

Learning Objectives and Teaching Strategies

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Models of curriculum development typically involve the specification of objectives followed by selection of learning experiences and content in order to achieve those objectives. However, objectives are usually not specified in ways that can be directly linked to modes of learning and strategies are often not appropriate for the objectives they are designed to achieve. A proposal is made for division of objectives into five categories suggested by Gagné: verbal knowledge, intellectual skills, cognitive strategies, attitudes, and motor skills. Key elements in instruction for each of these categories are described and a number of teaching strategies are outlined, with most illustrations related to topics in social studies, although the underlying principles apply generally.

L'élaboration des programmes d'études se fait habituellement selon le modèle suivant: définition des objectifs, puis choix des modes d'apprentissage propre à leur réalisation. Toutefois, il arrive souvent que les objectifs, tels qu'ils sont définis, ne puissent être rattachés directement à des modes d'apprentissage et, en outre, que les stratégies ne conviennent pas aux objectifs pour lesquels elles sont conçues. Dans un premier temps, nous proposons de classer les objectifs selon les cinq catégories établies par Gagné: information verbale, habiletés intellectuelles, stratégies cognitives, attitudes, et habiletés motrices. Dans un deuxième temps, nous décrivons les éléments essentiels à incorporer dans l'enseignement pour atteindre chacune de ces catégories d'objectifs, puis nous exposons un certain nombre de stratégies d'enseignement qui semblent convenir aux objectifs. Nous empruntons la plupart de nos exemples aux sciences sociales, bien que notre méthode soit applicable à toutes les disciplines.

Most current models of curriculum development involve the steps of establishing objectives and selecting learning experiences and content in order to achieve those objectives. In this article an attempt is made to clarify the relations between objectives and teaching strategies. This involves selection of a system of classifying objectives into categories for which principles of learning can be clearly identified and which can be directly linked with appropriate teaching strategies. Although this seems a logical step, and one which should not be too difficult to take, there are a number of problems associated with it.

One problem is that many goals and objectives are very general and do not directly match modes of learning. For example, the long-standing goal of "appreciating cultural heritage" involves attitudes and some knowledge of specific events and institutions, and carries implications of at least some effects on students' actions in the world outside the school. To teach for this goal effectively it is necessary to break it down into

specific instructional objectives and to arrange appropriate modes of instruction for each of these dimensions.

A second problem leading to a mismatch between objectives and teaching strategies is a tendency to make exaggerated claims for, and to rely too heavily on, new and exciting techniques of instruction. This is well illustrated by the reception given to films many years ago and by the claims that were made for discovery learning in the euphoria of the structure-of-the-disciplines movement in the early 1960s. The same kind of danger can be seen in some of the claims made for simulations and in their misuse as entertainment without adequate preparation and analysis.

A third problem is that many day-to-day teaching activities are habitual rather than the result of careful analysis of what is required to achieve particular objectives. We tend to persist in modes of operation even when they are clearly inappropriate for what we are trying to accomplish simply because we have become accustomed to that way of doing things. This partly explains the well-documented dominance of teacher talk and recitation in classrooms (e.g., Bellack et al., 1966; Goodlad & Klein, 1970).

A fourth problem is that many teaching strategies are capable of subtle variations which can significantly alter their effect. This means that particular strategies can be used effectively for several different kinds of objectives, and attempts to match them with objectives and modes of learning must include descriptive statements about how they are intended to be used to achieve those objectives.

In spite of these difficulties a number of attempts have been made to separate objectives into categories which can be directly linked to modes of learning and strategies for teaching. One of the more useful systems for linking teaching strategies and outcomes is outlined by Gagné, since his is essentially a synthesis of theories of learning linked to modes of instruction (Gagné, 1978; Gagné & Briggs, 1974). Because of this, Gagné's five domains of learning have been chosen as the basis for the present review. These are verbal knowledge, intellectual skills, cognitive strategies, attitudes, and motor skills. For each domain the manner in which learning appears to occur is discussed and several appropriate teaching strategies are described. Following this discussion some implications of the implicit goal of transfer of learning are noted and an approach to planning a unit of work is recommended.

The grouping of strategies reflects our analysis of modes of learning rather than their authors' original intention. Consequently there are several instances where the classification may be controversial.

The categories of objectives, statements about principles of learning, and illustrated teaching strategies are shown in Table 1.

TABLE 1
Objectives, Elements in Instruction, and Teaching Strategies

<i>Category of Objectives</i>	<i>Key Elements in Instruction</i>	<i>Teaching Strategies</i>
Verbal knowledge	Provide meaningful context Ensure processing	Advance organizers Recitation Mathemagenics Structural Communication Related physical activity Imagery
Intellectual skills	Ensure prerequisite skills	Learning hierarchies Mastery learning Programmed instruction Taba strategies Teaching concepts and generalizations Teaching constructs Discovery learning
Cognitive strategies	Present a variety of novel problems Provide process supports	Inquiry Training Productive Thinking Synectics Jurisprudential teaching Group investigation
Attitudes	Provide desirable models Condition desired responses	Modelling Conditioning Role Playing
Motor Skills	Practice with feedback	

VERBAL KNOWLEDGE

Verbal knowledge comprises facts or beliefs which can include beliefs about values. These are stored in memory as propositions. Propositions may be linked — that is, associated by the learner because he perceives either that they contain common concepts or that they contain highly related ones as far as he is concerned. For example, most social studies students would link the two statements: (a) Quebec is part of Canada, and (b) most people who live in Quebec speak French.

White and Gagné (1976) provide a more extensive description of linking. They show that linked propositions will be retained better than unlinked, and it seems likely that they will be more readily employed in making inferences, i.e., in transfer. Their analysis supports Ausubel's (1968) statements about meaningful verbal learning. It implies that new information will be assimilated when it consists of propositions that are readily linked to extensive bodies of propositions already in the learner's long-term memory. Recently Gagné and White (1978) have extended

their notion of linking to include two further types of memory structure, those of images and episodes. Images are mental pictures, while episodes are recollections of past events in which the individual took part. Images and episodes can join with intellectual skills and verbal knowledge to make up a person's knowledge of a topic.

The teacher of verbal information is faced with two major problems: how to get information from short-term memory into long-term memory and how to organize it in such a way that it can be recalled when needed. The two problems are closely related and their solution provides the key to the principles which have primary importance for the learning of verbal information. These are that verbal information will be learned and recalled more readily if it is presented in a context which has meaning for the student, and if it is mentally processed to establish linkages with other information in long-term memory.

Teaching strategies which clearly incorporate these principles include advance organizers, recitation, mathemagenic techniques, and structural communication.

Advance organizers are advocated and described by Ausubel (1968). They are carefully selected concepts under which new information can be subsumed. To be effective the following conditions should obtain. The organizers must be presented in advance, must be at a higher level of abstraction than the material to be learned, must be carefully linked to the learner's pre-existing cognitive structure, and should be selected by experts in the field of knowledge concerned. Most of the research done with advance organizers has been with written material using descriptive statements of concepts as organizers. However, the system should work equally well for verbal presentations and for organizers presented through pictures, diagrams, films, or other media. One common example is the use of an overview built around a diagrammatic representation of the economic system, as an introduction to studies in economics.

Advance organizers can be used in conjunction with the other strategies listed above, which have the effect of ensuring processing of the new information while organizers provide something for the information to be linked with.

Recitation, frequently referred to as classroom discussion or "chalk and talk," is probably the most widely used teaching strategy in school classrooms. The steps in the strategy are roughly as follows:

1. The teacher questions students in class about present knowledge and ideas related to the topic to be presented;
2. New information is presented, directly or through leading questions;
3. The teacher questions students about the new information to check their understanding and relate it to their previous knowledge.

This approach has a number of useful features as a means of generating verbal learning. The initial questioning serves the double purpose of reminding students of previous related knowledge with which the new information can be associated, and letting the teacher know something about the extent of their previous knowledge so that subsequent presentation can be made at an appropriate level. Later questioning, writing, memorization, and testing require students to continue to attend to and process the new information to establish more firmly links with previous knowledge.

The approach puts the teacher in a very strong position to respond flexibly to the reactions of the class. However, it has weaknesses in that it is very difficult to pitch a presentation at a level that is appropriate for all students, and it is hard to maintain interest and attention for long periods of time. These difficulties partly explain efforts of teachers to reduce the size of classes and arrange relatively homogeneous groups within them.

Mathemagenics is a term coined by Rothkopf (1965) and refers to behaviors which give rise to learning. Essentially, the approach involves the use of questions, instructions to students, and the careful structuring of written material for specific instructional goals. The research on these effects is extensive and has been reviewed in several documents (e.g., see Rothkopf, 1971; Gagné & Rothkopf, 1975). The intended effects of specifying goals for students and using instructions and questions are to influence students' inspection behavior and to control processing.

Structural communication (Egan, 1975) has been designed as a teaching strategy to ensure processing during learning. The structural communication system involves study units broken down into six parts.

1. Intention — usually a brief statement of objectives which might be associated with an overview or advance organizer.
2. Presentation — an initial presentation of information to be learned.
3. Investigation — a series of three to five problems or challenges to students which require them to use and reorganize the information that is made available to them in a response matrix.
4. Response matrix — a chart which presents the items of information (usually between 12 and 30) in random order for reference by students during the investigation.
5. Discussion — during which the selection and arrangement of information in response to the challenges is reviewed.
6. Viewpoints — which is a general concluding statement or review.

This strategy can include an advance organizer and seems an excellent means of ensuring processing. The investigations can be varied so that the strategy can be used for problem solving and cognitive strategy objectives as well as verbal information objectives.

Other devices involving processing of information have been shown to aid recall and can be used either on their own or in conjunction with any of the strategies described above. These include related physical activity (Kunihira & Asher, 1965), overlearning (Krueger, 1929), and the use of a variety of devices to foster imagery such as concrete image evoking works (Anderson, 1974) and picture drawing (Varley, Levin, Severson, & Wolff, 1974).

INTELLECTUAL SKILLS

Intellectual skills are stored memories of how to perform a class of tasks, in contrast to single facts. Gagné (1977) lists several subdivisions of skills, the most important of which in secondary school and college social science courses are using concepts, using rules, and problem solving.

Objectives in the category of intellectual skills include not only the ability to use concepts and rules when called upon to do so, but their use with relatively little guidance in problem solving. Consequently, there is a place for both carefully sequenced convergent strategies designed for particular concepts and rules, and open-ended divergent approaches which give students the opportunity to apply them in a variety of problem-solving situations.

In this analysis problem solving is differentiated from rule using by the amount of guidance given. A student who, after being cued to use demand and supply curves in thinking, predicted a fall in the price of oil following an increase in supply, would be engaged in rule using. More open-ended tasks such as responses to the questions: "How could the price of oil be reduced?" or "What would happen if huge oil reserves were found in Newfoundland?" would involve a greater degree of problem solving since students would have to categorize the task and identify relevant rules before using them.

Intellectual skills may be linked to one another and also to elements of verbal knowledge. For instance, a learner may have the ability to predict community reactions to a freeway construction project, which may remind him of another skill he has, of using a set of procedures for forming judgments about controversial issues. These skills may be associated by him with information about other freeway construction projects, about effects of pollution on ecology, and about the impact of the automobile on society.

The category of intellectual skills is very broad and includes much that is frequently classified in affective and skill areas. It includes, for example, the formation of concepts, the learning of skills such as map reading, learning to use library resources, certain aspects of learning to work in groups, and learning to apply values and moral rules in dealing with controversial issues and interpersonal relationships.

An extensive body of literature (Gagné, 1968, 1977) indicates that intellectual skills are hierarchical in nature. In other words the develop-

ment of new intellectual skills involves the combination of previously learned skills in some new insight or capability of action. This suggests the major principle which should guide instruction for objectives in this category. It is that intellectual skills will be most effectively developed if instruction is managed so that prerequisite skills are developed and/or recalled, and guidance is given in the new performance to be acquired.

Strategies which are likely to be effective in developing intellectual skills include some which involve careful sequencing of instruction, such as the use of learning hierarchies, mastery learning, and linear programming; and others which have been specially designed for acquisition and use of concepts, principles, and problem-solving skills.

Learning hierarchies are devices for sequencing the order of presentation of skills rather than teaching strategies as the term is usually understood. Once an appropriate sequence has been determined other techniques can be used to teach each of the sub-skills that are involved.

A body of literature has grown up around procedures which might be used for the empirical validation of learning hierarchies (e.g., Airasian & Bart, 1975; Cotton, Gallagher, & Marshall, 1977; White, 1973, 1974; White & Gagné, 1978). Individual teachers may find some of the recommended validation procedures beyond their resources. However, careful sequencing of skill development on a logical basis is highly recommended, even when empirical validation is not feasible.

Mastery learning is another approach which seems particularly suited to teaching intellectual skills (Bloom, 1968; Block, 1971). In this system, material to be learned is divided into units and instruction is provided for as long as necessary for students to reach a predetermined level of mastery before proceeding to the next unit. Instruction is carefully geared to the differing needs of individual students. The mastery learning approach can be used for any category of objectives, but the carefully planned progression through a sequence of units which are studied until mastered makes it particularly suited to the acquisition of a hierarchy of intellectual skills. In mastery learning programs a criterion level of approximately 80% to 90% mastery on tests is usually established. The acquisition of prerequisite intellectual skills would appear to require 100% mastery. It makes sense, however, to set a slightly lower requirement to provide for a small amount of random error by students during testing.

Programmed instruction (Skinner, 1954) has advantages for the development of intellectual skills which are similar in some respects to mastery learning. In the original and most commonly used form of linear programs, programmed instruction involves breaking down a final objective into a large number of small steps which are presented as a carefully sequenced set of "frames" to which students are required to respond actively. The material is carefully written and trialled so that almost all students are successful almost all the time. Immediate information about successful performance serves to reinforce learning and motivate the stu-

dents. Many programmed instruction sequences are designed to teach verbal information, and for that category of objectives a logical sequence is much less important than provision of a meaningful context and active processing. However, for intellectual skill learning the careful sequencing involved in linear programming makes it a valuable technique.

Strategies for teaching concepts and generalizations have been described by a number of writers. Martorella (1976) reviews the suggestions of a number of writers, adds some additional approaches of his own, and applies them to social studies instruction. Taba (1967) describes strategies for attaining concepts, developing concepts, developing generalizations, applying generalizations, exploring feelings, analyzing values, and interpersonal problem solving. These strategies begin at a very specific concrete level with a question designed to have students describe a particular object or event. Additional questions lead them into more complex and abstract levels of thinking.

The Taba strategies have been developed as part of a carefully planned social studies program in which key concepts and generalizations are initially developed in simple form and reintroduced at later stages in more complex form in studies of other settings. This approach to long-term planning and the use of questions calling for increasingly complex processing as concepts and generalizations are developed and applied is well suited to the development of intellectual skills.

Tanck (1969) describes some strategies for teaching concepts and generalizations which are similar in many respects to those mentioned above, and goes beyond them to explain an approach to teaching complex sets of related concepts and generalizations which he calls constructs. Examples of constructs would be the models of economic and political systems proposed by Senesh and Easton (Senesh, 1966).

The sequence of instructional activity begins with a simple description of the key organizing ideas as an advance organizer. Subsequent instruction serves to elaborate on these initial ideas, relating them to each other and to the advance organizer. Tanck uses the term cumulative structuring to refer to a process of building the construct over time, component by component, moving from the most concrete and specific ideas to the most complex and subsuming ones. Cumulative structuring is comparable to using a learning hierarchy. Consequently, the overall strategy can be seen to incorporate an interesting combination of major strategies recommended here for verbal information and intellectual skills. An advance organizer is presented first to provide a meaningful context for subsequent learning, and a form of learning hierarchy is used to provide for the sequential development of concepts and generalizations as intellectual skills.

Inquiry and discovery have been used as terms to describe a number of variations of fairly open-ended discussion techniques which bring students into contact with problems which they can analyze, hypothesize about,

and attempt to resolve. These have been advocated by a number of writers (Bruner, 1960; Massialis & Cox, 1966; Massialis & Zevin, 1967), and range from completely open and unstructured discussions to guided discovery in which the teacher uses probing questions to encourage students to think more deeply and reflectively about a problem and their approach to it.

Allowing students to identify and define their own problems and to select the concepts, principles, and modes of inquiry they deem relevant to it has been claimed to result in superior motivation, retention, and transfer. Discovery seems inefficient as a means of teaching new concepts and principles, and quite unsuited to the learning of verbal information. On the other hand, some sort of very open-ended problem-centred approach seems to be necessary for development of the intellectual skill of problem solving and is essential, though not sufficient without some additional conditions being met, for the development of cognitive strategies. Objectives relating to problem solving represent a point of transition between development of intellectual skills and cognitive strategies. To the extent that they relate to the application of concepts and generalizations they should be considered as intellectual skills, and to the extent that they relate to the students' management of their own thought processes they should be thought of as cognitive strategies.

COGNITIVE STRATEGIES

Cognitive strategies are a sub-set of intellectual skills that have to do with the management of our own thought processes, and govern our own behavior in perceiving, learning, remembering, and thinking. Many of these, such as our identification of which elements in the environment are worthy of attention at the moment, are largely unconscious. Others, such as a deliberate decision to use a particular strategy for memorizing information, are conscious and involve the application of rules about our own functioning.

There are several major difficulties in developing cognitive strategies. One is that their internal and partly unconscious nature makes it difficult to deal with them directly (Gagné & Briggs, 1974, p. 49). A second is that there may be limits to the extent to which cognitive strategies can be improved through instruction.

If we focus on the sub-set of cognitive strategies which deal with problem solving it becomes possible to identify some of the major elements involved in using them. Faced with a problem situation an individual categorizes it as one for which a particular mode of response is appropriate. If the situation is a familiar one a standard or routine response will be cued, frequently without conscious recognition of what has occurred. If the situation is unusual, or perceived to be particularly important, the cued response may be to engage in reflective thinking and a search for

relevant concepts, rules, verbal information, images, and episodes. The teachers' task in improving students' problem-solving ability might include trying to develop sensitivity to situations for which reflective thinking and problem solving are appropriate and ensuring that memory searches for relevant information and processes will result in the identification of the most effective procedures and the most useful knowledge for the problem at hand. The major principle which should guide instruction for cognitive strategy objectives is that cognitive strategies will be most effectively developed if students are exposed to a variety of novel problems for consideration in contexts which are as close to eventual transfer situations as possible, and if students are encouraged to reflect on and evaluate the cognitive strategies they use. At the same time attention must be given to the development of verbal information and intellectual skills that are likely to be useful for the resolution of certain classes of problems, and to establishing links between these so that they can be called upon when needed.

A number of teaching strategies introduce students to novel problems and have them reflect on their own thought processes. Inquiry training (Suchman, 1966), particularly when associated with process support strategies (Costa, Lavaroni, & Newton, 1967), seems to meet the required conditions very closely. However, others, such as the Productive Thinking Program (Covington, Crutchfield, & Davies, 1968), Jurisprudential Teaching (Oliver & Shaver, 1966), and Group Investigation (Thelen, 1960) should also be very useful.

Inquiry training utilizes a drive for cognitive consistency by presenting a discrepant event as an initial focus for inquiry. Students question the teacher or perform experiments to try to resolve the discrepancy while the teacher uses a variety of process support strategies to encourage them to reflect on the cognitive strategies they are using. The need to establish links between effective cognitive strategies and a variety of problem situations suggests that many different kinds of problems should be used.

In the Productive Thinking Program a more direct attempt is made to get students to acquire problem-solving strategies. Students work through a series of booklets containing detective-type mystery problems (Covington, Crutchfield, & Davies, 1968). As they do so they receive instruction in generating and evaluating ideas, clarifying a problem and viewing it from different perspectives, and receive feedback on their performance. Repeated guided practice on curriculum-related tasks helps to link the students' developing cognitive strategies to a variety of problems they are likely to face in school and in everyday living.

Jurisprudential teaching (Oliver & Shaver, 1966) was developed as a means of improving students' ability to deal with controversial issues which normally involve conflicting values. Resolution of conflicting values requires attention to three kinds of problems: clarifying which values are in conflict and choosing among them, checking the facts which are directly

related to the conflict, and clarifying the language through which the controversy is described.

Oliver and Shaver suggest eight processes as a means of dealing with these problems: abstracting general values from concrete situations, viewing values as dimensional constructs rather than as absolutes, identifying conflicts between values, recognizing categories of value conflict situations, developing analogies to the problem under consideration, working towards general rules regarding value conflicts in certain kinds of situations, testing factual assumptions, and testing the relevance of statements to the issue under review.

The teacher attempts to manage the discussion so that students consciously perform these eight operations. This serves a similar function to the process support strategies mentioned earlier, in making students aware of their approach.

Group investigation is a strategy developed by Thelen (1960) in which a classroom group models processes which occur in society and students reflect on their own and the group's effectiveness in addressing a problem or issue. Since effective cognitive strategies frequently involve interaction with others this group focus adds a dimension which is not apparent in the other teaching strategies described above.

The procedure involves two cycles. One of these is speculative and imaginative, where the purpose is to develop hunches and play with ideas without being too concerned about being "right." In the second, the intent is to find the best possible solution to a problem based on a rigorous analysis of available evidence. Within each of these cycles there are times when students work alone, times when they work informally with friends, and others when the class meets formally as a single group. These two cycles and three modes of activity result in a six-step procedure which is summarized in Table 2.

ATTITUDES

Attitudes are predispositions to behave in particular ways towards certain objects or events. They are generally considered to contain three elements: beliefs, emotions, and behavioral tendencies.

The beliefs that are part of attitudes take the form of a network of related evaluative propositions and are stored in memory as verbal knowledge. However, they have special characteristics which differentiate them from other verbal knowledge since they are closely linked to values and may be deeply embedded in self-concept, and since educational objectives relating to attitudes usually involve questioning or modification of existing belief systems rather than the addition of new ones. Drives for cognitive consistency and for the preservation of existing self-concept combine to make change extremely difficult to induce by direct means. Data which are discrepant with the existing belief system may be rationalized or per-

TABLE 2
Steps in Group Investigation Strategy

	<i>Working Alone</i>	<i>With Friends</i>	<i>Formal Groups</i>
Speculative Intuitive Cycle	1. Confrontation with idea or event. Individ- ual response.	2. Discuss response with friends. Modify or expand.	3. Teachers list responses, encouraging diversity. Class discusses patterns, problems, and questions that emerge.
Rational Demonstrative Cycle	4. Individual selection of and response to question or problem.	5. Discuss response with friends. Check data, modify.	6. Report to teacher, class, or outside group; review methodology and work out ways of improving; identify further problems and issues.

haps not even perceived, so that initial attitudes tend to be confirmed by subsequent experience.

Emotions are largely physiological in nature and involve glandular secretions and observable physical reactions. These responses may be triggered by perception of environmental cues or by internal linkages. The cognitive and affective elements are interactive, with feedback from bodily changes combining with consciousness of the emotion-arousing stimulus. Cognitive factors therefore play a double role by coding stimuli in such a way that physiological responses occur, and by interpreting those responses in the light of other environmental cues.

The patterns of behavior associated with attitudes are probably best seen as consequences of belief systems and emotional responses.

A great deal has been written about processes involved in attitude change (e.g., Triandis, 1971). It seems clear that the exhortations, persuasive communications, and logical arguments that are often resorted to have very little impact (McGuire, 1969). On the other hand, the processes of identification and conditioning seem likely to be the most effective of the reasonably accessible processes (Bandura, 1969).

Individuals tend to identify with others whom they respect and admire, and in so doing begin to adopt their beliefs and patterns of behavior. A teacher may herself serve as a model, or may draw attention to other desirable and respected models in literature, on film or television, or in the community. Attitudes can also be conditioned by arranging for the object of the attitude to become associated or linked with other concepts which

have different attitudinal associations. For example, a student who likes horses but dislikes arithmetic might be given problems about horses that involve arithmetic processes in the hope that the attitude to horses will rub off on the arithmetic.

There has been considerable confusion about objectives and strategies relating to affective areas of the curriculum. This analysis suggests that it may be best to regard the use of generalizations about how people feel and behave in conflict situations (e.g., Taba's strategies for exploring feelings and interpersonal problem solving) as intellectual skills; attempts to have students understand their own values and the way they influence their behavior (e.g., Rath's strategy for value clarification) as cognitive strategies; and attempts to alter students' preferences and values, as attitudinal objectives. The stages of moral development described by Kohlberg (1966) should be seen as descriptions of cognitive strategies which may set limits on the development of intellectual skills relating to moral judgments. These limits can be gradually extended through appropriate learning conditions.

This discussion suggests the principle which should guide the selection of teaching strategies for attitudinal objectives. Attitudes may be effectively modified by having students identify with desirable models and by arranging for conditioning and positive reinforcement.

Conditioning and modelling provide the basis for a number of suggestions by Mager (1968) for modifying students' attitudes towards learning. Conditioning and modelling can be combined by exposing students to situations in which the models with whom they are identifying derive satisfaction as a result of exhibiting the desired attitude. Advertising agencies frequently make use of this technique in showing sporting heroes deriving satisfaction from the use of a particular product.

The influence of peers in a school situation must also be considered in developing classroom strategies. Children frequently identify with leaders in their own group and derive considerable satisfaction or discomfort from their approval or disapproval. One possibly productive mode of intervention may be to bring about a short-term shift in the attitude of the group as a whole by introducing an influential speaker, and arranging group discussions immediately afterwards, preferably while the model is still present. This provides for modelling by the speaker, and conditioning brought about by group support for the new attitude.

Role playing is another widely used teaching technique which can have a major impact on attitudes. Shaftel and Shaftel (1967) and Chesler and Fox (1966) have described role playing procedures and their use for this kind of purpose in some detail. In role plays individuals inevitably identify with the role to some degree. While this does not force a change in attitude, it does at least place students in a situation in which an alternative attitude is considered openly and perhaps defended.

It should be emphasized that the processes of modelling, identification, and conditioning which are effective in changing attitudes operate largely at an unconscious level which helps avoid the ego-defence mechanisms that make changing attitudes so difficult. However, many educators may prefer the relatively ineffective method of logical argument on the ground that it leaves the student free to accept or reject what is proposed.

It seems that the most effective teaching strategies are ones which catch the student by surprise and manipulate his preferences without him being aware of what is happening. There must be serious questions about the extent to which this is legitimate in a society which places a high value on individual freedom, autonomy, and rationality. Secondly, the manipulation of values and emotional responses to various stimuli can have unpredictable and potentially dangerous consequences for the student if they have their origin in unremembered traumatic events, and serve important functions in the individual's ego-defence system. Considerably more discussion is needed on these issues, and attitude change should be pursued as a goal by these means only with extreme sensitivity and very careful thought.

MOTOR SKILLS

Motor skills involve the integration of sometimes quite complex patterns of movement in ways which are partly conscious and partly unconscious. New patterns of movement involve consciously controlled co-ordination of previously learned sub-skills. Once the new pattern is learned, it can be managed unconsciously and combined with other movements in development of a further skill. A student learning to play the piano must first concentrate on the very simple movements of striking the keys. After practice he can manage that task unconsciously and concentrate on the more complex tasks of striking chords and translating the written score into hand and finger movements. Eventually these too can be managed unconsciously and the student can sight read as he plays, concentrating on minute variations of timing and pressure to give expression to his interpretations of the composer's intentions, or slight variations of that to suit his own mood. At this level of skill it is possible to perform in a way that appears automatic, giving attention to other, perhaps totally unrelated events.

The process of developing motor skills may be described as the co-ordination and refinement of patterns of movement through conscious controls which become progressively less necessary with practice until they are no longer required for effective performance. During practice, guidance and feedback are necessary adjuncts to conscious control, but these become less important as the new skill is mastered and the individual can rely almost exclusively on intrinsic feedback (the "feel" of the movement).

The central principle which should guide instruction for development of motor skills is that it requires extensive opportunity for practice, with feedback on the correctness of performance.

Motor skills in social studies exclude study skills but would include such things as penmanship and the ability to draw recognizable maps or build models. Since these play a relatively small part in social studies instruction, appropriate teaching strategies for motor skills will not be reviewed.

TRANSFER OF LEARNING: AN IMPLICIT OBJECTIVE

In social studies instruction we are usually concerned that students actually use the information, skills, and ways of thinking we have taught them without any special prompting outside the school.

When the perceived environment is interpreted we respond in accordance with previously learned rules for behavior in situations of that kind. These responses are normally automatic and often quite unconscious. If something is perceived as threatening, stimulating, or unusual we act according to a rule which calls for us to deliberately focus attention on the situation and think consciously about it. In that case we still try to fit the situation into some familiar category so that we will know how to deal with it. In doing so we recall previously learned information, concepts, and rules that are directly linked to what we perceive to be the significant elements of the environment. Potentially relevant information that is not directly linked to those perceptions is not called on and therefore has no influence on behavior. A major problem for educators who hope to have the ideas they teach used by students in the world outside school is to arrange direct links between those ideas and the learner's subsequent perceptions of attention-worthy situations.

The processes used to search for items in memory are cognitive strategies in Gagné's terminology. They are largely unconscious, though one may consciously aid the process by attempting to recall related visual images and events, or by using other mnemonic devices to help recall or reconstruct the desired information. However, the unconscious search may terminate with the most closely linked usable item of information without triggering a need for conscious reflection and analysis. When this occurs responses are likely to be habitual and potentially powerful insights lie dormant and unused.

Research on transfer of learning and discussions of the conditions which are likely to facilitate it have been carried on for many years (e.g., Osgood, 1949; Thorndike & Woodworth, 1901). Stephens (1960) summarizes major theories relating to transfer and suggests teaching procedures which are generally supported by other writers (Ellis, 1965; Klausmeier & Davis, 1969). These include focusing attention on the thing to be transferred, developing meaningful generalizations, providing a variety of experiences, practising applications to other fields, and practising transfer.

This analysis supports those recommendations since they are likely to result in the establishment of linkages with a number of potential transfer situations and with other elements in memory.

To parallel earlier discussions about categories of objectives these comments might be concluded by suggesting some principles about transfer of learning. Learning is more likely to transfer if it is strongly linked with other elements in memory and if it is stored in memory in a form which is similar to subsequent transfer settings. Teaching techniques appropriate for this purpose include the suggestions made by Stephens and other strategies such as simulations, role plays, and field trips, which are likely to result in the formation of episodes in memory.

PLANNING FOR TEACHING

An early step in planning should be to identify a principal objective. This should be described with as much precision as possible and in ways which clearly identify the category of objectives concerned. The way it is stated should be consistent with the kind of behavior involved. A verbal information objective, for example, might begin with the phrase "to be able to state. . . ." Intellectual skill objectives should make it clear that the learner is to be able to apply concepts or generalizations, rather than to define them. If the learner is to transfer learning spontaneously, this should also be made clear in the objective. Thus, "to apply . . ." (in specified circumstances) would be more appropriate than "to be able to apply. . . ."

In addition to the principal objective(s) there will almost certainly be a number of additional objectives to which the teacher hopes the unit will make some contribution. These should also be specified as clearly as possible. Since strategies can contribute simultaneously to more than one objective, planning can become very complicated, particularly when we recognize that slight variations in the strategies can vary their effect, and that the teacher may need to alter the intended procedure in response to unexpected events in the classroom. Consequently, a unit outline must include enough information to indicate how the strategy is to be used, and yet allow for flexibility and spontaneity. A planning worksheet with columns for each category of objectives can be a helpful device for keeping track of the strategies and the objectives to which they are intended to contribute. A teacher working with a planning worksheet can see at a glance which objectives are to be served by each strategy, can look down the columns to check that adequate coverage is being given to each objective, and can make easy adjustments to subsequent activities if it becomes necessary to alter some of the planned procedures.¹

The following sequence of steps is recommended in planning an instructional unit to achieve multiple objectives (Allen, 1977) :

1. Determine a major objective and decide on a topic of study. These decisions are suggested together since they are interactive. In most cases,

however, they would have been made in advance as part of long-term planning. If the major objective is the ability to apply a generalization it may be helpful to use as the topic for the unit a question which would be answered by the application of the generalization.

2. Prepare a list of supplementary objectives, grouping them into categories according to the mode of learning associated with them. In most instances these objectives will be selected from a master list of objectives for a whole course.

3. Develop a preliminary list of possible teaching strategies. It may be helpful at this stage to use brainstorming techniques and reference materials to get as large and varied a list as possible.

4. Select an introductory strategy or group of strategies. They should create interest in the unit of study, provide for diagnosis of students' present knowledge and level of skill, and provide an advance organizer for the information to follow.

5. Select a concluding strategy or group of strategies. They should provide students with a sense of closure on the topic, provide for application of the generalizations and concepts that have been learned, and provide for evaluation of the student's learning. To meet these criteria, introductory and concluding activities will usually be open-ended and will involve students actively. Some of the discovery episodes described by Massialis and Zevin (1967) would be ideal for this purpose.

6. Prepare a planning worksheet with columns for each category and sub-category of objectives. Write in brief descriptions of the introductory and concluding activities, and place check marks in the columns to indicate which objectives each activity will contribute to in a major way. No more than two or three checks should be included for any activity.

7. Select additional strategies for the working sessions and include them on the worksheet in the same way. They should be carefully sequenced to provide for sequential development in skill areas, interest and variety, and a balance of acquisition and application of information. Although the teacher is concerned with many objectives, the students are primarily concerned with the one identified by the topic or topic questions. Therefore all of their activities should appear relevant to the topic question.

8. Review the range of strategies to ensure adequate development of objectives in each category. This may result in decisions to delete some objectives or add others, as well as in changes in some of the strategies described.

9. Decide on evaluation devices to use as an indication of the extent to which each strategy has achieved its intended purposes. Evaluation need not involve formal testing, but should be sufficiently systematic and thorough for the teacher to proceed to subsequent activities with reasonable confidence.

10. Review the worksheet during teaching to make whatever adjustments are necessary as a result of unanticipated events in the classroom. If a particular strategy has to be deleted or substantially altered during instruction, the effects on the whole range of objectives should be apparent.

Earlier in this paper several reasons were noted why matching objectives, modes of learning, and teaching strategies was often not done well. These included ambiguity in goals and objectives, over-reliance on a narrow range of strategies, failure to consider alternatives, and the fact that the effects of many strategies can be substantially altered through apparently minor changes in procedures.

Use of the planning sequence suggested here may substantially reduce these problems. Precise definition of objectives within categories that are directly linked to modes of learning should help with the first; the brainstorming suggested in (3) above, together with recognition of the difference between modes of learning for different categories of objectives should help with the second and third; and the use of a summary worksheet showing brief comments about how each strategy is intended to be used and the objectives to which each one is intended to contribute should help with the fourth.

We have used Gagné's categories because they appear to offer a fairly clear guide to modes of learning and hence to the selection of teaching strategies. However, our major point is not that Gagné's system ought to be used, but that some system be used which points clearly to the kind of learning that is involved in achieving objectives. The objective of transfer of learning is frequently assumed, but it is of central importance and should be deliberately planned for through appropriate strategies.

NOTE

- ¹ An example of a format for objectives and a planning worksheet for a unit in social studies may be obtained from the authors by contacting them directly.

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