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ABSTRACT

This paper contends that integrative teacher decisions, the links that unite classroom events, are lacking in many classrooms. The author first presents examples of integrative decisions. These examples involve (a) teacher planning, (b) classroom interaction, and (c) pupil feedback. The author uses these examples to demonstrate that there are differences in the ways teachers collect and process information. According to the author, little evidence has been collected on a) whether integrative decision-making affects pupil outcomes and b) whether teachers can be trained to become integrative decision-makers. She does, however, propose three basic techniques for training teachers to become more integrative in their decision making. The first technique involves comparing alternative procedures. The author states that this technique helps teachers become more integrative in their planning decision. The second technique concerns adapting procedures to pupil differences. According to the author, this process will help teachers become more integrative in their interactive decisions. The third technique shows teachers how to monitor interactive decisions in order to help them become more integrative in their use of feedback. (PB)

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Training for Teacher Planning and Decision Making

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The title of this symposium is "Teacher Education and Teacher Effectiveness: A Missing Link." The metaphor of the missing link is an apt one, and it will be elaborated upon briefly by way of introduction.

Teaching can be seen as a series of events - a chain, if you will. In planning a lesson, the chain of events might include selecting a topic, stating an objective, considering the steps or procedures to be followed, preparing some instructional materials, and arranging the classroom for instruction. In conducting a lesson, the chain of events might include giving pupils some information to study, asking a question, listening to a pupil answer the question, commenting on the pupil answer, asking another question, and so on.

Each of these single events may become a link in a chain which forms a strong, coherent connection, anchoring academic concepts to the reality of a pupil's world. Alternatively, each of these single events may remain isolated, connected by no essential relationship other than their proximity in time, leaving the content of instruction to drift aimlessly past the pupil. It is the teacher who must forge the events into a chain, hooking one event in to another. The tool the teacher uses to perform this task is the decision making process. If the teacher does not create the connections between instructional events, deciding that one event must follow another in order to reach some final goal, there will be no chain.

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Teacher decisions, then, are the links that unite classroom events. When teacher decisions integrate events, they form a coherent chain of instruction. When teacher decisions fail to perform this function - when there are missing links - classroom events are segregated, and instruction is static, leading nowhere.

This paper will contrast instances of integrative decision making with instances of missing links, to illustrate the effects of each state of affairs on teacher information processing. Then it will suggest three basic training techniques that can be used to increase the frequency of integrative decision making.

Integrative Decisions vs. Missing Links: Some Examples

The instances of integrative decision making and missing links to be presented here derive from a pilot study on teacher planning and perceptions, part of the Beginning Teacher Effectiveness Study being conducted by the Far West Laboratory, and funded by the California Commission on Teacher Preparation and Licensing, with monies provided by the National Institute of Education. The information reported on here should not under any circumstances be considered a set of conclusions from that study. The first phase of the field study has just been completed, and data analysis has merely begun. However, it is possible at this point to explain the procedures used, and to give some examples of teacher responses to the data collection tasks.

Teacher Planning

Teachers in the pilot study were asked to plan two twenty-minute lessons, one in reading and one in math, dealing with content selected by the research team. The content was the same for both second and fifth grades, and was to be adapted by each teacher to suit the abilities of his/her particular class.

The four master teachers and four student teachers who were the subjects of the pilot study were asked to provide written plans for each lesson, using any format they wished. These plans were then analyzed to determine what aspects of the lesson teachers thought important enough to make notations about.

There were no pre-set categories by which the teachers' lesson plans were analyzed, although attention was paid to the subjects' use of such standard content as objectives, materials, procedures, and evaluation. Other categories emerged as the plans were studied and compared. All of the plans without exception, included a mention of a sequence of steps or activities that would constitute the lesson. Beyond that some interesting differences were noted but only one of those differences will be discussed here: integrative planning vs. planning with missing links.

A plan that seems to instance integrative decision making is presented in Illustration I. It is a plan for a lesson on the lattice, a mathematical system where the operations are movements in space that can be related to addition and subtraction. This plan is at once both sketchy and detailed. The teacher has objectives in mind. The steps that are sketched in relate to these objectives. The details are notes to remind the teacher what information to give, what kinds of problems to present in what order and which children to watch particularly to monitor learning - all details that will help to insure that the objective is reached. The teacher apparently sees these details as related to each other and to the objectives.

A plan that seems to instance missing links is presented in Illustration II. It is written in narrative style, but it tells us much less. The steps of the lesson are set forth, but no overall purpose emerges. Each step is a

Illustration I

Integrative Lesson Plan

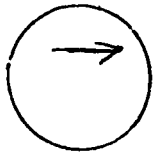
"Lattice Math"

90	91	92	93	94	95	96	97	98	99
80	81	82	83	84	85	86	87	88	89
70	71	72	73	74	75	76	77	78	79
60	61	72	63	64	65	66	67	68	69
50	51	52	53	54	55	56	57	58	59
40	41	42	43	44	45	46	47	48	49
30	31	32	33	34	35	36	37	38	39
20	21	22	23	24	25	26	27	28	29
10	11	12	13	24	15	16	17	18	19
0	1	2	3	4	5	6	7	8	9

On 0 to 99 Number Board, with paper arrows

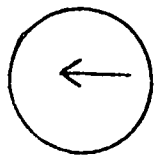
Oral Work

1. Develop generalizations for → , ← , → → , and ← ←



68 → =69
92 → =93
65 → =66
48 → =49

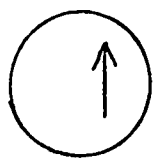
90 → → =92
0 → → = 2



94 ← =93
21 ← =20
89 ← =88

47 ← ← =45
54 ← ← =52
10 ← ← = 8

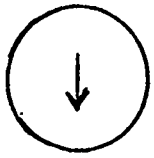
2. Develop generalizations for ↑ and ↓



0 ↑ =10
21 ↑ =31
75 ↑ =85
36 ↑ =46

47 ↑ ↑ =67
52 ↑ ↑ =72

Illustration I (Cont'd)



19 ↓ = 9
24 ↓ =14
89 ↓ =79
66 ↓ =56

? 3. Maybe ↗ and ↖ , depending on responses.

40 ↑ → =51	40 ↗ =51
35 ↑ → =46	35 ↗ =46
77 ↓ ← =66	77 ↙ =66
50 → ↓ =41	50 ↘ =41
24 ↑ ← =33	24 ↖ =33

On ditto papers with lattice, 0 to 99

1. Circle number - give child an arrow - use requested direction to find an answer. (Tony and Jerry)
2. Continue developing generalizations.

   Proceed depending on class's response.

Use small chalkboards (one per child) with easy to difficult examples - application.

1. → ←
2. ↑ ↓
? 3. ↖ ↘
? 4. Combinations

42 ↓↓ → → =24
55 ↑ → ↓ ← =55
11 → → ↑↑↑ =43
79 ↑ ← ← ↑ =97

Illustration I:

Lesson Plan with Missing Links

"Lattice"

I'll start this lesson by showing how the numbers go in direction, indicating how the next one is greater than the previous one. Next we'll go backwards, then up, then down, then diagonally.

Then we'll try and do the problems together that are on the ditto.

separate activity. There is no specificity about what will actually be attempted or accomplished with each activity, nor any indication of how one activity builds on or leads up to another. This teacher apparently sees the lesson as a series of rather vague things that she will be doing - what the children are expected to be doing is even more hazy.

In the integrative plan the teacher has a clear conception of an objective that links the steps of the lesson together and sharpens attention to critical details. In the non-integrative plan this clear conception of purpose is not visible. It is the missing link.

Classroom Interaction

After planning and teaching a mathematics lesson on the lattice, teachers in this study were asked to view a videotape presenting segments of several lessons in which other teachers were introducing the same content to other pupils. The teachers were asked to react to these various lessons, indicating what general approach was being used and which specific procedures seemed appropriate or inappropriate.

In one particular videotaped sequence the teacher uses a unique strategy for dealing with pupil errors, which he calls the "It's your problem" technique (Morine and Morine, 1973). The sequence of interactive events that transpires when Peter misses a problem is presented in Illustration III. This is a good instance of integrative decision making. The teacher has a triple objective in mind in this segment of the lesson: 1) helping Peter to understand the lattice; 2) giving Peter a feeling of success for having solved the problem by himself; 3) maintaining the involvement and learning of the other pupils while Peter solves his problem. With these goals in mind, the teacher presents a whole series of problems to the class, each

Illustration III

Peter's Problem

T	OK.....let me give you some problems. Here is the problem and the answer - and see if you can figure out what's happening. (writes on board: 13 → → =15 42 ↑ =52 21 ↘ =12) Alright.....now let me give you one and you see if you can figure out the answer...(20 → =___) Kevin?
Kevin	10
T	No...let me leave that there for you to work on, Kevin. (20 → =K) Let's try this one. (11 → =____) Todd?
Todd	12
T	12 is right. Let's try this one. Kevin do you know yours?
Kevin	21
T	21 is right...very good Kevin. How about this one - one straight up? (1↑ = ___) Peter?
Peter	2
T	2...no. What's the answer to this one, Peter? (1→ =___)
Peter	2
T	That's 2. Look at that one (1 ↑ =P) and see if you can figure that one out. What's the answer to this one? (3↑ = __) Who knows?
Veronica	13
T	13 is right. What's the answer to this one, Kevin? (14 ↑ =___)
Kevin	24
T	24...OK...what's the answer to this one? (42↑ =_____) Nettie?

Nettie	52
T	52 is right. Peter do you know yours? (1↑ = __)
Peter	22
T	22...no, not quite...What's the answer to this one? (20↗ = __) You've got to look at this and then you kind of have to look at that lattice and see what's happening. Ed?
Ed	32
T	32..no..close but..no brass ring.
Ed	31
T	31..that's right. It just goes from 20 right here. It doesn't go shooting off...How about this one, 7 straight up? (7 ↑ = __)
Todd	17
T	17...6 straight up? (6 ↑ = __)
Kevin	16
T	16...5 straight up? (5↑ = __)
Ed	10
T	5 straight up goes to 10?
Ed	15
T	15..OK..4 straight up? (4↑ = __) Veronica?
Veronica	14
T	3 straight up? (3↑ = __) Nettie?
Nettie	13
T	2 straight up, Veronica? (2↑ = __)
Veroncia	12
T	12...1 straight up, Peter?
Peter	11
T	11..good boy..

of them linked somehow to the problem that Peter is trying to solve, thus giving Peter the keys to unlock his private riddle.

Many teachers who viewed this sequence of interactive events commented favorably on the procedure of "saving" a problem for a pupil and giving him time to work on it. Not a single teacher realized that the subsequent problems related to Peter's problem. One teacher even commented that "he spent an awful lot of time on problems with 'up' arrows," but still the observer never made the connection between those problems and Peter's final insight that $1 \uparrow = 11$.

For these teachers the link was missing. They were unable to perceive the essential attribute of this technique for dealing with pupil errors. One must wonder how often they are able themselves to use pupil errors as a clue to pupil misconceptions, and shift gears in mid-lesson to deal with those misconceptions, linking their behavior to the perceived problems of pupils.

Pupil Feedback

Feedback is a necessary ingredient for any self-corrective device, including the teacher. During classroom interaction pupils are the major source of feedback to the teacher. The information that teachers collect about pupils during the course of a lesson is an important aspect of decision making. To provide data about this aspect, teachers in this study were asked immediately after teaching each of the two lessons to group the twelve pupils they had just taught, according to the types of behavior or responses they had noticed during the lesson. They could have as many groups and as many pupils in a group, as they liked. They were to select for themselves the criteria they would use for grouping. When the pupils had been sorted into categories by the teacher, and the categories explained, the teachers were asked if they had noticed anything else or could think of another way in

which the pupils might be divided into sub-groups. This grouping and regrouping went on as long as the teacher could think of another basis for sorting pupils. Some teachers only grouped once; a few grouped in four or five different ways; most used two or three different bases. Almost all teachers sorted initially on the amount of pupil participation, or involvement, or interest in the lesson. This seems to be a universal type of information that teachers collect.

An example of integrative use of pupil feedback is provided by a teacher who considered two different tasks in which pupils had been involved, and sorted them according to their success or the type of difficulty they had in dealing with each task. These tasks were essential for the instructional objectives, so the teacher had carefully noted how each pupil had responded to them. This feedback provided her with useful information for interactive decisions, enabling her to adapt the lesson to the pupils' performance.

An example of non-integrative use of feedback is provided by the teacher who could only group pupils on the basis of participation in the lesson. In sorting pupils he identified two pupils as non-participants in the lesson, only to realize later, as he viewed a videotape of the lesson, that both pupils were absent during the lesson. In identifying a third pupil as a non-participant, this teacher commented, "Willie never volunteers." On viewing the videotape the teacher noted several instances when Willie did have his hand raised, but had not been called upon. "When kids are quiet like that, you forget they're in the class," was his appraisal of the situation.

This second teacher was ignoring useful information that was available from pupils during the lesson. Actual pupil behavior did not disconfirm his expectations even when it was directly contradictory, because he did not try to connect these two types of information. There was a missing link in his observation of pupils.

Contrasting Concepts

These examples demonstrate that there are differences in the ways that teachers collect and process information. The BTES studies on teacher planning and perceptions (Morine and Vallance, 1975) are designed to collect data that will help to delineate these differences in a variety of ways. At this preliminary stage, however, the concept of integrative decision making, contrasted with the concept of missing links, is one viable way of analyzing teacher responses.

Training for Integrative Decision Making

If differences of this nature exist among teachers, there are two obvious next questions. Does integrative decision making affect pupil outcomes? Can teachers be trained to become integrative decision makers? Unfortunately as yet, little evidence has been collected to answer those questions. But progress is being made toward the day when answers may be available. The Stanford Study (Marx and Peterson, 1975) provides some preliminary indications of relationships between teacher decision making and pupil outcomes. When the BTES studies on teacher planning and perceptions are completed, they should provide additional information about such relationships.

The focus of this paper, however, is on teacher training. There are

three basic techniques to be proposed here as candidates for the job of training teachers to become more integrative in their decision making. The three techniques are: comparing alternative procedures; adapting procedures to pupil differences; noticing interactive decisions.

The first two techniques are being used now, in the field test of a Far West Laboratory training package on Responsive Teaching (Morine, 1974). The third technique is being used to collect data in the BTES studies. With minor adaptations it could readily be used in teacher training. It is expected that the three techniques will be used together next year in a Teacher Corps project at California State University, San Jose. Through evaluation of that project, further information on training effects and pupil outcomes will become available.

Each of the three techniques (comparing alternative procedures, adapting procedures to pupil differences, and noticing interactive decisions) will be described briefly in the remainder of this paper.

Comparing Alternative Procedures

The "missing link" teacher mentioned earlier, who planned her lattice lesson strictly as a series of activities, without mention of either a specific objective or expected pupil responses, failed to integrate instructional activities because she saw no essential relationship between an instructional purpose and a sequence of activities. The technique of comparing alternative procedures responds to this lack. In the training package on Responsive Teaching the technique is used to instruct teachers in the use of two concept learning models: concept formation and concept attainment, more commonly known as the Taba model and the Bruner model (Joyce and Weil, 1972).

Teachers are introduced to the two lesson models by demonstration lessons in which they participate as pupils, through reading material which compares and contrasts the two models (as seen in Illustration IV), and with the presentation of videotaped examples of the two models in which the same teacher deals with similar content in both models.

Having learned the similarities and differences between the two models, the teachers then select a concept to be developed, and plan two lessons to explore the concept, one lesson in each model. After peer teaching for practice, the lessons are taught to two different groups of pupils, and are videotaped or audiotaped for later playback, analysis, and comparison by the teacher and a supervisor or peers. The analysis concentrates on identifying the phases or sequences of each model, and contrasting the pupil responses to the two models.

In thus comparing the concept formation model and the concept attainment model, teachers develop an awareness of the relationship between a specific objective and the sequence of activities that can be built to achieve it, for they see that the slightly different objectives of the two models require different sequences of activities and that these lead to different types of pupil response.

It is expected that this process of comparing alternative procedures will help teachers become more integrative in their planning decision.

Adapting Procedures to Pupil Differences

The teachers who failed to link Peter's error with the teacher's subsequent selection of problems, in the example noted previously, were unable to integrate that classroom interaction because they saw no necessity to adapt group instruction to the cognitive response of one individual pupil.

Illustration IV

Comparing Two Models

Objectives

	Concept Formation	Concept Attainment
	Pupils will develop their own organization of data, forming groups (concepts) that enable them to describe the data.	Pupils will use data organized by teacher to figure out the rule or concept that is used to differentiate one set of data from another.

Opening Moves in Each Phase

Phase I: Data Base	(Data Selection) T. presents pupils with a body of data and asks them to select specific data with which to work.	(Data Presentation) T. presents pupils with pre-selected and pre-organized data, and asks them to study it.
Phase II: Concept Development	(Grouping) T. gives directions to pupils to start them organizing data.	(Data Production) T. asks pupils to produce or test additional examples within the same organization, predicting whether a particular item is an example or non-example of the concept.
Phase III. Analysis	(Reporting and Labeling Groups) T. asks pupils to report on what items they have grouped together, and what they might call (label) their groups.	(Analyzing Data and Verbalizing Generalizations) T. asks pupils to identify similarities and differences in the sets of organized data. T. may ask pupils to state the "rule" that differentiates between sets of data, or to name the sets.
Phase IV: Concept Testing	(Regrouping) T. asks pupils to add new data items to their established groups, to see whether they still work. T. asks pupils to compare their groups, then asks for pupil suggestions for regrouping or renaming the groups.	(Revised Generalizations) T. asks pupils to apply their generalizations (rules or set names) to new data items, to see if they hold true. T. asks for pupil suggestions about restatements of the rules or renaming the data sets.

The training technique of adapting procedures to pupil differences responds to this gap in interactive decision making.

In the Responsive Teaching package this technique is applied in two ways. First, teachers are alerted to observable pupil behavior that might indicate individual differences in pupil need for structure (Hunt, Joyce, et al, 1974). Videotapes and discussion serve to suggest various techniques by which a teacher might provide more structure or direction for one pupil, or encourage another pupil to propose his/her own structure or direction. Teachers can then reanalyze their own taped lessons to identify the techniques they have used for responding to these differences, and to discover indications of differences in pupil need for structure that might have been overlooked during the lesson.

In addition, each model is reviewed with an eye to the transformations that can be made in order to provide more structure or less structure. These changes in structure can occur in either the cognitive (content) or social (process) aspects of the model. (Illustration V presents examples of these types of transformations). Teachers view videotaped lessons that illustrate these various transformations of the models. They then select a model and plan two lessons dealing with the same content, in which the amount of structure provided by the teacher is varied. They peer teach, micro-teach, tape and analyze these lessons, concentrating on identifying the ways in which they have adapted the model to provide for pupil differences in need for structure.

These two applications of adaptation alert teachers to one important type of pupil difference and demonstrate the range of variations that can be used to accommodate these individual differences even within the context

Illustration V

TRANSFORMATIONS OF MODELS

Cognitive Complexity

Examples of Variations of Opening Moves in Concept Formation Model

	Low Cognitive Structure	High Cognitive Structure
Phase I: Data Base (Data Selection)	T. identifies a topic and has pupils generate data out of their own experience or knowledge.	T. begins the data selection by presenting a few examples of data himself.
Phase II: Concept Development (Grouping)	T. gives a very open direction, such as "put together any items that you think belong together for any reason."	T. gives specific directions for grouping, such as, "you should have more than two groups," "use all of the items on the board," "don't put the same item in more than one group," "put these into groups that would help you to describe (topic)."
Phase III: Concept Naming (Reporting and Labeling)	T. has all pupils report on their groupings and labels in random order, so that all varieties of organizations are open for consideration.	T. selects a few pupils who are to report on their grouping and labels, in order to focus pupil attention on organizations of particular interest.
Phase IV: Concept Testing (Regrouping)	T. asks pupils if, after hearing several different organizations, they can see similarities or differences between them.	T. selects several new items of data and asks pupils where each would fit in the different organizations discussed.

Social Complexity

Examples of Variations of Opening Moves in Concept Attainment Model

	Low Social Structure	High Social Structure
Phase I: Data Base (Data Presentation)	T. asks pupils whether they want to study materials alone or work with a partner, discussing what they see.	T. tells pupils to study materials alone and to write down notes to themselves on what they observe.
Phase II: Concept Development (Data Production)	T. asks pupils if they are ready to share their ideas, and asks for volunteers. T. asks pupils whether they want to write their own examples on the board, or select a pupil to record, or have the teacher record their ideas.	T. calls on pupils to record their ideas, being certain that every pupil gives at least one example.
Phase III: Concept Naming (Analyzing Data and Verbalizing Generalizations)	T. asks pupils whether they want to analyze data working individually, in pairs, or as a total group.	T. calls on pupils to identify similarities and differences in data, being certain that every pupil participates in the discussion.
Phase IV: Concept Testing (Revising Generalizations)	T. asks pupils how they would like to organize themselves to collect data for testing and evaluating their generalizations.	T. asks pupils to work individually (with assigned materials) in testing their generalization against new data. Later, T. calls on selected pupils to report their findings.

of group instruction. It is expected that this process of adapting procedures to pupil differences will help teachers become more integrative in their interactive decisions.

Noticing Interactive Decisions

The unobservant teacher who labeled absent pupils as non-participants in the lesson failed to collect feedback from pupils because he saw no essential relationship between pupil behavior and his application of the few instructional principles which formed his pedagogical credo. "Give several people a chance to respond" meant to get more than one answer to each question, not to keep track of who had been talking and call on someone who hadn't. The technique of noticing interactive decisions responds to this feedback vacuum. This particular technique has not yet been used (by this author, at least) as a training procedure, but it is being used as a means of data collection in the BTES study, and the response of teachers to the task suggests that it could be extremely useful as a learning device.

In the BTES study, immediately after teaching a twenty-minute lesson on sentence expansion, teachers view a videotaped recording of the lesson. They are asked to stop the tape whenever they see a point at which they consciously made a decision, and to talk to an interviewer about what they were thinking at the time.

Many teachers respond to these initial directions by protesting that they didn't make any decisions -- the lesson went just as they had planned it. But once the tape begins to play they suddenly discover a number of decisions. Some of the typical decision making situations occur when:

a pupil makes an error

a pupil is unable to answer a question

an opportunity arises to reinforce some previous learning

an opportunity arises to go off on a tangent from the planned content

pupils seem restless or uninterested in the activity

one planned activity, in a sequence of activities, has been completed

the lesson is interrupted by some outside disturbance

the available time is almost used up

Interestingly enough, teachers seem to exhibit individual differences in the types of situations that they identify as decision points. Some concentrate on opportunities to reinforce other learning, others focus on pupil interest or restlessness, still others choose to discuss their reasons for responding to pupil errors in particular ways. Nearly all seem delighted at the opportunity to explicate their thinking, and several have commented on the insights they have gained about their behavior as a result.

To use this technique for teacher training, one could use the procedure described above as a means of diagnosing teacher awareness of decision making situations. Then the procedure could be adapted slightly to develop awareness of additional types of situations. For example, if a teacher is cued only by pupil restlessness or bored facial expressions, a supervisor might stop a taped playback after every instance of pupil hesitancy in answering a question, and direct a series of questions to the teacher. Is this pupil usually hesitant? Do other pupils seem ready to answer the question? What information is needed to answer that question? How long do you normally give a pupil to answer a question? What are three different moves you might make at this point? What are the expected consequences of each?

This procedure could heighten teacher sensitivity to the uses of feedback and extend the range of situations in which conscious decision making occurs. As one teacher notes, "After you told me you were interested

in decision points, I found myself getting little beeps all during the lesson, saying, there's one - I'm making a decision!" It is expected that the technique of noticing interactive decisions will help teachers become more integrative in their use of feedback.

Premises and Promises

The premise of this paper is that missing links need to be filled in, and that integrative teacher decisions are the links that are missing in many classrooms. There is no promise that integrative decision making is the principal attribute of "the effective teacher," if such a creature exists. But there is a supposition that teacher decision making needs to be studied much more thoroughly in order to determine its effects on pupil outcomes. Part of that study will involve training teachers to be more integrative in their planning, their interactive decisions, and their use of feedback.

This paper has distinguished between integrative decision making and missing links, and has proposed three basic training techniques by which integrative decisions might be increased. The techniques - comparing alternative procedures, adapting procedures to pupil differences, and noticing interactive decisions - could be condensed to Comparing, Adapting and Noticing, forming the acronym CAN. But that label would be decidedly inappropriate for the training strategy proposed here, for the very essence of its goal is to eliminate the lesson that comes in a CAN, preformed, nonmalleable, indigestible, and poorly suited for pupil consumption.

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