et al, 1980, p. 301).

The significant gap between spontaneous mediation of empathy and focusing reflected in Intentionality/Reciprocity scores, and the lack of the mediation of Transcendence points to the difference between Feuerstein's concept of education and those aspects of teacher-student interaction that are supported by more traditional forms of teacher training. Feuerstein included Transcendence into the triad of the universal criteria of MLE: Intentionality/Reciprocity, Transcendence, and Mediation of Meaning. In his opinion, if one of these criteria is absent, the interaction cannot be considered leading to MLE. A more traditional forms of teacher training seem to place much less emphasis on generalization and transfer.

Our second research question focused on possible differences in the level of mediation between classroom teachers and "inclusion" teachers. Intuitively, it seemed more plausible that because classroom teachers are more constrained by specific curricular content, their level of mediation will be lower than that of "inclusion" teachers whose interaction is expected to be more attuned to the students' cognitive and learning needs. This intuitive hypothesis, however, has been confirmed only with respect to one of the MLE parameters, namely "Mediation of feeling of competence". There is, of course, a certain logic in such a result because children with special needs usually have a poor self-image as learners and are in greater need of encouragement and support. "Inclusion" teachers apparently are sufficiently sensitive to such a need and provide it via the performance associated with the Mediation of the feeling of competence. On the other hand, one could expect the special education training received by the "inclusion" teachers to prepare them for showing stronger mediation in all parameters of MLE.

As mentioned in the Results section, older teachers, teachers with M.Ed. degrees, and teachers with more than ten years of experience demonstrated somewhat higher average levels of mediation. The teachers' background parameters are, of course, interconnected – older teachers naturally have more teaching experience, and usually it takes time for teachers to get M.Ed. degrees. Nevertheless, it is interesting that teachers older than 35 demonstrated a certain mediational advantage over their younger colleagues. This may indicate that more recent professional training of younger teachers was not more mediational than that of their older colleagues, who, in their turn, acquired more mediational skills as a result of their greater practical experience. Teachers with an M.Ed. degree demonstrated stronger mediation than their colleagues who had only a B.Ed. degree. The available data does not allow us to ascertain whether such a difference is related to the higher professional level of teachers who studied for M.Ed. or to the didactic methods they acquired during their M.Ed. studies.

The current research was exploratory in its nature and, as such, has the following limitations. Probably the most important of these limitations is the fact that observations were conducted by one person (the first author) and could reflect the observer's subjective interpretation of the teachers' performance. It would, of course, be more appropriate to have two observers and to compare their MLE scoring, but for practical reasons, such an arrangement was not possible. The second limitation is related to the fact that classroom teachers taught the entire class, while "inclusion" teachers worked with small groups or individual students. The "inclusion" teachers thus worked under conditions more favorable for mediation, but as the results showed, they realized this advantage only in what concerns the mediation of the feeling of competence. Finally, the study was conducted in the opportunity sample of schools, which are neither representative of the entire school system nor of various student populations. So, the study conclusions cannot be generalized to the educational system in general.

All the above limitations notwithstanding, we would like to conclude that the present study seems to advance our understanding of the spontaneous mediation demonstrated by teachers who have never been trained in the Feuerstein mediational pedagogy. Both classroom teachers and "inclusion" teachers demonstrated relatively strong spontaneous mediation in some of the MLE parameters (e.g., Intentionality/Reciprocity or Mediation of feeling of competence) but not in others (Transcendence). This finding helps us to differentiate more precisely Feuerstein's concept of MLE (Feuerstein et al, 1980) from a more generic version of teacher-student interaction practiced by teachers. For Feuerstein, the identification of the more general cognitive or learning principle and its transfer to various areas of students' experience represents the condition *sine qua non* of the MLE. Teachers who were not trained in the Feuerstein methodology demonstrated the empathy-related aspects of MLE rather than the cognitively-related aspects.

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Appendix A

<b>Teacher</b>	<b>Lesson No</b>	<b>MLE criterion</b>	<b>Score (0 to 3)</b>
		Intentionality/Reciprocity	
		Transcendence	
		Mediation of meaning	
		Mediation of the feeling of competence	
		Mediation of the regulation of behavior	