meaning of a word" (p. 393). Each person, then, carries his own meaning of the concept, and "the point at which the individual's network becomes related to other people's networks for the same concept is at the denotative meaning of the word" (p. 393).

Class concept characteristics should be reviewed too, before learning processes and methods are discussed. Klausmeier and Ripple (1971) explain, "A class concept is an abstraction that represents a set of things, events, or ideas" (p. 394). Specific examples of the abstraction within the class are called instances. For example, the word "book" represents a concept, and the books that each individual personally reads are instances of the class of the things called books (example, p. 394). Klausmeier and Ripple (1971) further explain that the class concept has a verbal name or symbol, but one can possess a concept without knowing its name. "Words representing many concepts have definitions that are accepted by mature people who speak the same language. The particular meanings one associates with one's own experiences... are one's own concepts" (p. 394-395), all within this broader framework of meaning. Klausmeier and Ripple stress, though, that communication can be limited if differences of meaning within the framework are too varied, such as occurs in child-adult communication. Deaf-normal hearing speaker communication can also lapse into this difficulty, for much the same reasons of widely disparate meanings.

Several methodologies and principles of teaching are available for the teaching of basic concepts. Many are similar, but all include good guiding principles on which teaching procedures can be based. Siegfried Engelmann's procedures will comprise a large amount of the theory, practice, and details of the teaching process, and several other authors will be pre-
presented and discussed in relation to basic concepts.

Saltz (1971) summarizes what concept learning is, explaining, "Concept learning is the associating and bounding of the set of attributes" (p. 34). Klausmeier and Ripple (1971) add that these attributes of the concept should be emphasized in the teaching and learning process. The relevant attributes should especially be pointed out, such as the emphasis of the four equal sides that are critical in a square carried out by using different sizes of squares. The instances should be illustrated in many contexts, and preferably actual objects and pictures will be used in the demonstrations. But Klausmeier and Ripple stress that "actual objects and the usual photographs and drawings often include details that are distracting and that prevent cognizing the defining attributes" (p. 424).

Conclusions have also been drawn that special drawings or animated movies in which defining attributes are clearly shown are of better use in establishing the desired concept, rather than too much detail in various other audiovisual material that distracts the attention from defining attributes, as asserted by Travers, McCormick, Van Mondfrans, and Williams (as cited in Klausmeier and Ripple, 1971).

The correct terminology concerning the concept to be taught should be established. Johnson and Stratton (1971) conducted a study in which they used four tests and a fifth, the combination of the other four, to teach several concepts. The authors wanted to compare achievement by the subjects on all tests after various methods were used in presenting the concepts. For instance, open-ended or free response items were used, where the subject was asked to briefly explain what a particular word meant. Sentences were used, where the phrase was completed to define the concept,
such as, "A controversy ends when ________." (example, p. 362), along with use of synonyms and classification, where objects or events were classified under the various concepts or unrelated events and so on were recognized as not belonging to the classification.

Interpretation of these four tests of concept learning show that there are at least two ways that the learner assimilates concepts. First, a subject sets concept acquisition as his goal, varying his methods on his own initiative and testing himself so that the intended differences between training methods vanish. Thus each method takes over some of the advantages of the mixed method. (p. 368)

Johnson and Stratton (1971) feel that the second possibility is one in which "the transfer occurs on the testing day when the subject treats the four tests as problems and uses whatever he can recall to solve them" (p. 368).

The nature of the concept to be taught must be made clear, such as number, time, or space. Then proper sequencing of concept instances and their presentation is necessary. However, Klausmeier and Ripple (1971) caution, "The greater the amount of irrelevant information presented along with relevant information, the more difficult it is to attain the concept" (p. 425). Archer (1962) adds, in addition to agreement with the above statement, that the most obvious conditions in concept identification occur when the obviousness of the relevant information is maximized to the learner, and the obviousness of the irrelevant information is minimized. Archer believes, too, that perceptual biases of the learner might be a factor, or
that inner speech may modify problem-solving behavior. Even verbal pre-training may affect performance by changing inner speech. Klausmeier and Ripple (1971) stress that a sufficient number of irrelevant instances can be presented to differentiate and focus upon important relevant attributes. However, this mixture can provide more efficient learning. Instances also are best presented simultaneously rather than in succession, as indicated in research done by Cahill and Hovland (1960). Their study indicated a low number of errors due to the inability of subjects to assimilate information given perceptually and to draw inferences for the concept being sought. More of these errors apparently were a result of a failure to remember earlier instances, using them in such a way to see their implications for the concept. The errors increased progressively with increasing numbers of intervening instances.

Kates and Yudin (1964) conducted a similar study about the successive or simultaneous presentation of concept instances. Kates and Yudin (1964) believed that in the simultaneous condition the learner can check his new guess about the concept against the preceding instances, all of which are shown. The successive condition was found to be inferior to the simultaneous condition in a series of concept problems that were positive. "The overall conclusion is that concept performance is more efficient when all instances are shown and there is no need to rely upon memory for previous instances" (p. 107).

Suchman (1964) is a proponent of "discovery learning". He believes inquiry is fundamental among forms of learning, and the inquiry occurs when a person attempts to promote conceptual changes for himself by gathering and processing information. Assimilation and accommodation duly work in the
inquiry process. Assimilation is "taking in and incorporating what we perceive in terms of what we know and understand" (p. 60), while accommodation is a "process of reshaping and reorganizing conceptual structures until they fit and account for perceived events" (p. 60). Inquiry learning occurs during the process of data gathering, analysis, and experimentation under control of the learner, and the learner influences and really programs his own learning in terms of his own cognitive needs. These personal needs are molded by the learner's styles of learning and informational requirements. There are no external rewards, since "inquiry is motivated primarily by the satisfactions in the process itself. The other part of the motivation comes from the excitement inherent in gathering and processing information" (p. 69).

Suchman (1964) further believes there are at least three consequences of his inquiry program. First, he feels that development and strengthening of inquiry in learning itself would occur. Secondly, a self-image would develop in the students as a result of greater autonomy in learning. Thirdly, a great understanding of concepts and principles within the discipline of learning through inquiry would develop.

Klausmeier and Ripple (1971) lastly emphasize that usage of the concept should be provided for, along with independent evaluation of the concept learning. They conclude, "Self-evaluation of the adequacy of one's concepts is one of the most important attitudinal and cognitive learnings that an individual can acquire" (p. 429).

Tennyson and Rothen (1976) investigated three strategies for concept learning to determine which one(s) would be most effective. They believed that effectiveness in concept learning could be obtained by an adaptive
design strategy, where adjustment of the basic learning environment is made to the unique learning needs and characteristics of each student. In the study the basic learning environment was the number of instances presented to each student. The research tested the premise that the number of instances necessary for a concept attainment was possibly determined by individual needs. Tennyson and Rothen hypothesized that a strategy that used premeasure (aptitude), pretest (prior achievement), and on-task performance (learning) data would be more effective than a strategy using only pretask (premeasure and pretest) data. The researchers further believed that both full (premeasure and pretest) and partial (pretask only) adaptive design strategies would be more effective than a nonadaptive strategy, in which the number of instances is selected according to the number of critical and variable attributes and practice sets. "Posttest performance outcomes suggest that a phenomenon associated with student interest in content, once learning of the content is assumed by the student, may be operating" (p. 591). Tennyson and Rothen (1976) further stressed that in a learning environment where no attempts are made to change instructional time and method when learning has occurred, the students also might lose interest and motivation in the task, contributing further to a poor achievement and performance.

DeCecco (1968) contributed an outline of steps for concept learning and presentation (see Appendix B for complete outline). DeCecco felt that the learning steps of concept attainment should be concise, yet contain necessary entering information, learning information, and reinforcement for the student. His steps total nine, but the steps fall into the following sections. Steps One and Two inform the student what will be taught and what will be learned, Step Three provides entering behavior and establishes the
verbal input needed for the concept, and Steps Four and Five involve the actual presentation of positive and negative concept instances, either simultaneously or in succession. A referral to the Kates and Yudin study (1964) would provide information as to what type of presentation, simultaneous or successive, would be favorable overall. Finally, Steps Six through Nine verify the concept learning the student is experiencing, and reinforce it according to the correctness of the responses.

Eleanor Rosch (1973) outlined several principles of structures of attribute and concept categories, and relationships among these categories. She contended that there were colors and forms, for example, which were perceptually more salient than other stimuli in the same category. She spoke of the "internal structure" of these categories, meaning that "categories are composed of a 'core meaning' which consists of the 'clearest cases' (best examples) . . . 'surrounded' by other category members of decreasing similarity to that core meaning" (p. 112). She further felt that most categories that are real were highly structured internally, without well-defined boundaries.

Rosch (1973) made several predictions about the learning of natural perceptual categories. First, she felt these natural categories differed from the abstraction processes found in studies involving artificial category learning in several ways. The learning of the categories seemed easier when the natural prototype was central to a set of variations to this example, rather than when the category had a central prototype that was distorted and the natural prototype was a peripheral member. The natural prototype tended to be learned first, whether or not it was central to the category, and the student tended to define the category as a set of varia-
tions from this natural prototype. The natural prototype in all these cases was operationally defined "as the 'most typical' example of the category, even when the natural prototype is not central to the category (p. 112). Rosch implied, then, that in the learning of concepts by children, the child initially defines a concept category by means of concrete, or clear, cases, then in terms of abstract critical attributes.

Siegfried Engelmann's contributions to concept learning are very extensive and will largely be discussed and applied to lesson plans included in this paper. Engelmann, in collaboration with Becker and Thomas, published *Teaching 2: cognitive learning and instruction* (1975), providing an excellent source of requirements and techniques useful in teaching concepts.

"A concept can be defined as the set of stimulus characteristics unique to a set of stimulus instances in a given group of concepts" (Becker et al., 1975, p. 57). A general case of a concept is considered to be successfully taught when, after some members are taught, any member that is indeed a concept example can be correctly identified by the learner. For example, it is necessary to discriminate relevant characteristics from irrelevant characteristics within positive or negative instances. Between positive and negative instances, however, it is necessary to discriminate between relevant characteristics of each type of instance. Stimulus generalization takes place when nonmembers of the concept are responded to correctly, indicating an understanding of what does and does not constitute a case of a particular concept. Concept instances not used in instruction could be presented too, if these testing examples are correctly identified with the concept, the extra examples giving identification practice.
At least three factors should be noted in controlling the process of stimulus generalization. First, the number of identical characteristics shared by instances of two concepts will affect correctness. Secondly, Becker et al. (1975) point out that the number and magnitude of differences in concept characteristics of two concepts will affect the ease with which the differences are discriminated. Thirdly, the degree of prior discrimination training, in view of concept differences, will be a factor in determining correct recognition of concept instances.

Becker et al. (1975) further discuss attention to the following suggestions in creating and presenting instructional materials. Differential reinforcement should be practiced throughout the process, with presentation of positive and negative instances (example, nonexamples) to which reinforcement for responses is appropriately given. What might occur, though, is that a child may emphasize the length of chair legs instead of the presence of the legs themselves in enabling him to learn the concept of chair. The child learns the concept of chair, noting the need for legs, but he further emphasizes their length. Also, if irrelevant characteristics remain the same throughout the presentation of instances, the presentation of additionally new examples differing in these irrelevant features may likely cause more errors to occur in concept identification. In other words, irrelevant stimuli should be varied throughout the presentation, not just in the change from training to test examples. Finally, if two concepts differ in several ways, one can learn to discriminate them by paying attention to any essential difference. With new concept additions to the sets that must be discriminated from others, though, there is a need to teach additional essential characteristics.
Cumulative programming, Becker et al. (1975) add, is especially essential for naive learners for related set learning, in order that these learners can correctly respond to random presentations of set instances, both old and new ones. New instances, in this case, would involve combinations of irrelevant instances, all of which have already been taught. These instances should preferably be positive and negative, with the variance of irrelevant features, to make it possible to teach a discrimination ability that is maintained when additional new instances are given.

Concepts, according to Becker et al. (1975), fall into five domains, and in teaching it is necessary to move from lower to higher domain orders and to teach within one domain at a time. The five domains include objects (living and man-made), object properties (mass, heat, shape, color), object relationships in space (order, location, direction, size), events in time and space (conservation of mass, changes in energy, group composition), and lastly, relationships among events in time and space (cause and effect).

Different formats obviously can be and are strongly suggested by Becker et al. for the teaching of these different domains of concepts. Object concepts, for example, could be presented using a "This is a/an object." format, while object properties could be presented using a "This object is attribute." format (p. 149). Polars could also be utilized, along with relationships shown in sentences like, "The ball is over the book. Where is the book?", and actions indicated by questioning, "What is the man doing?", while pointing to him. (Examples, Becker et al., 1975, p. 149). Becker et al. further suggest that in beginning identification of concepts within the various domains "the teacher should first teach concepts that can be demonstrated readily through the direct presentation of
instances and not instances" (p. 147), and then the teacher can move on to higher domains and more complex levels of concept recognition.

Concepts must be analyzed for teaching procedures, emphasizes Engelmann (1969). The concept analysis "allows us to specify the minimum set of essential discriminations that a learner must make to avoid confusing instances of a concept with instances that do not satisfy the concept requirements" (p. 9). Analysis, however, will not tell what the child must do in order to show he has learned the concept.

Analysis of a given concept is carried out by referring to the observable characteristics of the positive instances of the concept in a given universe, or specific situation. The learner should only be expected to use the concept in these situations, starting at this point to know what sort of discriminations he must learn in order to avoid confusion of the concept. Engelmann gives an example, saying, "If the positive instances comprise a single concept, there is something we can note about these instances that cannot be noted about any of the other instances. That something is the concept" (1969, p. 16). The something, the concept, has an essential characteristic that distinguishes this instance from other instances of other concepts. The analysis of concepts, additionally, supplies the teacher with specifications of the type of test that must be passed by the student to show understanding of the concept, and provides a method for judging program design effectiveness for teaching the concept.

Martorella (1972) presented four points for the organization of concept learning experiences. First, he believed that each component in the teaching program had some sort of subordinate component or was in a hierarchical relationship to other components. Secondly, he stressed that
while facts about the concept must be organized, the given concept may require that learning of a subordinated concept in advance of the major concept must also take place. Thirdly, Martorella acknowledged that a variety of data elements may serve as sources of the facts from which concepts are constructed; and lastly, he stated that a learner's "conceptual development was a coefficient of his data-base dimensions" (p. 19), indicating that if the foundational storage of the learner was reasonably large, he would probably experience quicker, more efficient conceptual development. Gibson and Gibson (1955) added that "a stimulus item starts out by being indistinguishable from a whole class of items in the stimulus universe tested, and ends by being distinguished from all of them" (p. 38). The Gibsons also believed that perception grew richer in differential responses to the environment rather than in images of it. Learning was successful, according to the Gibsons, whenever the progressively elaborate qualities, features, and dimensions of environmental stimuli, the various phenomenal properties of phenomenal objects, corresponded to physical properties and physical objects of the world.

Engelmann (1969) also stresses the importance of and need for programming. Programming implies a sequencing of routines and tasks. The sequencing allows the teacher to review the previous demonstrations and so on in the procedure to correct mistakes in the sequence that are interfering with learning. In programming, one must realize that one concept can be a subconcept of another. A simultaneous demonstration of subconcepts, as reviewed already in Kates and Yudin (1964), could be carried out in the programming. Engelmann (1969) describes the following: "The concept soft is quite different from the concept wet. Yet both are instances
This illustration demonstrates how two different levels of concepts can be pursued, teaching the child how two concepts are related to one another, how the instance of one concept can be an instance of another, and how groups of concepts and instances share main characteristics that must be carefully discriminated by the learner.

Engelmann (1969) further states, "The objective of teaching is to somehow give the child concepts by showing him the sets of shared characteristics that comprise these concepts" (p. 19). These can be given directly, since words and pictures illustrate some concepts easily, while other concepts are extremely difficult to represent. Language levels, though, may be too high, and so present another problem in understanding for the deaf child.

Concepts are most often demonstrated, and Engelmann (1969) adds that many instance presentations will probably be necessary for learning. The demonstrations would provide positive concept instances, while non-instances additionally shown would illustrate examples that do not share essential characteristics for the given concept. The instances of both types should be presented one at a time, which means extra teaching time but insures presentation of all the fixed characteristics of the concept instances. Then the teacher will receive feedback from the students after the procedure is completed, and this information can be used in a test to evaluate learning and understanding of the concept. Naturally the greater the number of demonstrations and so on the teacher had used in the presentation, the greater the amount of feedback and greater the assurance that a good evaluation would be constructed. The test would probably consist of a task or
series of tasks to evaluate the discrimination of instances and non-instances of the concept.

Houtz, Moore, and Davis (1973) conducted an investigation into conceptual teaching in school, using nondimensioned concepts that had both positive and negative types of instances. Nondimensioned concepts were defined by the researchers as being indicated only by the presence or absence of distinct attributes. The Type 1 positive instances shared only one relevant attribute, while the Type 1 negative instances shared all attributes of a positive instance, but lacked one relevant attribute as well as one or more irrelevant ones. Type 2 positive instances shared several identical irrelevant attributes; however, while the positive instances all shared relevant attributes, two successive positive instances might have shared one or more of the same irrelevant attributes. Type 2 negative instances shared the attributes of a positive instance immediately preceding it, but they lacked one or more irrelevant attributes. The types of instances were then presented in various series combinations to the subjects, and the ease of identification of relevant attributes in the concept definition was noted for each combination.

Houtz et al. (1973) concluded from these procedures that the relationship of the varied types of positive and negative instances in the series was important for learning. The authors explained,

It appears that it is the effectiveness of the instances, by virtue of their structure, in limiting the number of hypotheses that subjects may generate from them which determines the efficiency of learning concepts. A negative instance that limits the number of hypotheses to be consi-
dered in combination with any type of positive instance can be as efficient as a series of positive instances by themselves and can be more efficient if the positive instances share irrelevant attributes that increase the number of hypotheses to be considered. In contrast, a positive or negative instance that increases the number of hypotheses to be considered reduces the efficiency of concept learning. (Houtz et al., 1973, p. 211)

Houtz et al. offered further advice to teachers about presentation of concept instances. They felt that widely different positive instances of Type \( L \) sharing few irrelevant attributes, along with negative instances of Type \( L \) that are missing only one relevant attribute at a time as compared to the positive instance, might be most effective in the teaching presentation.

A task in conceptual learning, according to Engelmann (1969), always involves a response from the learner. The task itself is a self-contained unit including a set of directions for responding, and a particular set of responses that is appropriate. Sensory input characteristics should also be noted, in such situations where auditory discrimination would be extremely important for the correct response. Summarily, Engelmann remarks, "The types of specific functions a task has with respect to other tasks tells the programmer the types of discrimination the child must learn to make" (p. 34).

Tasks require the child to do something to demonstrate learning of the concept. Demonstrations will not accomplish this completely, but they will be necessary as part of the presentation by the teacher. Three points about concept attainment tasks should also be noted. Carroll (1971) ex-
plains that, first of all, concept attainment becomes more difficult when the number of relevant attributes increases, or the number of values of attributes increases, or the salience of the attributes decreases. Secondly, attainment can become more difficult as the information load to be handled by the learner increases and as the information is increasingly a part of negative rather than positive instances. Finally, the various strategies for handling the information that is available would have differences that make some strategies, in the long run, more successful than other strategies.

Tasks, Engelmann (1969) further explains, are grouped into task classes, and mastery of all the tasks within the class is necessary to demonstrate complete understanding of the concept. The task class that has been constructed then constitutes the test of the learner's task understanding, and understanding of the particular task test of the class too. Tasks can include use of positive instances within the task class. In the case of the positive instance tasks of "Give me the ball" and "Give the ball to me", negative instance tasks would include "Stand up" and "Tie your shoe" (examples, p. 35). So in giving a test the task form should apply not only to this particular task but to any number of similar ones. This form will allow for demonstrating all the specific functions of the task and all the discriminations the learner must make to successfully learn and understand the concept. Words should be selected so that no nonsense instructions will result if the form is consistently used. Having a child put something in a box, put something by a table, and throw something against a wall vary enough but basically hold true to the original form, enabling the child to more easily handle all these tasks. Word
meanings should also be discussed and/or clarified before the task begins to insure better understanding.

Furth (1966) discusses an additional type of task, the transfer type of task. "These have an introductory task which is simple. The subsequent second or transfer task, using familiar material in a new way, may then be taken as an index of cognitive performance" (p. 74). The transfer-type task additionally minimizes, or partially controls, other factors such as motivational or personality characteristics that might interfere with the cognitive performance of the learner.

According to Engelmann (1969), "A teaching routine is the demonstration that all instances of a concept can be treated in the same way" (p. 20), positive instances in one specific way and negative in another way. The routine conveys information about instances of the concept information to be tested in tasks given to the learner. It should teach more than one instance, and provide task conventions, which are signals to be used to test the child's concept awareness. The most efficient type of routine is one, then, in which all the instances can be taught, and in this teaching the instances are treated in basically the same way to imply that these instances specifically relate to one another. For example, "This is a ball. This ball is red.", serves to name the main concept and relate its particular color as a subconcept of the major concept of "ball"-ness (p. 54-55).

A minimum teaching procedure therefore involves a presentation of instances, usually positive instances and negative instances, and some kind of differential signal, one signal to tell... when an instance is an instance of the concept and another to tell... when an instance
is not a concept instance. (Engelmann, 1969, p. 21)

Teaching procedures should consider the following principles too. First, there are qualitative differences in things that can be observed in the same way. Treating positive and negative instances in different ways, however, enables demonstration of these qualitative differences. This might suggest discovery learning for the child, such that when things are the same they are treated in the same manner, and if treated the same, then they must be the same in a particular way. This particular way, then, would eventually be presented as the critical, fixed characteristics of the concept.

The concept itself, as already mentioned, must be analyzed in order to insure the effectiveness of the tasks and entailing factors involved in the teaching procedures. Concepts will probably be taught on two levels anyway, the individual concept and peripheral concepts. Engelmann (1969) stresses that "an efficient routine teaches two concepts at the same time" (p. 51). The two concepts must be clearly demonstrated, and if the demonstration includes every instance of every subgroup, the treatment of these instances should be the same in some respect.

One of these instances within the teaching process might be involved in what Engelmann (1969) labels a sacrificial instance. The sacrificial instance may require a great deal more time to teach than the regular instances, and the chances of recurring mistakes are greater in responses to the first instance, the sacrificial one, rather than other instances. Since concept learning inherently involves much time and the chance of mistakes in perception repeatedly occurring is very possible, the sacrificial instance provides three ways to solve these problems. It may involve
the programming of a trivial instance initially in the program, providing a point early in the process where errors can be more easily corrected. Likewise, the sacrificial instance may involve simplification of initial tasks in general. Most importantly, spurious clues should not be allowed in this case of process simplification, especially in order to lessen the possibility of the learner responding to a cue, such as the lipping of the response by the teacher.

Primary factors, Engelmann (1969) believes, for effectiveness in teaching procedures include acknowledgement of the limited nature of human memory. Casual presentation of concept instances every few days is most likely less effective than a massed example of instances. Grouping may eliminate extraneous variables in the learning. The presentation of a single instance, for example, can unintentionally signal that any of the characteristics of the object may be relevant. Another instance presentation, though, reduces the shared characteristics. Most importantly, if a characteristic is not shared by all instances of the concept, then it should not be shared by all members of the instance group used to illustrate the concept.

A second factor related that the teaching of concepts to a naive child involves less work than with the child who has past experience with the concept, particularly if this past contact was incorrect, partial, or distorted. The implications are as follows concerning both memory and past experience. "The presentation with the least memory demand and the least misrule potential is the most desirable" (Engelmann, 1969, p. 29) type of presentation. Analysis of concepts should be the basis for this presentation format. Specific functions of the concept with respect to others is
necessary to show too, and can be demonstrated by converting positive instances into negative ones, and vice versa. Another name for this procedure is functional equivalence, whereby it is demonstrated that several instances are the same except in one respect. Finally, the instances should be presented quickly to increase the probability that the child will focus upon the appropriate, critical attributes of the concept.

Engelmann (1969) further emphasizes that "when a child is taught a particular task, he must learn that concept that is involved, the rule for responding, and the rule that the response will produce an outcome that is desired by the child" (p. 82). Reinforcement, then, is a necessary part of the teaching procedure. The learning itself is a lengthy, involved process. The child is taught a task, doing so to learn the concept involved in it. Then a rule for responding is included, and then contingent or noncontingent reinforcement is given. The use of both types of reinforcement could reduce the degree of punishment involved in undesirable responses. For example, the elements of the demonstration are noncontingent in nature. They are fun to watch and participate in, and are presented whether or not the child produces a correct response. Generally noncontingent reinforcement is used most effectively in demonstrations of the concept, while contingent reinforcement is used most effectively to structure tasks. In these ways the child is compensated for the amount of punishment that may be a part of any task performance. "As a rule, initial demonstrations should be reasonably clean and have a minimum of noncontingent reinforcers that are not functional in establishing a routine or teaching concept discriminations" (Engelmann, 1969, p. 82).

Engelmann (1969) adds that it is almost impossible to demonstrate
a concept without also teaching a concept about the process of learning. Each learning set will have its own particular characteristics relating the child to the teaching presentation. For instance, the reinforcing remark, "Good... you're really smart" involves what Engelmann calls a content independent concept of "School work is fun" or "The teacher is nice" (p. 84). Content independent concepts, however, should not distract from the presentation of the content concept, and they should provide clear instances. Engelmann further feels that if the noncontingent reinforcers are strong, there is a greater possibility that the learner will attend to the characteristics of the presentation relating to him, without attention to the concept characteristics that are shared by the instances. For example, ice cream tastes so good that the feeling of the cold concept is not noticed. But with no contingent reinforcement it may be hard to keep the attention of the child. Reinforcement, though, could be made more suspenseful by keeping it relatively unpredictable between routines and predictable within them. The amount of time on each example should be kept to a minimum, while the reinforcement degree varies as a cost of the response decreases and increases. In other words, not as strong and as extensive a reinforcement would probably be necessary for response that is easy and known to the learner, while the answering of a difficult question would require a strong, encouraging reinforcement.

In conclusion, the child will demonstrate his concept learning by making use of it. Engelmann (1969) explains, "The first step is to introduce very obvious instances in which the delay between learning and using is very short and the application of what has been learned is quite similar to the original learning" (p. 93). Examples can also be presented out of
context, as was suggested by Furth (1966), to see the extent of carryover and understanding of the concepts. It can also be stressed to the child that the content of what had been learned can be used with many problems, encouraging the child to use a systematic attack in problem-solving. Persistence, positive self-image and learning image, and acceptable learning behavior, both individual and with the entire class, should also be encouraged.

Conceptual learning is obviously an involved, lengthy, but interesting process, and the additional language and receptive limitations imposed by deafness will require additional work and persistence for both the teacher and deaf child, in order to promote successful learning. The achievement is not impossible, though, and the information and methods reviewed here should be a helpful source for the presentation and learning of language concepts.
APPENDIX A

The following series of lesson plans involves a sample of the teaching techniques one could employ to teach the concept "different". Within the context of the *Boehm Test of Basic Concepts* by Boehm (1969), "different" is used to designate which of three pictured objects is not the same as the other objects. The sampling of lesson plans includes conceptualization of differences, and which of three objects is different, involving the five sense modalities.

Lesson Plan- Sample 1

Subject- language (concept of different)

Objectives-

1) Each student will verbally indicate whether or not two masks are the same or different with 90-95% accuracy.

2) Each student will point to and name, if possible, the part(s) that make one mask different from the other with 90-95% accuracy.

3) Each student will draw two masks on an outline, making the two masks different, with 95% or more accuracy in these differences.

4) Each student will verbally indicate and point to the numbered mask out of three possibilities that is different from the others, with 90-95% accuracy of selection.

5) Using three outlines, each student will draw three masks within the outlines, making two masks the same and one mask different, with 90-95% accuracy of the differences.
6) Each student, when presented with sets of three objects (masks and otherwise), will put an "X" on the one that is different with 95% accuracy.

Materials

- tongue depressors
- tagboard masks (mounted on tongue depressors)
- paper with mask outlines (sets of 2 and 3)
- crayons
- ditto
- pencils

Procedure

Multicolored masks mounted on tongue depressors will be presented, two at a time. The first three sets will be identical, with teacher emphasis that the masks are "Not Different". Attention will be drawn to identical parts too.

Three more sets of two masks each will be presented. These will be labeled as being "different" and the teacher will verbally describe and point out differences in color, size, shape, features, and so on. In the latter sets the teacher will ask the students to indicate these differences.

The paper with outlines for two masks will be given out, and the students will use their crayons to create two different masks, different for each student and different from any one set done by the rest of the class. These drawings will be checked, and reviewed by the entire class, giving additional practice in finding differences. (Shape would not be a factor— the outlines are to be identical throughout.)

Then sets with three masks will be presented. Again the teacher will verbalize how two are not different, while a third is different from them. As the remaining two or three sets are given, the students can
increasingly respond as to which is different, how it is different, etc.

Paper with outlines will again be given, drawings made (2 same, 1 different), and drawings will again be discussed and reviewed to find which of the three set drawings is different.

A ditto, in which sets of three drawings are presented, will be handed out for completion. The students will be directed to put an "X" on the one drawing in a set of three that is different from the others.

Lesson Plan- Sample 2

Subject- language (concept of different)

Objectives-

1) Given visual stimuli of texture circles, each student will correctly point to the texture circle that is different in touch from among three choices, with 90-95% accuracy.

2) Each student will verbally indicate and separate pairs of texture circles that are different with 90-95% accuracy.

3) Each student will verbally indicate, while his eyes are closed, whether or not two texture circles are different with 90-95% accuracy.

4) Each student will pick up the texture circle from among a set of three that is different, while his eyes are closed, with 90-95% accuracy.

5) At a learning station with varied objects to be touched set out in groups of three, each student will correctly separate and name (if possible) which of the objects is different in touch from the other two, with 95% or more accuracy.
Materials

- texture circles (sets of 2 and 3)
- learning station- sets of 3 objects (varied combinations)
  
  - touch all, find which one is different
- sandpaper (varying roughness)
- plastic
- wood
- waxpaper
- fabric swatches (velvet, knit, linen)
- apple, orange, lettuce
- paint
- glue

Procedure

The teacher will present two, then three, texture circles in sets. Visual input will be provided, since the students can see the objects in addition to feeling them. The class will review each set, letting a student or students feel the set circles, designating pairs as not different or different. Sets of three will require the indication of which one of the three is different. Verbalizations as to how the circles feel different will be encouraged, but visual differences will be minimized for concentration on the sense of touch.

Visual input will be dropped when the students must close their eyes. At this time all students will have a turn touching the sets of two and three circles. Initially the differences will be emphasized and discussed, and increasingly each student can try to make the different designations for the sets.

After all students have had a turn and any necessary corrections or additional explanations have been made, the learning center will be presented. Each student will have a turn, and, with eyes closed, will be directed by me in touching objects in sets of three. The student must then find and hold up the different one. Necessary repetitions and practice
will be continued for any students having difficulties, while the other children continue further work.

Lesson Plan - Sample 3

Subject - language (concept of different)

Objectives -

1) Each student will point to and name which sound source made the different sound with 90-95% accuracy.

2) Each student will verbally indicate whether or not two sound sources are different with 90-95% accuracy.

3) Each student will verbally indicate and point to the number of the sound source that is different, given 3 sounds (no visual) and number cards 1-3, with 90-95% accuracy.

4) Each student will correctly choose two sound makers that would make different sounds, given a variety of objects already demonstrated and heard, with 90-95% accuracy.

Materials

sound makers - record, radio, laughter
rattle, blocks, bell, squeeze toy
whistle, pan and spoon, horn
tambourine, hammer and nail
number cards 1-3

Procedure

Since this may be a difficult lesson for young children particularly, and additionally children with a severe or profound hearing loss, possibly only two sound makers would be used in this lesson. This reduces the chance of errors, gives extensive listening experience anyway, and increases
success for the child.

Initially two soundmakers will be in view when their sounds are produced. Then the student will listen to both, and the class as a whole can indicate whether the sounds are different or not different. Gradually the visual input will be reduced, then dropped, and through listening alone the students can try to decide if sounds are different or not different. Visual input will be added for reinforcement of correct responses and/or corrections.

Then the students can take turns making sounds with two objects, seeing if the other students can guess correctly different or not different. Also, two soundmakers will be shown, then eyes closed by all, the sound made, and a decision by a chosen student as to which objects made the sound. All students will get a chance to respond and all will have a chance to be the sound producer.

Within a group each student will have to listen to three sounds, first given additional visual input, then auditory only. Each sound will be numbered 1, 2, or 3, with the direction to tell which one is different from the others. After the visual input is dropped, the teacher will verbally label one, two, and three for the sounds, so the students know when to listen. Each student can then take a turn, trying to indicate which of the three sounds is different, naming number 1, 2, or 3. If this is too difficult, practice with only two sounds can be continued.

Directionality can also be practice, if three sounds are too difficult. Using a procedure similar to that above, one could see if the student knows if a sound came from the same or different location.
Subject- language (concept of different)

Objectives-

1) Each student will point to and name, if possible, which of two items was tasted with 90-95% accuracy.

2) Each student will verbally indicate if two things taste different or not different, with eyes closed, with 90-95% accuracy.

3) Each student will carry out the same procedures and give the same responses as outlined in objectives 1 and 2, involving the smelling of two things, with 90-95% accuracy.

4) Each student will point and name, if possible, which one of a set of three objects tastes or smells different (two separate activities) with 90-95% accuracy.

Materials

"Test Kitchen" setup (sink, aprons, etc.)
taste badges
orange, potato, lemon
vanilla, onion, cheese

nose badge
flower, grass, soap
vanilla, lemon, strawberry
onion, wood

blindfold
numbered containers 1-3 (two sets)

Procedure

The class will talk about tastes first. Sample will be sent around for each student, such as an orange slice and lemon slice. The group can discuss the taste and designate these as being different tastes. Two of the same object can also be passed out for contrast, and more paired samples
will be given, giving each student a chance to indicate whether or not the tastes of the pair are different. These samples will be discussed throughout with the class. Then each student will be blindfolded and become a taster in the "Test Kitchen". One student at a time will taste paired objects, designate different or not different and receive a "taste badge" for his work, witnessed by another student. Then three containers with unseen objects in them (one in each container) will be presented. One through three (1-3), in that order, will be tasted, and then the student must name and/or point to the numbered container with the different taste object. Even fancier taste badges will be again given to the students.

The same type of procedure will be carried out involving the smells of objects. "Nose badges" will be passed out upon completion of smelling tasks, and two then three smells will be used in the procedures.

If there is time, taste and smell can be combined together. For example, vanilla has a taste and smell that are different, while an orange has a much more similar taste and smell.
APPENDIX B

DeCecco (1968) outlines the following learning steps in concept instruction:

1) Describe the performance expected of the student after he has learned the concept.
2) Reduce the number of attributes to be learned in complex concepts and make important attributes dominant.
3) Provide the student with useful verbal mediators.
4) Provide positive and negative examples of the concept.
5) Present the examples in close succession or simultaneously.
6) Present a new positive example of the concept and ask the student to identify it.
7) Verify the student's learning of the concept.
8) Require the student to define the concept.
9) Provide occasions for student response and the reinforcement of these responses.
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