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KNOWLEDGE FROM PICTURES:
AN EXAMINATION OF EPISTEMOLOGICAL
ASSUMPTIONS FOUND IN INSTRUCTIONAL
MEDIA TEXTBOOKS

DISSERTATION

Presented in Partial Fulfillment of the
Requirements for the Degree Doctor of Philosophy
in the Graduate School of the Ohio State University

By
Edward Joseph Petrick, Jr., B.A., M.A.

* * * * *
The Ohio State University
1986

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Approved by
Adviser
College of Education
To My Parents and Family
ACKNOWLEDGMENTS

permission to reprint excerpts from *Condition of Knowledge: An Introduction to Epistemology and Education* (Scott, Foresman, and Company, 1965).

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CHAPTER I
INTRODUCTION

The Problem

Many educators who have written textbooks on audiovisual instruction or the use of media in education have claimed that pictures are an important source of knowledge. Brown, Lewis, and Harcleroad, for example, tell us that pictures can help us deal with the "current rapid expansion of knowledge" by enabling students "to learn more in less time, meaningfully."\(^1\) Similarly, Gerlach and Ely claim that pictures provide us with important information when they tell us that, "Information is found in many media, all of which are forms of storage," and further that, "When the picture of Roosevelt, Churchill and Stalin at Yalta is taken from the file, the event has been reconstituted for the viewer."\(^2\) Locatis and Atkinson assert that photographs not only communicate the truth but do it better than words when they state that, "The words may be true (children in the world are starving and need help) but a photograph can communicate the same message with more feeling and greater effect."\(^3\) Photographs are also
claimed to be an excellent source of knowledge by Hauenstein and Bachmeyer. "When people look at a photograph," write Hauenstein and Bachmeyer, "they can see into the past" because "photographs provide exact record(s) of human events, knowledge, and messages."\(^4\)

In addition to providing information, pictures of all kinds can, according to Klasek, "assist in the prevention of and correction of misconceptions."\(^5\) The proposed use of pictures to clarify misconceptions is exemplified by Catherine Williams when she writes that:

> If a child believes, for example, that all Africans live primitively and savagely, pictures of life in cities will help him to recognize that only some Africans live in an underdeveloped society.\(^6\)

Pictures can provide the student with information to prevent or correct misconceptions because, according to Gerlach and Ely, "... most visuals are saturated with information (i.e., they usually present more than one fact or concept ...."\(^7\)

Two broad areas of knowledge are continually addressed and have received primary attention in the textbooks. We are repeatedly told that we can come to know the meaning of words and facts about the world through pictures. Claims about the value of pictures in coming to know the meaning of words readily abound. Catherine Williams, for instance, identifies an
instructional purpose served by pictures as, "giving meaning to word symbols," while Heinich, et al., have more recently remarked that, "still pictures can translate abstract ideas (words) into a more realistic format." Claims about the advantages of pictures in coming to know facts about the world are also readily found. These range from Williams' claim that, "A set of study prints best helps the learners to visualize and understand early Egyptian civilization," to Heinrich, et al.'s general assertion that "pictures supply us with information."

These textbook authors not only assume that pictures are important in providing knowledge, but also that knowledge is an important, if not the most important, goal of schooling. Hauenstein and Bachmeyer, for example, write, "In our society, the purpose of the school is to generate, organize, transmit (present) knowledge." Likewise, Gerlach and Ely write that, "Most school learning falls into the cognitive theory," and further that, "Cognitive learning deals with intellectual abilities and skills (knowledge)." Brown, et al., acknowledge the importance of knowledge as an educational goal when they write that, "One of the greatest challenges to teaching arises from the current rapid expansion of knowledge" and that the
challenge, in part, is to "cover the sheer volume of knowledge when there is very little time to do so."\textsuperscript{14}

In spite of the common belief among the various textbook authors that knowledge is an important goal and that pictures (particularly photographs and drawings) can play a significant role in helping students acquire knowledge, there are conflicting assumptions as to what constitutes knowledge. These assumptions about the meaning of knowledge range, on the one hand, from Hauenstein and Bachmeyer's "information is knowledge"\textsuperscript{15} to Brown, et al.'s assertion that knowledge is "good and dependable information."\textsuperscript{16} On the other hand, Heinich, et al., assume that knowledge is entirely a matter of what can be remembered and recalled,\textsuperscript{17} while Edgar Dale has asserted that belief, comprehension, and understanding are necessary for knowledge.\textsuperscript{18} There are significant differences among these claims, for among other things, to teach and test for recall of pictures is different than teaching or testing for the comprehension and understanding of pictures.

In addition to conflicting assumptions about the nature of knowledge, there are conflicting assumptions about what is required on our part to obtain knowledge from pictures. For the most part, the textbook authors assume that pictures "present" or "transmit" information and all the viewer must do is look and he "has" what the
picture has to give. Seeing is knowing by such an account. Yet the authors contradict themselves and each other. Williams, for example, begins by warning us that, "Communication may break down with pictures as well as with words," yet several pages later writes that, "The universal language of pictures makes them so uniquely important for teaching." Hauenstein and Bachmeyer, on the other hand, write that, "When people look at a photograph, they can see into the past," which conflicts with Wittich and Schuller's claim that, "... though we tend to assume that pictures communicate more or less automatically, we must remember that this is not the case ...." The tension between a picture being first a part of a universal language and then a coded message is continued by Brown, et al., when they state that, "Graphic materials of several types serve as a universal shorthand to assist readers in understanding that torrent of information that now deluges the world ... A single cartoon, for example, will catch a person's attention and instantly convey its meaning." At issue here is the question of what a picture can and cannot do.

Although there are some shared views on the kinds of pictures we should use to gain knowledge, there is also conflicting advice. Pictures that are true or authentic, for instance, are commonly suggested for
use in teaching. We are instructed to evaluate pictures by asking such questions as, "Does the picture convey a generally true impression?" and "Is the information accurate (truthful, up-to-date)?" Likewise, we are told that we should check the "authenticity and accuracy of the picture," use only pictures that "convey authentic and truthful impressions," and that "a good picture should present facts." Yet we are also given conflicting advice. Locatus and Atkinson tell us to use more "realistic" or detailed pictures (photographs), while Heinich, et al., advise us to use less detailed pictures (drawings). John Harrell tells us that large numbers of pictures will enable us to know the meaning of words, while Edgar Dale warns us that too many pictures confuse.

The suggestions by some authors that we use "true" pictures or pictures which present true impressions raise some further questions. Are pictures the sorts of things which can be true? Do some pictures "present facts" or "convey a generally true impression" as is suggested by some authors? If some pictures did present facts or convey a generally true impression, then we would seem to have at least some pictures which would not mislead, that would lead to knowledge. Yet Edgar Dale writes that, "any picture is only a sampling of an event or condition, a slice of life. In a sense every
picture, no matter how good, is only part of the truth." This statement by Dale suggests that all pictures can mislead. At bottom is the question of what is a "good" picture for teaching knowledge, what pictures should we use? The answer to this question, at least in part, depends on what we mean by 'true' and 'know' and what pictures can and cannot do.

Purpose. Although much is claimed or assumed about knowledge and the advantages of using pictures to gain knowledge, none of the textbook authors with whom I am familiar have actually attempted to analyze the concept of knowledge in their books. Nor have these authors attempted to determine on the basis of such an analysis the limitations or possible dangers in using pictures to gain knowledge. Instead of arguing or establishing what knowledge is and what pictures can do, they largely assert or assume such things as though they were obvious. As a consequence, there is conflicting and often contradictory advice for using pictures in classrooms to gain knowledge with little help provided in the textbooks to determine which advice is best.

The concept of knowledge, on the other hand, has received much critical scrutiny throughout the history of philosophy. Proposed definitions of knowledge have been thoroughly sifted through much careful analysis and important logical distinctions have resulted. These
distinctions, moreover, have been applied to the practice
of education by philosophers who have wished to increase
our understanding of teaching and learning. Philosophers
of education have furthered our understanding of 'knowledge' and its relation to educational concepts and
practices.

What I propose to do here is to use selected analyses of both 'knowing' and 'seeing' by philosophers of
education to examine textbook assumptions about what
can be known through pictures. More specifically, I
will focus on the analysis of 'knowing' by Israel
Scheffler and 'seeing' by Jonas Soltis to evaluate the
assumptions about knowledge found in a number of recent
and frequently cited textbooks on audiovisual instruc-
tion. My aim is to clarify what can be known through
pictures, what is required to gain that knowledge, and
what are the limitations or possible dangers of using
pictures to gain knowledge.

Importance of the study. There are several related
reasons why such an investigation is important. First,
pictures are of considerable educational importance.
Pictures are increasingly used to influence what
students believe both in and out of the schools. As the
textbook authors have observed, pictures have been used
in schools to teach the meaning of words and facts
about the world for some time. According to a number
of experts, pictures will be increasingly used in the schools. The beliefs students bring with them, on the other hand, are often based on pictures, particularly those from magazines and television. Many students came to believe, for example, that our most recent war was immoral when they were shown pictures of Vietnamese children being scalded by American napalm. Clearly, pictures figure prominently in the beliefs of the students we teach.

It is not so much the use of pictures which is of concern, however, as it is their misuse, whether accidental or intentional. The textbook authors have noted that the use of pictures sometimes results in mistaken beliefs and focus on ways to avoid these. Pictures have also been used in the schools to intentionally obscure the facts. The miseducative function of pictures outside the classroom is well documented. Gebner, et al., for example, have shown how even adults base their erroneous beliefs about crime in the community on television rather than on experience or more accurate information. Much miseducation can be traced to the misuse of pictures.

The authors of the textbooks which will be examined have written about what pictures to use and how to use them to gain knowledge. They have provided
guidance for teaching with pictures and in teaching students how to use pictures. These textbooks, moreover, are used in many colleges and universities where future teachers are educated. An important reason for undertaking this study, therefore, is to examine what an influential group of authors have had to say about what figures prominently in the beliefs of the students we teach, namely pictures.

Although the various textbook authors tell us much about gaining knowledge from pictures, they have not, either as a group or individually, been consistent in what they have told us. Some authors, for example, assume that pictures "present" knowledge while also assuming that we need to acquire skills in order to derive knowledge from them. Other authors have assumed that students must have previous skills and knowledge if they are to gain knowledge from a picture but also assume that pictures provide a common experience regardless of skills and experience. Therefore, another reason for examining what the textbook authors have assumed about gaining knowledge from pictures is to evaluate some conflicting views and determine what is necessary in order to gain knowledge from pictures.

What we assume about the meaning of 'knowing' and 'seeing' does guide and influence the way pictures are
used in the schools and therefore needs to be addressed. If knowing is believed to be entirely a matter of what can be remembered or recalled, for example, then in teaching and testing for knowledge we need not be concerned with a person's belief about and comprehension of the picture. If knowing the meaning of the word 'fish', for example, is being able to recall a photograph of a bass used in the classroom upon hearing 'fish', then we would not need to be concerned with whether the student can distinguish fish from non-fish pictures (let alone talk about the differences) in teaching and testing for such knowledge. If we assume that pictures "present" or "transmit" knowledge to the student, then we would not need to teach students any skills in obtaining knowledge from a picture or in determining whether a picture is being presented in a misleading way or not. We would understand, for example, what the Civil War was like after seeing some photographs of battles and battlefields taken during the war without any previous knowledge about either the war or who took the pictures and why. Through an investigation of 'knowing' and 'seeing', we can better understand what is involved in teaching and learning from pictures.

By bringing together what a group of educators have written about teaching and learning from pictures
with what some philosophers of education have written about the meaning of knowing and seeing, I hope to enlighten educational practices involving the use of pictures to gain knowledge. My aim is to bring thought together with practice so that, as Scheffler has said, "the former is enriched and the latter is illuminated."35

The Nature of the Problem and the Methods of Investigation

Frequent mention has been made thus far about assumptions and the analysis of concepts. The problems identified were identified as the conflicting assumptions behind suggestions made in the textbooks for using pictures to gain knowledge. Some of these assumptions were clearly stated while others were unstated but implied by the remarks of the authors. "Pictures translate words" was, for example, clearly stated, while "the meaning of a word is what it stands for" was often implied. An analysis of the concepts knowing and seeing were said to be important for assessing these various assumptions. In order to determine, for example, whether we can know about the past by looking at a picture, we need to be clear about what counts as knowing and seeing. Assumption-finding and conceptual analysis were in this way identified as the major methods or tools of analysis in this investigation.
This study is concerned with the meaning of concepts and the reasoning of the authors rather than with empirical experiments and statistical analyses. No attempt will therefore be made to empirically study the cultural meanings of pictures or the preconceptions of students which affect what they see, although the fact that there are cultural meanings and preconceptions is relevant to this study. The focus is on the meaning of concepts - on words and symbols generally - and how we reason with concepts. In order to clearly think about and effectively use pictures to obtain knowledge of even the cultural meanings of visual symbols we must at least be clear about the meanings of 'seeing' and 'knowing'.

What Is Assumption-Finding? Before directly commenting on what is involved in assumption-finding, a few remarks need to be made about what is meant by 'assumption'. Robert Ennis wrote that the most common use of 'assumption' is what he calls the "deprecatory" use. An example of this use would be, "You're just assuming that all of our students will be interested in this film because your students were. You don't know." Here, the charge that one has made an assumption is tantamount to the charge that one has made an unwarranted or hasty generalization; that little or no evidence is available for the given belief. It would
be a mistake to view all assumptions as being this kind and, in particular, to view the focus of this study as being limited to the depreciatory sense of assumption.

A reasonable way to identify the kinds of assumptions which are important to this investigation and the methods used to identify them is to begin by considering a simple example of assumption-finding. Suppose a school board member were to say:

John is gay and his teaching probably influences our children in bad ways.

Something like this might be said in a school board meeting where a decision about "terminating" a teacher is being made. Let us further suppose that the board member believes John is a gay teacher on the basis of some questionable evidence. The first observation which can then be made about the school board member's comment is that the statement "John is gay" is a clearly stated assumption given in support of the conclusion, "John's teaching probably influences our children in bad ways." As a stated assumption, it is an assertion, something assumed but not known to be true, which in this case is a premise supporting the conclusion that, "John's teaching probably influences our children in bad ways." The argument of which it is a part, however, has something missing. Some additional assumption is needed which will tie John's being a gay teacher to the
likelihood that he will influence students in bad ways. An **unstated assumption**, a "missing premise," is required to make the inference satisfactory. 37

The identification of the unstated assumption is often more difficult than discovering that one is needed. For example, a possible candidate for the argument we have been considering would be, "All gay teachers influence our children in bad ways." Certainly this assumption would combine with the stated assumption to make a satisfactory inference to the conclusion. "All gay teachers influence our children in bad ways and since John is a gay teacher, his teaching influences our children in bad ways" is a valid, though questionable, argument. Yet this is too strong a generalization with which to saddle the school board member, for he said that John would "probably" influence our children in bad ways. We would be unfair to say that the board member said that "all gay people make bad teachers," for he only said some do. The fact that we could point to some gay teachers who did not influence their students in "bad ways" would not count against this more modest generalization. All that the argument under consideration requires in order to be complete (for the premises to be sufficient for the conclusion) is the assumption that, "Most gay teachers influence our
children in bad ways." Now if "influence in bad ways" were to mean "teach to be homosexual," then there is another unstated assumption, namely, "someone can be taught to be a homosexual." This last assumption, given one currently accepted view that sexual preference is inherited is challenged. Whether or not assumption-finding leads to the conclusion that the argument was not sound in this case, it does give us a better perception of its strengths and weaknesses.

Identification of unstated assumptions often requires more effort than was the case with the previous example but it is also likely to result in better returns. Consider, for example, the case of a president of a university in which enrollment is down and financial costs are escalating. The president goes to his constituents and says:

We must lower our entrance requirements if we want to maintain our course offerings and the faculty to teach them.

Without going into too much detail, we can see that to get from the assumption that, "we want to maintain our course offerings and the number of faculty needed for them," to the conclusion that, "we must lower our entrance requirements," we need the unstated assumption that "lowering entrance requirements is the best way to maintain course offerings and the faculty to teach
them." The president's argument thus assumes that there are no better or more feasible ways to save courses and faculty needed for those courses than lowering entrance requirements. There are, however, further and more questionable assumptions which are needed for the argument, namely that, "lowering standards will increase enrollments" and "increased enrollments will result in additional funds to help save courses and faculty."

These unstated assumptions may not have been in the mind of the president; he may be unaware that his argument requires them. They are, however, required by the argument if it is to be sound. One of the more important functions of assumption-finding is to determine whether someone has assumed more than or other than what he thought he had assumed.

These brief examples of assumption-finding demonstrate what is meant by identifying and examining stated as well as unstated assumptions. It makes clear the fact that unstated assumptions may not have "been in the mind" of the authors. It also shows that the method of assumption-finding, while requiring certain steps such as clarifying language and identifying gaps in the argument, is not altogether mechanical. Judgments are called for not only in finding gaps, but in determining the assumption which best fills the gap.40
What Is Conceptual Analysis? As we saw in our first example of assumption-finding, clarifying language can be a significant step in evaluating an argument. The need to clarify language becomes even more crucial when we have assumptions such as, "creationism and evolutionary theory are both matters of faith," where distinctions between 'theory', 'belief', and 'faith' are important in determining the soundness of the argument and perhaps what ought to be taught. When we need to clarify a term in such instances, we turn to conceptual analysis. Conceptual analysis is a method used to clarify the meaning of concepts.41

Conceptual analysis is as old as Socrates, who used it to investigate the meaning of such concepts as truth, justice, and beauty. As a method of inquiry, conceptual analysis attempts to be neutral with respect to subject matter and can be applied to any subject whatever. In this century, the method has been developed considerably and applied to a wide range of problems including those which are distinctly educational. The analysis of 'knowing' by Scheffler and 'seeing' by Soltis,42 as these concepts relate to educational concepts and practices, are examples of such recent applications. The aim of such analyses is to arrive at "something like a definition"43 by examining concrete and specific
examples of the concepts. While an analysis can yield a definition, it is common for a good analysis of a concept simply to yield a set of conditions that (a) are necessary and sufficient for its standard application, and (b) provide a good understanding of how its use differs from other related concepts.

A relevant question to raise at this point is, "Why should we take the trouble to analyze or consider the analysis of a concept when we can easily consult a dictionary?" It should first be noted that dictionaries were consulted in the course of this investigation. Consulting a dictionary, however, is not always a straightforward and reliable method of finding a good definition, particularly with complex concepts such as knowing and seeing. Different dictionaries often provide nonequivalent definitions and faulty definitions are not uncommon. Conceptual analysis, moreover, is much more than a definition.44

People frequently rely on dictionaries for definitions and even refer to how "the" dictionary defines terms without being aware of the differences between dictionaries and the occurrence of faulty definitions. Differences between dictionaries were found, for example, when Robert Ennis consulted eight different dictionaries on the word 'propaganda'. He discovered that the dictionaries did not agree and those with
current dates excluded current meanings of the term. Apart from differences between dictionaries, faulty definitions are not uncommon even in the best dictionaries. In one dictionary, for instance, we find 'need' defined as "thing wanted, respect in which want is felt." By such a definition, I "need" a million dollars since I both want it and feel that want very strongly. Yet it is this very kind of want which we distinguish from biological needs like nutritious food (which we may not want). In another dictionary, an "unabridged" one, 'faith' is defined as, "belief which is not based on proof." By such a definition, we would have to say I have faith (not knowledge) that there is now a paper before me; for if I could prove that at all, my belief is in any case not based on any such proof. These errors are not so much an indictment of the dictionaries as an indication of how difficult it is to construct a good definition, and the unavoidable circularity of some dictionary definitions.

Conceptual analysis is more than a definition in part because not every definition is an analysis. A definition of a term is, roughly, a specification of its meaning (or different meanings) in terms of ordinary language used by those who know the language. Thus,
one might define 'desire' by saying, "The term 'desire' means want;" and if this definition is correct, then 'desire' and 'want' have the same meaning or use (are synonymous). A definition, as this suggests, need not be an analysis. Consider a similar example. Suppose that we define "therefore" as meaning hence. There is no analysis in either case. The defining expression provides no account of the conditions which govern the use of the term being defined. Yet for some purposes the latter definition, at least, is perfectly adequate. A conceptual analysis not only indicates the conditions which govern the use of the word, but examines how they are related on the bases of specific and concrete examples. A good conceptual analysis often not only arrives at a definition but provides the bases--the reasoning and examples--for such results.

Textbook Selection

A number of textbooks which provide guidance for teaching with pictures were selected for examination. The textbooks were chosen largely on the bases of suggestions by faculty specializing in instructional media, citations and references found in the textbooks, and the results of a national survey on the most recommended books on Instructional Development. In the formative stages of this study, the late Edgar Dale
and John Bellend, then of the Ohio State University, were consulted and suggested a number of books dealing with the pedagogical uses of pictures. Scott Grabinger, from the University of Nebraska - Lincoln, was consulted in 1985 about more recent textbooks dealing with the pedagogical uses of pictures. Several of the textbooks suggested by Dale, Bellend, and Grabinger were listed among the most recommended books on instructional development in the results of a national survey. Textbooks which were cited in either the textbooks listed in the survey results or the textbooks suggested by Dale, Bellend, and Grabinger were also consulted.

All of the textbooks examined in this study have been referred to in other textbooks on instructional media. There are, however, several books which were heavily cited. Edgar Dale's *Audiovisual Methods In Teaching*, Brown *et al*’s *AV Instruction: Media and Methods*, Gerlach and Ely’s *Teaching and Media: A Systematic Approach*, Wittich and Schuller's *Instructional Technology: Its Nature and Use*, and Williams' *Learning From Pictures* were heavily cited and are frequently referred to in this study. Although Heinich *et al*’s book, *Instructional Media*, is not as heavily cited as the others, it is also frequently referred to in this study because of its recency (1985) and the inclusion
of the textbook's first edition in the list of most recommended books on instructional development.

Edgar Dale's *Audiovisual Methods in Teaching* and Catherine Williams' *Learning From Pictures* have been more closely examined than many of the other textbooks. Among the textbooks, Dale's and Williams' included the most complete discussion of the pedagogical uses of pictures. These two textbooks have also been cited as authoritative sources. In a review of books for selecting instructional material, for instance, Marda Woodbury writes of Williams' book that: "it is still the basic authority on picture selection and utilization." 49 Francis Dweyer, on the other hand, has attributed much of the current widespread use of pictures in teaching to Dale's work. 50

Many of the textbooks consulted have gone through a number of editions. For the most part, the most recent editions of the textbooks were used for this study. There appears to be little difference, however, among the different editions of the same textbook as far as assumptions about gaining knowledge from pictures are concerned.

**Limitations**

Israel Scheffler's analysis of knowledge will be used to examine textbook assumptions about what can be
known through pictures. He considers 'knowledge' in relation to educational concepts and practice, discussing what is called a "justified true belief" analysis of 'knowing that.' At least since the publication of Edmund Gettier's paper, "Is Justified True Belief Knowledge?," this kind of analysis has come under attack. Yet it is clear that there are some good reasons for maintaining that the conditions of truth, belief, and justification, though necessary for knowing that, are not sufficient for knowing that; there are some good reasons for believing that we can have justified true belief which is not knowledge.

Hence, although not informed by the most recent developments in epistemology, Scheffler's discussion of 'knowledge' can be used to point out some significant problems with the textbook assumptions. Yet given what has been said about a good conceptual analysis yielding necessary and sufficient conditions for the use of a term, some additional comments are required about analysis which may yield only a partial account of a concept under investigation.

A conceptual analysis may yield only a partial account or only partial understanding of the concept under investigation, and it can be of much value even then. One might discover just some necessary
conditions or just some sufficient conditions. The former may help one to rule out certain apparent cases of, say, knowledge. The latter may enable one to devise a test that allows one to make a positive judgment. If, for example, believing is necessary for knowing, then a person who does not believe a proposition or statement does not know it, no matter how good his or her evidence. This makes the connection between knowledge and belief of considerable practical importance. For often we assume that students know some statement when they say it and provide some evidence for it, yet this would not necessarily be the case if belief is necessary for knowledge. Similarly, if performance of certain tasks is sufficient for high intelligence, we have a way of identifying at least some highly intelligent people whether we can analyze intelligence or not. Thus, even if we cannot formulate a set of necessary and sufficient conditions for the application of a concept, the quest for an analysis can still yield valuable results.

In order to further clarify the limitations of this investigation, something needs to be said about what is meant by 'picture' in this investigation. Among those things which have been identified as pictures by the authors under consideration, have been drawings,
paintings, photographs, and films (motion pictures). These have generally been contrasted with or separated from "graphics"--maps, charts, and diagrams. This distinction between pictures and graphics, however, is somewhat roughly drawn as the authors themselves have observed (what, for example, is an aerial photograph of a city street system or a "pictorial graph"). I have chosen not to address the conceptual question of what is a picture, but to focus, for the most part, on drawings, paintings, and photographs because these are the kinds of pictures most frequently addressed by the authors.

Strategy

The arrangement of the text in no way reflects the organization of the textbooks. The statements chosen were scattered throughout the textbooks. Specific statements about knowledge were typically found in a chapter dealing with "instructional objectives." Claims about using pictures to know the meaning of words and facts about the world were generally made under the headings of "advantages of using pictures" and "uses of picture." The topic area of "choosing pictures" was invariably utilized. These statements or claims, which formed the bases of the authors' arguments for how and why we should use pictures, were
chosen largely on the basis of whether they made references to knowledge, truth, belief, or evidence.

The text itself is comprised of six chapters. Except for the final chapter, each chapter begins with a review of certain assumptions found in the textbooks and utilizes the analysis from the preceding chapters in assessing the assumptions. As with the text as a whole, each chapter except the last begins with a review of certain textbook assumptions, focuses on some conceptual distinctions, and utilizes those distinctions in examining some problem. The organization of the text was based on a desire to balance a review of a conceptual analysis with an application of the analysis. Chapter II, for example, deals largely with an analysis of the most basic concept, knowledge, while Chapter III focuses on specific arguments for using pictures to know the meaning of words. Chapter IV arises in part out of a need to clarify the concept of seeing in order to further deal with questions about knowing the meaning of words through pictures. Chapter V, "Facts About the World," utilizes the results of the previous analyses of 'knowing' and 'seeing' to address specific claims about using pictures to know facts. In Chapter VI, the study ends with a summary of conclusions and a discussion of some practical applications of the distinctions made in the previous chapters.
Summary

Many educators have written about the advantages of using pictures to obtain knowledge in instructional media textbooks. These authors have said that pictures, particularly photographs and drawings, are useful in coming to know the meaning of words and facts about the world. The textbook authors differ, however, in their assumptions as to what constitutes knowledge. These authors also contradict themselves and each other when discussing what pictures can do, what is required to obtain knowledge from pictures, and what kinds of pictures we should use to obtain knowledge.

The purpose of this study is to examine what has been written in these textbooks about obtaining knowledge through pictures. Selected analyses of both 'knowing' and 'seeing' by philosophers of education will be used to examine assumptions found in the textbooks about obtaining knowledge through pictures. This study is thus concerned with the meaning of concepts and the reasoning of the authors as it relates to educational practices. The aim is to clarify what can be known through pictures, what is required to obtain that knowledge, and what are the limitations or possible dangers of using pictures to obtain knowledge.
There are a number of important reasons for undertaking this study. Pictures are of considerable educational importance and these textbook authors have been influential in providing guidance for teaching and learning from pictures. Yet the advice provided in the textbooks is often conflicting and assumptions behind the advice faulty. These conflicts are due in large part to assumptions about the meaning of 'seeing' and 'knowing'. Assumptions about 'seeing' and 'knowing' do guide and influence the way pictures are thought about and used in the classroom and therefore will be addressed.
It is difficult to determine what we can know from pictures unless we are clear about the meaning of 'knowledge'. Many of the textbook authors have provided answers to this general question about the meaning of 'knowledge', both in categorizing learning objectives and in identifying what can be learned from pictures. Yet the answers provided in the textbooks differ, sometimes significantly, and none have examined 'knowledge' in order to provide a basis for their views. As a means of assessing these various and often conflicting views, we will focus on a particular analysis of knowledge as discussed by Israel Scheffler. Our aim will be both to clarify the concept of knowledge and to provide some useful pedagogical distinctions for guidance in using pictures.

What Is Knowledge - Textbook Accounts

A number of authors write about knowledge as being information. Brown et al., for instance, write that "one of the greatest challenges to teaching arises from
the current rapid expansion of knowledge." They go on to say that "there is now estimated to be 100 times as much to know today as there was in 1900," with the consequence that "the sheer volume of information to be analyzed and studied tends to force teachers to 'cover ground'."¹ This concern with the "growth of knowledge" is restated by Brown et al. in another way as follows:

... man is today discovering, clarifying, and recording new information at a phenomenal rate --essentially doubling our fund of knowledge every ten years.²

What is apparent in these references to the "growth of knowledge" is the equating of information with knowledge. Indeed, in addressing what they call the "tasks" of the "knowledge business," they write that one task is "to store knowledge in libraries, recording collections, computer banks, tape banks, museums, and the like ...."³ Since it is information which is stored and new information which is claimed to result in increasing knowledge, it is fair to say that Brown et al. assume that knowledge is information.

Hauenstein and Bachmeyer also write about knowledge as being information. These authors, however, are much more explicit. They identify two basic types of knowledge: presented and experiential. Presented knowledge, they write, is "information contained in
the sender's message" and experiential knowledge is
"information already possessed by the receiver."4
In both of these "types of knowledge," 'knowledge'
is defined as meaning information. The only distinction
between the kinds of knowledge is the location of the
information. When Hauenstein and Bachmeyer state
that, "Everyone is a sender and a receiver of knowledge,"
and "When an individual sends, he presents knowledge in
a form which he feels will be at least understood by
the receiver," they mean no more than people send and
receive information.5

When Hauenstein and Bachmeyer and Brown et al. write
about knowledge as being information, information is
not always clearly distinguished from misinformation.
Brown et al., for instance, write about the increasing
amount of information in the world as being a "growth
in knowledge." What they fail to acknowledge is that
much of that apparent growth is due to an increase in
misinformation. Much that is going into our libraries
and computer banks is not true. Yet Brown et al. go
on to state that knowledge is not "just" information
but is "good and dependable information."6 What Brown
et al. clearly wish to do by qualifying information
as being good and dependable is to distinguish it from
misinformation. Similarly, when Hauenstein and
Bachmeyer write that "School subjects are pieces of presented knowledge" and that "presented knowledge" is the information contained in the sender's message, they seem to be excluding misinformation from what they call knowledge. It seems fair to assume that when both groups of authors write about knowledge as being information, they wish to exclude what is false or misinformation.

Other authors have focused on performance as a condition of knowledge. Both Heinich et al. and Kemp and Dayton, for instance, follow Benjamin Bloom in distinguishing "knowledge" from "skills and abilities." They refer to knowledge as being entirely a matter of "remembering" or "recalling" information. Heinich et al. thus define knowledge as "recalling specifics, remembering, defining, recognizing, repeating (e.g., You will recite from memory 'Paul Revere's Ride' by Longfellow)" and distinguish knowledge from 'comprehension', which they define as "translating, interpreting, paraphrasing, summarizing, extrapolating." Similarly, Kemp and Dayton write "Knowledge--recalling information" and distinguish it from "Comprehension--interpreting information." The so-called "ability" to "comprehend" is not necessary to knowledge, nor is it a relevant consideration in testing for knowledge.
This is clearly evident when Kemp and Dayton write:

Since a majority of instructional media are designed to provide information, they serve objectives in the cognitive domain. The lowest level, knowledge, represents rote learning through memorization and recall of facts.11 'Knowledge' for these authors is entirely a matter of what can be remembered; comprehending, applying, analyzing are skills or abilities which are not essential to knowing.12 Knowing is entirely what you can parrot; it is essentially rote learning.

Edgar Dale differs from both Heinich et al. and Kemp and Dayton in asserting that knowing is more than being able to parrot some information. Dale writes that knowledge involves a "process of incorporation" in which the learner must "integrate the new (learning) experience with all his previous learning" by "adopting them as one's own." He further states that:

Only the individual learner, moreover, can organize the new experience for his own use, according to his own internal system of filing and classification. Knowledge, therefore, is not merely something he absorbs, it is something he works out for himself in his own arrangement and rearrangement of experience. He is establishing a network of interconnections between the old and the new.13 A person has knowledge only when "he works (it) out for himself;" he cannot just "absorb it" or unintelligibly memorize it. Knowledge, according to Dale, is more than information which is remembered, it is information
which is believed, comprehended, and understood. The importance of understanding as a condition of knowledge is noted again when Dale quotes Robert Maynard Hutchings in support of his view as follows:

A characteristic of knowledge is organization, which comprises understanding, order and interpretation. A heterogeneous collection of facts is not knowledge. The educated man is not one whose mind is a waste-basket, or even an Encyclopedia Britannica, of unrelated facts. He is one who grasps the significance of what he sees.14

The point Dale makes is that the ability to parrot information is by no means a sufficient condition for knowing something. We cannot say that even the simplest kinds of information, such as "Lincoln is the capital of Nebraska," are known until they are believed and understood. And the way to test whether such a fact is known is to test for the "abilities" which Heinich et al., as well as Kemp and Dayton, separate from knowledge. To the extent to which a person does not comprehend, could not apply, or could not analyze the statement, "Lincoln is the capital of Nebraska," then to that extent he cannot be said to "know" that Lincoln is the capital of Nebraska, according to Dale.

Gerlach and Ely, like Dale, assert that intellectual abilities and skills are essential to knowledge. This assumption is clearly stated when
they write, "Cognitive learning deals with intellectual abilities and skills (knowledge)." Yet Gerlach and Ely go much further than Dale by focusing almost exclusively on skills. Although they have called knowledge "what" is recalled or recognized, they clearly stress certain sorts of "know how" when they speak of knowledge. This is evident in their following discussion of 'cognitive':

Students learn to distinguish one color from another, to name parts of speech, to order events chronologically, to state rules, to apply rules, and to do many other similar tasks. These tasks are examples of what is frequently called knowledge. Some writers use the term "cognitive" to describe these kinds of tasks. Cognitive means pertaining to the recall or recognition of knowledge and the development of intellectual abilities and skills.16

Knowledge, according to these authors, is the ability to perform a task.

Not all skills, however, fall under knowledge or knowing, according to Gerlach and Ely. There are intellectual skills and then there are non-intellectual skills. Gerlach and Ely call these latter "psycho-motor skills," distinguishing them from knowledge in that they pertain "to the manipulative or motor skill area," and given such examples as learning to write, color with crayons, to cut with scissors, to operate a sewing machine, to type, and to pole vault.17 These,
according to the authors, are not examples of knowledge and make up only "a small portion of the time (in most classrooms)." Only the "intellectual" skills of identifying, naming, describing, ordering, and constructing are held to be knowledge.

The difference between Gerlach and Ely's view of knowledge and that of Edgar Dale's can be seen through certain contrasts. Dale includes only what is at least comprehended and understood by a student as being knowledge. Gerlach and Ely, in contrast, count "naming" as a cognitive skill or knowledge and state that, "Naming, however, is generally used for situations where recall is all that is desired." Given that recall can be no more than stating what has been unintelligibly memorized or unthoughtfully accepted from the teacher, Gerlach and Ely include as knowledge what is not included by Dale. Gerlach and Ely also include as knowledge such things as "ordering" where it is not necessarily the case that one understands what he/she has done. As Gerlach and Ely note:

Ordering does not necessarily involve words. Consider this objective: "to order on the flannelboard the parts and organs of the circulatory system in the order of the blood flow, given flannel cut-outs representing the artery, etc. ...." In this situation, the learner manipulates flannel symbols or parts rather than words; the performance, or product, is nonetheless ordering.
Whether the product of ordering above indicates understanding of the human circulatory system on the student's part or a simple recall of the teacher's earlier performance is not detectable from this "performance" alone.

In summary, although the textbook authors go about defining knowledge in a number of ways, they basically fall into two camps. On the one hand, we have those who identify knowledge with information and knowing with having information. On the other hand, we have those who assume that knowledge requires the use of intellectual abilities or skills and knowing is a special sort of doing. Within these camps, there are views which differ significantly so far as the educator is concerned.

**Scheffler on Knowledge**

The textbook authors have defined 'knowledge' in a number of ways. They have not, however, provided an adequate analysis of the concept. As a result, we will focus primarily on an existing analysis of knowledge discussed by Israel Scheffler to assess the merits of the textbook views of knowledge and to provide some useful pedagogical distinctions for guidance in using pictures.

In *Conditions of Knowledge*, Scheffler sets out to answer the epistemological question, "What is knowledge?"
in relation to educational concepts and situations. He begins by considering the case of knowing that has figured most prominently in classical discussions in epistemology, namely, 'knowing that' or knowing propositions. In order to arrive at a definition or statement of criteria for 'knowing that', we are asked to consider under what conditions we would say that a person 'knows that'.

'Knowing that'. Following what has been called the traditional or justified true belief view of knowledge, Scheffler argues that there are three conditions for knowing that and calls them the belief condition, the evidence condition, and the truth condition. Person X knows a proposition, according to Scheffler, if and only if that proposition is true, person X believes the proposition, and person X has "the right to be sure" about the proposition. These three features are not only necessary conditions for knowledge, but are also jointly sufficient for knowledge. Thus, if a true proposition is believed by person X, and person X is in a position to know (which generally requires having adequate evidence for that proposition), then person X is said to know in a strong sense the proposition in question. It is to this definition of propositional knowledge and the conditions of truth, belief, and evidence that we now turn.
In order to establish the conditions necessary for 'knowing that' such and such is the case, Scheffler considers the relationship between 'learning that' and 'knowing that'. He observes that although we would normally say that a person who learned, as a consequence of schooling, that Boston is the capital of Massachusetts has come to know that Boston is the capital of Massachusetts, we cannot generalize from this case. We cannot say that any time a person learns something, the person has come to know that something. What is required in order to assert that a person knows in this case is that whatever is claimed to be known is true. To use Scheffler's example, we would not acknowledge that a student knew that evil spirits caused disease even if that student learned so because we reject as true that evil spirits cause disease.

From this distinction between what is learned and what is known, Scheffler goes on to distinguish between what is believed and what is known. Returning to the "evil spirits" example, he observes that we would admit that the student believes that evil spirits cause disease if he were sincere, but that he is wrong or mistaken in what he believes. No matter how strongly or certain our student feels about the truth of what he says, if we think he is mistaken, we will deny that
he knows what he beliefs. As with 'learning that', it is the truth condition which distinguishes 'believing that' from 'knowing that'. The point of the truth condition is summarized by Scheffler as follows:

For X to be judged mistaken is sufficient basis for rejecting the claims that he knows. It follows that if X is admitted to know, he must be judged not to be mistaken, and this is the point of the truth condition.²⁰

Mere opinion or belief is distinguished from knowledge by the condition of truth. Yet what does it mean to say something is true and what sorts of things do we qualify as being true? Scheffler addresses these questions in defending an absolute theory of truth. First, he observes that there is a fundamental distinction between absolute truth and certainty. He says:

It is one thing to believe that truth is an absolute, i.e., unvarying property of ideas or beliefs; it is quite another to suppose that we can ever be certain that we have the truth. Accordingly, it is logically quite possible to deny certainty and yet uphold an absolute theory of truth.²⁷

Scheffler further argues that although what is "taken to be true" changes from time to time with the progress of investigation, whatever is "taken to be true" is taken to be true absolutely. Truth, he tells us:

... is an attribute of statements, beliefs, propositions, or ideas, not an attribute of things, processes, or events generally. To say that truth is absolute is to say that whatever true statements or ideas affirm is unqualifiedly in fact the case.²⁸
Scheffler illustrates this last point by noting that if it rained in Mexico City on April 7, 1834, the sentence, "It rained in Mexico City on April 7, 1934," is not just true in Mexico City, it is simply true. Analogously, it is not just true on April 7, 1934; it is simply true.\(^{29}\) Truth is an unvarying property of statements, beliefs, propositions, or ideas and the truth of these, in the words of Alfred Tarski, "consist in their agreement to reality."\(^{30}\)

The question next raised by Scheffler is whether believing something that is true--having true belief--constitutes 'knowing that'. In response to this question, Scheffler points out that there seems to be both a weak and a strong sense of 'knowing that'. The distinction being made here is that a weak sense of 'knowing that' requires only true belief, while a strong sense of 'knowing that' requires in addition to true belief, evidence or the ability to back up one's belief. To use Scheffler's example, a person who has come to believe correctly that \(E=mc^2\) knows that \(E=mc^2\) in a weak sense. He does not "really" know, or know in a strong sense that \(E=mc^2\), however, unless he can supply suitable supporting reasons or evidence. According to Scheffler, then, a person must believe \(x\) and \(x\) must be true if we are to correctly assert that the person 'knows that' \(x\) in the weak sense (where \(x\) stands for any statement.
or proposition). In order to assert that the person 'knows that' in the strong sense, the person must in addition have evidence--have a good case, or good reasons, in support of x.\textsuperscript{31}

Whether we wish to use a strong or weak sense of 'knowing that' often depends on such relevant conditions as the difficulty, technicality, or complexity of a subject. We would normally say that the student who has learned that Boston is the capital of Massachusetts from a teacher has come to know this without demanding evidence. In this case we apply the weak sense of know. In the case of complex formulas such as $E=mc^2$, we are more likely to apply a strong sense, for as Scheffler observes, the question, "He has learned it, but does he really know it?" seems relevant in this case, whereas it does not in the Boston example.\textsuperscript{32} This is because the question of whether a student can support a fact he has learned seems relevant with relatively complex facts but not with simple ones. The point here is that there are two major ways in which we use 'know that' rather than one, and their use seems appropriate in some contexts but not in others.

Scheffler goes on to argue that knowing in the classroom context requires a stronger sense of knowing than knowing in everyday life, since our educational
purpose is to "interiorize the subject--its methodology as well as its content--within the student". He correctly states that we would say that many Americans know that penicillin is helpful in cases of pneumonia, that Washington was the first President of the United States, and that coffee is grown in Colombia, "even though our evidence for these items consists, for the most part, in an appeal to authority or the testimony of expert opinion." Inside the classroom, however, we do not want a student to make an appeal to authority "no matter how reasonable or how strong." We want him to supply evidence from within the subject at hand, "on the basis of relevant methods and materials of his subject rather than to the independent authority of persons." The student may truly believe, for example that the answer to an arithmetic problem is 85 because the teacher said so, but he does not know the answer unless he can do the arithmetic necessary to arrive at the answer. In a strong sense of 'knowing that', he must be able to "back up his belief in a suitable manner."

'Knowing that' and the Textbook Accounts. Let us briefly consider certain assumptions of the textbook authors and examples of learning from pictures to help illustrate what has been presented thus far on the
concept of 'knowing that'. First, consider the assumption that knowledge is information, as Hauenstein and Bachmeyer as well as Brown et al. claim. As with Scheffler, they seem to have ruled out any false statements or misinformation as being knowledge. That learning misinformation does not result in knowledge can be shown by the following examples. If I am led from a picture to believe that all Eskimos live in igloos, I cannot know that all Eskimos live in igloos, because the truth is that they do not. Likewise, if I have come to believe from pictures that all American Indians rode horses and murdered innocent settlers, I have come to believe something which is false. In both of these cases, we would ordinarily say that I have acquired misinformation and that I was mistaken in what I had learned, no matter how strong my belief or what was depicted in the picture.

Information by itself, however, does not necessarily lead to knowledge. A student who is presented with pictures depicting American soldiers shooting down unarmed Indian children and women at Wounded Knee, South Dakota, may not believe that American soldiers did this even though such an event is clearly indicated by the picture, the caption, and available evidence. Such a student would not believe what is true and we would find no difficulty in saying that the person does
not know x since he does not even believe x. In saying a person 'knows that' x, we are minimally committed to asserting that the person believes x and x is true. Information, then, need not necessarily lead to knowledge.

Our consideration of the textbook accounts of knowledge requires further clarification. First, we began by treating 'information' as meaning some statement or proposition. Yet many of the authors also speak of "visual information" such as the looks of a person or a boat. Hauenstein and Bachmeyer, for example, talk of the "visual information" provided by pictures, while Gerlach and Ely write that, "most visuals are saturated with information." This ambiguity of 'information' as being either statements or looks is significant. Truth, as Scheffler points out, is an attribute of statements, not things such as pictures. The statement, "this is a boat," may be true, but the boat I see, or even the picture of the boat I see, is neither true nor false. Insofar as we are talking about "knowing that," therefore, we are not talking about "visual information" in the sense of looks. This point will be discussed further in Chapter Five.

'Knowing that' and Verbal Responses. In first reviewing Scheffler's analysis, learning was assumed
to entail believing; that if a person learned some information, that person has come to believe it. Certainly this need not always be the case. A person might learn that, "atoms are made up of electrons and neutrons" so that she can pass a test. There are many true statements learned without comprehension, let alone belief, so that a test can be passed. Scheffler emphasizes this point when he writes:

Students often acquire propensities to make those verbal responses to test questions that facilitate their passing their courses, or at any rate, that are thought to reflect the attitudes and opinions of the test-makers, independently of their own genuine beliefs.

and rightly stresses that we need to distinguish the genuine engagement of students' thought and belief, in teaching, from the mere shaping of their verbal responses on examinations. Believing something to be the case is not the same as having the tendency to express or affirm a statement under questioning, and parroting only demonstrates success in "acquiring the outward manifestations of knowledge," not knowledge itself.\textsuperscript{41}

Given the distinction between a verbal response and belief, it is clear that knowledge is not entirely a matter of "remembering" or "recalling" information as is asserted by Heinich \textit{et al.}, among others. What one person remembers or recalls may not be believed by that
person. To believe some statement, moreover, minimally requires its comprehension. What a person believes when he says "Whales are not fish," for example, depends on his understanding of the meanings of 'whale' and 'fish'. If a child takes 'whale' to mean "large fish" and 'fish' to mean "small fish," what that child believes when he says, "Whales are not fish" is not what is generally meant by the statement. The child's mere recall of the statement "Whales are not fish" implies neither that the child comprehends nor believes that statement. Knowing thus requires at least the intellectual abilities or skills of comprehension and analysis which Heinich et al. separate from knowledge. Edgar Dale is correct in asserting that knowledge is more than having a fact which one can parrot. Knowledge is not simply a storage of information by the learner.

In order to make further progress in examining the textbook assumptions, it is important to understand Scheffler's distinctions between a strong and a weak sense of 'knowing that', and between 'knowing that' and 'knowing'.

'Knowing That'--A Strong Sense. Except for a few cases of knowing where evidence does not seem to be a requirement, a strong sense of 'knowing that' requires not only true belief but adequate evidence to support
the belief. In defining 'adequate evidence', Scheffler first makes the following stipulation of 'evidence':

The notion of evidence, for the purpose of the evidence condition, is, then, to be taken as roughly equivalent to that of good reasons, or a good case.

Scheffler defines 'evidence' in such a way so as to allow for different sorts of propositional knowledge, such as mathematical and moral, where 'evidence', as the term is commonly used, is not required. If someone knows that the Pythagorean theorem is true, for example, what is required in the strong sense of 'know that' is a proof, not evidence. Similarly, what is required in the strong sense if we are to say someone knows that some course of action is wrong, is not evidence only, but reasons for his/her judgment, which may include "peculiarly moral reasons." What is required by the evidence condition, then, is a good case which will vary with the subject: "In empirical matters empirical evidence is appropriate; in mathematics it is proofs that count; in moral deliberation, moral reasons have a distinctive role to play."

Given that 'evidence' here may mean logical proof, moral reasons, or empirical evidence, there is the additional problem of determining what is required in terms of "having evidence." The problem is illustrated by the case of the detective who believes truly that
the butler committed the murder and has all the clues or evidence, but cannot appreciate the force of the clues, for he is unable to reconstruct the crime. According to Scheffler, the detective does not know in a strong sense. 'Having evidence', Scheffler points out, is ambiguous in having both a weak and a strong sense; this distinction being based on whether one realizes what they have constitutes evidence or not.

To quote Scheffler:

In the strong sense, this involves the realization that such items constitute evidence, though their bearing may as yet not be clearly apprehended. In the weaker sense, having the clues does not even require the realization that they constitute evidence; the evidential items are "had" in some rudimentary way but are as yet camouflaged, not neatly sifted and separated as relevant elements for an appropriate argument, not even appreciated as having potential value for some such argument.45

A person is required to have evidence in the strong sense if we are to say he 'knows that' in the strong sense.

Scheffler further argues that it is not enough just to realize that one is in possession of relevant evidence; one must also have the proper "pattern" in which to place the evidence. This is stated by Scheffler when he writes:
In every case where evidence is required ..., knowing (in the strong sense) involves not merely having adequate evidential data but also appreciating their value as data, in the light of an appropriately patterned argument.  

and:

... when we judge that someone has adequate evidence, we are judging that he has an evidential argument which he understands. In saying he knows, we are not merely ascribing true belief but asserting that he has proper credentials for such belief, the force of which he himself appreciates.

Having evidence in a strong sense thus requires that a person realize that the evidence she has constitutes evidence for her belief "in light of an appropriately patterned argument."

In summary, 'knowing that' has both a weak and a strong sense, according to Scheffler. The weak sense requires only true belief and is limited to rather simple subjects, such as proper names and a number of well known facts. The strong sense, which is appropriate for the classroom context, typically requires true belief which is supported by "evidence." Here, "having evidence" requires that the person realize the force of the evidence and be able to provide a patterned argument with that evidence or, to say the same, a good case which includes proofs and moral reasons as well as evidence in the general sense. 'Knowing that' in a strong sense thus typically requires the use of such
complex skills as gathering evidence, supporting our beliefs, and producing an argument. To know some statement in the strong sense is more than just to have been told it, grasped its meaning, and accepted it. It is to "have earned the right," through one's own effort or position, to an assurance of its truth.

"Knowing How". Not all knowledge is fundamentally of a verbal or symbolic character. We can know more than we can tell. Many people know how to recognize a person's face and could pick that face out of a million. Yet few can tell how they recognize the face they know. Similarly, many people know how to ride a bicycle without being able to tell, except quite vaguely, how they ride it. In many cases, we frequently know how to do something but are hard pressed when we are asked to tell how we do it. "Knowing how" is fundamentally different from 'knowing that'.

The distinction between these two types of knowledge can be seen by considering their relationship to the concepts of truth, belief, and evidence. 'Knowing how' does not involve truth, belief, or evidence, as does 'knowing that'. This is demonstrated by the fact that "X knows that ____" is completed by a full sentence which, in the words of Scheffler, is "typically construable as a vehicle of belief, true or false, and
well - or ill-grounded."^50 Such is not the case, however, when we consider, "X knows how to ____." Another way in which to consider this distinction is by examining our use of 'belief.' We do say "believe that," but not "believe how;" we do not say "X believes how to ride a bicycle."

Pedagogically, a most important distinction is the logical independence of 'knowing that' from 'knowing how.' A person can know all the facts needed to do something without knowing how to do it. Conversely, a person can know how to do something without knowing any of the facts about it. A mechanic, for example, may know how to fix a car without being able to tell you how to fix the car. Conversely, a person may know all about fixing a car and tell us that such and such must be done, but not know how to do it. Having a skill, as Scheffler notes, is quite different from knowing that the skill is such and such; knowing how is quite different from knowing that.\textsuperscript{51} Put somewhat simply, there is a logical distinction between knowing facts or having information (that) and possessing skills or being able to perform certain operations (how).

When educators question students to find out what they know, the logical independence of 'knowing that' and 'knowing how' is often obscured and the belief that
all knowledge is 'knowing that' is assumed. This common error has been recorded in many accounts about schooling and is captured in a particularly forceful way by Charles Dickens in his novel, *Hard Times*. In *Hard Times*, a student is told that she does not know what a horse is, even though the teacher is aware that the student has an intimate knowledge of horses on the perceptual level due to her father's occupation as a horse breaker. The teacher, appropriately named Mr. Gradgrind, assumes by his remarks that all knowing is knowing the facts and gives inordinate attention to seeing that his students are able to recall facts and definitions verbatim. Gradgrind fails to acknowledge the ambiguity of 'knowing what' and to recognize the importance of teaching know-how along with knowing that. Knowing what a colt is may mean either knowing that a colt is a young male horse, or knowing how to recognize a colt when we see one, or how to visually distinguish one from a wild fawn.

Knowing how to recognize and identify something is logically distinct from knowing that something is such and such. Such "verbal information" is different from "visual information;" knowing how to identify something on the basis of looks does not require that one know that the something is such and such, nor does
knowing that something is such and such require that a person be skillful in identifying that something. Yet if we are concerned that a student know what something is in a strong sense, we would want them to know both kinds of knowledge. More will be said about this shortly.

′Knowing how′ and Practice. A further distinction between 'knowing that' and 'knowing how' lies in the practice criterion. The practice criterion can be understood by considering some key arguments over the distinction between the two types of knowledge. Up to this point, we have been more or less following Gilbert Ryle's argument for the distinction between knowing how and knowing that, as presented by Scheffler. Ryle's intention in making this distinction was to discredit a rather pervasively held belief that all knowledge is fundamentally of a verbal or symbolic character, and to demonstrate the fundamental independence of verbal (knowing that) and performative knowledge (knowing how).

Ryle's distinction was in turn challenged by John Hartland-Swann. Hartland-Swann argued that Ryle was correct in criticizing philosophers for treating verbal knowledge as the basic or only form of knowledge, but not because there was a basic difference between knowing that and knowing how, as Ryle maintained. All
knowledge, according to Hartland-Swann, is essentially performative or 'knowing how', which he claimed Ryle had inadvertently shown. Knowing that Christopher Columbus discovered America or that whales are mammals is reducible to knowing how to answer such questions as, "Who discovered America?," "What are whales?," and "Are whales mammals?" In essence, knowing that is a kind of knowing how; knowing that is being able to perform in certain ways in certain circumstances.

Hartland-Swann's position was in turn examined by Jane Roland (Martin). Roland accepted Hartland-Swann's conclusion that all knowing is performative but argued that there is an important pedagogical distinction between knowing that and knowing how, which is ignored by reducing all knowledge to knowing how. In essence, she argued that certain performances require practice (e.g., swimming), while others did not (e.g., saying "Christopher Columbus discovered America"). She writes:

When Jones was a witness to the murder, he knew immediately that X murdered Y and did not need to practice stating facts or answering questions. Similarly, when Jones looks out his window and sees rain falling, he knows that it is raining without any sort of practice in saying, "It is raining" or answering the question, "What is the weather like right now?" ... On the other hand, Jones could not know how to swim or speak French unless he had at some time practiced swimming or tried to speak French.
Roland therefore held that it was pedagogically wise to maintain Ryle's distinction between knowing how and knowing that in terms of the "practice" criterion. Skills such as knowing how to identify birds require practice, while knowing such facts as "birds fly" do not (provided we know English). Learning how to improve an ability is not like learning that or acquiring information.

Roland goes on to distinguish another type of 'knowing that' or knowing rules of conduct such as "Johnny knows that he ought to be honest." She distinguishes this kind of knowledge from those discussed by Ryle and Hartland-Swann by pointing out that knowing how to perform a skill and knowing propositions of a factual nature are capacities. As capacities, they imply the ability to do something under specified conditions but do not imply frequency or regularity. In the case of knowing rules of conduct, however, one needs to acquire something more than the capacity to act in a certain way, and that something more is the tendency to so act. Knowing that one ought to be honest, in this sense, means more than just knowing how to be honest or knowing that one is supposed to be honest; it means that one is prone or disposed to act honestly in appropriate situations.
Teaching and testing for such knowledge is thus different than teaching and testing for facts or skills.

Others Kinds of Knowledge

Although there may be only two basic types of knowledge on logical grounds, there are other ways of distinguishing types of knowledge as Jane Roland has demonstrated. Of interest here is Harry S. Broudy's classification of knowledge on pedagogical grounds. Broudy distinguishes between three types of knowledge which students are called upon to learn in the context of schooling and is particularly concerned with how we test for the presence of each type. The first he calls 'knowing that' or knowing a "statement of fact" such as, "there is a cloud in the sky" and "Washington crossed the Delaware." The second he calls "knowing what" or classificatory knowledge, which covers an understanding of "statements classifying things into kinds, or indicating the properties of certain things" such as, "aluminum is a metal," "all is not gold that glitters," and "it rained here." The third type he calls "knowing why" or explanatory knowledge, which covers our understanding of theories or explanations which account for facts such as the theory of oxidation, which accounts for the fact that the iron rusted after the rainstorm. All three types of knowledge,
Broudy tells us, "are involved with each other, the terms used in stating facts and theories are concepts, and these, in turn, affect what we perceive the facts to be. On the other hand, 'aluminum is a metal' describes the way language is used in chemistry; that is, it is a fact about language usage."\(^{61}\)

All three types of knowledge distinguished by Broudy involve procedural knowledge as well as propositional knowledge. All three types of knowledge, he observes, involve the processes of "recall, recognition, discrimination, and judgment."\(^{62}\) Not only must the student recall and understand the meaning of a proof, a rule, a fact, or a distinction when being tested for knowledge, he/she must know when to use the particular knowledge. To solve a mathematical problem, for example, one must not only recall certain theorems, axioms, and rules, but must also judge when a problem calls for them. Similarly, when asked to identify an igneous rock a student must not only know the meaning of the concept 'igneous' and recall the defining features, but must judge which particular rock has these features. Even at the level of knowing a simple fact, such as, "Christopher Columbus discovered America," the student must know when such a fact is an acceptable answer to a question. "Knowledge at any
level," Broudy writes, "even the rapid recognition involved in the judgmental aspect of a skill, seems to denote an awareness of the cue, stimulus, or problem in a context." A criterion for adequate knowledge, he tells us, is "an awareness of an appropriate context that grounds the adaptive response" which requires "discrimination and flexibility."

This judgmental aspect of knowing in general, this 'knowing when', further distinguishes mere recall of facts or knowing how to answer a question from knowing that such and such is the case. Although knowing how to answer such questions as, for example, "Who discovered America?" provides some evidence for knowing that "Christopher Columbus discovered America," knowing how to answer such questions is not equivalent to knowing that fact. First, the student must know when "Christopher Columbus discovered America" is an acceptable response to a question. This includes questions other than "Who discovered America?," and, "What do you know about Christopher Columbus?" As Scheffler observes, we need "to distinguish the genuine engagement of students' thoughts and beliefs, in teaching, from the mere shaping of their verbal responses on examinations." Knowing (that) something, and therefore believing something, is not the same as having the tendency to express or affirm
the same statement or fact under questioning. In a strong sense of knowing that, this means we want the student to know how to amass evidence and to know how to provide a patterned argument with this evidence for his/her belief. Archaeological findings, historical records, and anthropological evidence (including properly identified pictures), for example, are facts that can be used to provide an argument for Christopher Columbus having discovered America.

We are provided with some general guidelines for determining whether to require a strong or weak sense of 'knowing that' when Broudy identifies what sort of response is required by each kind of knowledge he categorizes. He tells us that 'knowing why', or explanatory knowledge, requires reasoning about facts and not just the mere recall of factual statements. Knowing how to put the facts in a pattern argument is required for 'knowing why', and such 'know how' requires, as Roland asserts, practice. 'Knowing that' or factual knowledge requires a comprehension of the stated facts and thus cannot be substituted for knowing how to answer some questions, as we have previously noted. Finally, 'knowing what' or conceptual knowledge requires more than the mere recall of an example presented by a teacher. As Broudy writes, "However
one learns a concept, operationally the test for mastery
(knowledge) would tend to be the speed and accuracy
with which one was able to classify new instances
correctly."67

In summary, there are a number of important features
about the concept of knowledge which we have encountered
in reviewing some analyses. Among these is the fact
that truth is a condition of 'knowing that' and "visual
information" is not something which is true. This will
become important when we consider the claims made by
the authors about "true pictures." Second, the mere
recall of information or recognition of looks is not
knowledge. We need to distinguish between the conditional
responses to a question or picture and the response
that indicates that knowledge has been acquired. We
also need to distinguish making a mistake from not
knowing. These distinctions between knowing and
responding will be important when we discuss the rela-
tionship between seeing and knowing. Third, all knowledge
involves a certain know-how and this is true with
"visual" as well as with "verbal" knowledge. Following
Broudy's classification, we will consider the textbook
arguments for using pictures to know the meaning of
concepts, to know facts about the world, and distinguish
knowing facts from knowing explanations.
Summary

Although the textbook authors define knowledge in a number of ways, they basically fall into two camps. On the one hand, we have those who identify knowledge with information and knowing with having information. On the other hand, we have those who assume that knowledge requires the use of intellectual abilities or skills and knowing is a special sort of doing. Within these camps, there are views which differ significantly so far as the educator is concerned.

In order to assess the merits of the textbook views of knowledge and to provide some useful pedagogical distinctions for guidance in using pictures, Scheffler's discussion of 'knowledge' was examined. Scheffler distinguishes two fundamentally different types of knowledge, 'knowing that' and 'knowing how'.

'Knowing that' has both a weak and a strong sense according to Scheffler. The weak sense requires only true belief and is limited to rather simple subjects, such as proper names and well known facts. The strong sense, which Scheffler argues is appropriate for the classroom, typically requires true belief which is supported by "evidence". 'Knowing that' in a strong sense thus typically requires the ability to back up what one has learned.
'Knowing how', on the other hand, does not involve truth, belief, or evidence as does 'knowing that'. 'Knowing how' does not require the possession of any verbal or symbolic knowledge. To 'know how' is to be in possession of a skill or being able to perform certain operations under suitable conditions.

In considering arguments over the logical status of 'knowing that' and 'knowing how', it was pointed out that there were good pedagogical grounds for distinguishing between kinds of knowledge apart from any logical grounds. 'Knowing how', for example, requires practice but 'knowing that' does not. Other kinds of knowledge were distinguished on pedagogical grounds.

A number of problems with the textbook accounts were identified on the basis of the analysis of knowledge presented. Accounts of knowledge as being information suffered from a number of defects. First, 'information' was not always clearly distinguished from misinformation nor was "verbal information" always distinguished from non verbal or "visual information". Both information and misinformation can be obtained through pictures, but only information or true statements can be known since truth is a condition of 'knowing that'. In a strong sense of 'knowing that',
having information would not count as knowing unless the person believed the information and could support his belief. Non verbal or "visual information", it was argued, cannot be true because truth is a property of statements, not things or looks of things. "Visual information", therefore, cannot be knowledge in the sense of 'knowing that'.

Among the textbook accounts which assumed that knowledge requires certain abilities or skills, those which held that knowledge is simply "remembering" or "recalling" information were found to be most defective. Since knowing that requires at least belief and comprehension, it requires intellectual abilities and skills which were excluded in these accounts. Even with the simplest facts, judgment is required. One must "know when" it is appropriate to recall facts or knowledge will be denied. With more complex facts, the ability to reason and support one's belief is generally required. Knowledge is not simply a storage of information by the learner.
CHAPTER III
WORDS, PICTURES, AND MEANING

Now that the concept of knowledge has been explored, specific claims about what can be known through pictures may be more profitably examined. Knowledge of word meaning has received much emphasis in the textbooks and will be addressed here. The claims about the value of using pictures in coming to know the meaning of words will be examined utilizing distinctions which were developed in the previous chapter.

Assumptions about meaning play a central role in the textbook accounts. Three major views of meaning will therefore be addressed in assessing the claims about the usefulness of pictures in coming to know the meaning of words. The weaknesses of two common views of meaning assumed in the textbooks will be shown. A third view of meaning as conditions for use will be argued for and related to the use of pictures.

Textbook Accounts

A frequent suggestion made in the textbooks is to use pictures in teaching the meaning of words.
Catherine Williams, for instance, identifies an instructional purpose served by pictures as "giving meaning to word symbols" and asks us to:

Consider how much easier explaining aqueduct, blockhouse, combine, sextant, or zebra would be with the aid of a picture.¹

Edgar Dale makes a similar claim when listing some of the purposes for which still pictures can be used in teaching. He writes that one purpose is, "To translate word symbols—clear up new terms."² He goes on to say that, "What might otherwise remain verbal abstractions can be translated into sharply defined visual images."³

Similar remarks by Dale and others range from the weaker claims that, "pictures make verbal descriptions clearer,"⁴ "pictures can be used to clarify the meaning of words,"⁵ and "pictures provide a means of gaining concrete experiences, out of which understanding of meaningful content of words can come,"⁶ to the stronger claims that "pictures concretize verbalisms"⁷ and "pictures can translate abstract ideas (words)."⁸ The claims thus range from the apparently true claims that pictures can add or help to the more questionable claims that they can translate.

On the assumption that the meaning of words can be known through pictures, we are further advised to use pictures to avoid misunderstandings which can
result from verbal abstractions. Brown et al. suggest that we "use pictures to reduce verbal load in instruction, especially for poor readers." They go on to reason that:

Verbal instruction without pictures or real experience can sometimes result in funny and even pathetic misunderstandings. In such cases, pictures can be extremely important aids to vocabulary development and to the presentation of new ideas.

Writing in more general but similar terms, Locatis and Atkinson advance the general principle that:

When people know the meaning of words, print media often can suffice for teaching. When they lack such knowledge, visuals might accompany the printed text.

A key assumption made by all the textbook authors is that pictures and words are easier to understand than words alone because pictures help us to understand words.

Other writers have gone further to suggest that pictures can help us to understand words and thus avoid misunderstandings. Edgar Dale believes that written materials can be understood "far better" with accompanying pictures. He writes, for instance, that:

A student reading about colonial New England, Periclean Athens, or an alkali flat can understand the written material far better when he can see many supplementing pictures.
Locatis and Atkinson go even further by stating that photographs can be used to avoid misunderstandings which result from the use of either words of less "exact" pictures. They write that:

Words often cannot adequately communicate meaning. Even graphics and sketches can be misleading, because they lack detail and are subject to interpretation by the artist. Photography, on the other hand, can capture rich detail and depict objects and events more exactly.13

For Locatis and Atkinson, at least, the more detailed the picture, the less chance there is of misunderstanding. In contrast, Heinich et al. also believe that pictures can help us understand words but claim that drawings which are "less detailed and more to the instructional point than photographic materials ... are easily understood by students of all ages."14

A central assumption behind these suggestions for using pictures to understand word meaning and to avoid misunderstanding is the belief that the meaning of a word is the thing or idea to which it refers. Words are assumed to be labels or, as Dale says, "names" whose meaning is the thing or idea to which they correspond.15 This assumption about meaning is explicitly stated when Dale writes that, "Usually we agree on the meaning of a term--what it stands for;" when Brown et al. write, "Filmstrips are useful means
of illustrating concepts and of tying words to objects or things;" and when Wittich and Schuller tell us that:

One important goal of education has been reached when individuals have acquired a large enough store of cognitions and concepts to be able to think aloud and solve problems using symbols (words, numerals, and other cues), and without referring continually to the things for which the symbols stand.\(^{18}\)

The assumption is clearly articulated by Robert Bullough when he writes that:

Words are understood by people because they agree collectively that a certain combination of digits will stand for a particular thing. ... The word is merely a label that helps us to communicate a meaning for a thing; it is a kind of shorthand that makes it possible to communicate the idea "man" without having to draw a man every time.\(^{19}\)

According to these accounts, meaning is reference.

In addition to this central assumption of meaning as reference, pictures are assumed to resemble what they refer to. The meaning of words can be known through pictures because pictures not only refer to things or ideas as do words, but resemble them. This position is expressed by Heinich et al. in a very recent and popular text as follows:

The primary function of a visual as a communication is to serve as a more concrete referent to meaning than the spoken or written word. Words are arbitrary symbols. They don't look or
sound (usually) like the type of thing they represent. Visuals, however, are iconic. They normally resemble the thing they represent. As such, they serve as concrete clues to meaning. The more iconic, or pictorial, they are—that is, the closer they come to representing the thing or concept being referred to (the referent)—the more likely they are to prevent breakdown in communication. It is a general principle of human communication that the likelihood of successful communication is increased when a concrete referent is present. Lacking the actual presence of the thing being discussed, the next best referent is a visual representation of it.20

Making the same kinds of distinctions, we find Fleming and Levie writing:

Both the word "apple" and the picture of an apple are signs for, refer to, a particular fruit .... Digital signs, such as words, do not resemble their referents, while iconic signs, such as pictures and diagrams, do resemble, at least to some degree, their referents.21

and Bullough claiming that:

Words are understood because of the establishment of a convention; pictures are understood because they replicate (resemble) the thing for which they stand in one degree or another.22

When a word is paired with a picture and both refer to the same thing, the picture will presumably increase the likelihood of understanding the meaning of the word. The likelihood is increased because the picture resembles the thing to which they both refer and from which they both receive meaning. To borrow from
Fleming and Levie, we can know the meaning of the word "apple" by looking at a picture of an apple which looks like the thing apple to which both the word and picture refer.  

Dale's Cone of Experience. The purposed relationship between words, pictures, and meaning which underlie the suggestions for using pictures can be further clarified by considering Edgar Dale's "Cone of Experience." Not only has Dale provided the most detailed explanation of this relationship in his "Cone of Experience," but this model for choosing teaching media has been very influential in the field of instructional media. Francis Dwyer, for instance, writes that:

An explanation for the current widespread use of visualization can be traced back to the 1940s and 1950s when a number of theoretical orientations were identified—specifically, the iconicity theory identified by Norris (1946), Dale's (1946) cone of experience, and the sign similarity orientation developed by Carpenter (1953).  

Similarly, Wilber Schramm, in his highly regarded book, Big Media, Little Media, states that Dale's Cone of Experience has been very influential in the field. This model for choosing teaching media has also been authoritatively cited in a number of recent textbooks. Heinich et al., for instance, write in their more recent text that:
... still pictures can translate abstract ideas into a more realistic format. They allow instruction to move from the level of verbal symbols in Dale's Cone of Experience to the more concrete level of still pictures.\(^26\)

while Simonson and Volker, after two pages of explaining Dale's Cone, conclude that,

> Generally, the more realistic the symbols used to communicate the idea, the more successful will be the message transmission process.\(^27\)

Other authors have also suggested the use of Dale's Cone in selecting and using instructional material.\(^28\)

A reasonable step would therefore be to go to Dale for a more explicit explanation for the relationship between pictures, words, and meaning.

In his "Cone of Experience" (Figure 1), Dale classifies learning experiences beginning with "concrete" or "direct purposeful experience" and leading upward through presumed levels of abstraction to "verbal symbols" or words.\(^29\) Dale presented this categorization of experience as a cone with the least abstract experiences at the bottom or base, numbered one, and the most abstract at the top numbered twelve. Pictures occupy intermediate positions between words and directly experienced things. They range from still pictures, position nine, to the less "abstract" motion picture with the added dimension of movement at
Figure 1. Dale's Cone of Experience
position eight, and educational television with the further addition of sound at the seventh position.

Dale utilizes the Cone in presenting his reasons for believing that pictures can be used to, in his words, "translate" the meaning of words. First, he tells us that the meaning of a verbal symbol or word is "what it stands for,"30 "refers (to),"31 or "names."32 Yet, Dale goes on to say, words

... do not look like the objects or ideas for which they stand and they usually contain no visual clues to their meaning. The word horse as we write it does not look like a horse ....33 Pictures can help us here because they look like the thing for which the word stands. According to Dale, pictures "directly remind us of the things for which they stand,"34 because "pictures are iconic ... they resemble in many particulars the object they represent."35 In terms of the Cone, between words and the things they represent come pictures which more or less look like the things. Pictures, therefore, can enable us to link word with thing much like we might link a person's picture with his name and thus come to know the meaning of a word.

It is this abstract-to-concrete continuum, the word-to-picture-to-thing relationship, which leads Dale to say that, "The closer a word is to some possible concrete presentation--to showing the object
to which it refers--the easier it is to teach and learn." According to Dale, the more "concrete," "realistic," and "lifelike" the instructional material, the easier it is to learn.

The Textbook View. A line of reasoning can be constructed from what has been presented here about words, pictures, and meaning. Most fully expressed in Dale's 1969 text and essentially restated sixteen years later in a book by Heinich et al., the reasoning is as follows. The meaning of a word is what it refers to. Pictures also refer, but unlike words, visually resemble their referents. Because of this resemblance, pictures are more easily understood than words, which are arbitrarily linked to things. Hence, we can know the meaning of a word and avoid misunderstanding by accompanying a word with a picture which has the same meaning or referent as the word.

This constructed argument is helpful in identifying a number of important questions which need to be examined. First, we can easily see from the argument that the suggestions for using pictures to clarify meaning rest on a referential theory of meaning; the meaning of a word is assumed to be what the word refers to. But, is the meaning of a word what it refers to? If meaning is not reference, we would have
rethink why pictures often seem to clarify the meaning of words as well as reconsider the practice of using pictures to teach the meaning of words. Second, pictures are said to resemble and thus refer to things or ideas. Do pictures always refer, let alone resemble what they refer to? If pictures do not refer to what they resemble, then we would need to ask why some pictures can help us to understand some words, and further, whether pictures are always better understood than words. What we can know about the meaning of words from pictures will depend in part upon the answers to these questions.

In what follows, we shall examine the assumption that the meaning of a word is that to which it refers. We will also assess the assumption that pictures resemble or look like what they stand for. Through such examinations, we will be better able to determine what can be known about words from pictures and what can be assumed about the relationship between picture, meaning, and things.

Do Words Stand For Things?

Let us begin by becoming a little clearer about the assumption that words mean what they stand for or refer to. According to this assumption about meaning, a word acts as a name of label for a thing or
idea from which it receives its meaning. 'Apple', on this assumption, is the name we give to a particular fruit designated by the word. General acceptance of this view is reflected in the frequent occurrence of questions like, "What does so-and-so stand for?" or "What does such-and-such refer to?" whenever the meaning of a word is wanted.

There are several possible versions of this reference view of meaning, three of which can be identified in the textbooks under consideration. On one reading of the textbooks, the least sympathetic reading, words are thought to be like proper nouns in that for each word there corresponds only one thing. Just as "Jimmy Jones" refers to some one person, so 'apple', it is thought, refers to this particular fruit. This view is represented in Heinich et al.'s statement that, "They (words) don't look or sound (usually) like the thing they represent" and Fleming and Levie's claim that "Both the word 'apple' and the picture of an apple are signs for, refer to, a particular fruit." Dale also seems to subscribe to this view at one point when he writes that:
Words like radius, circumference, triangle are not difficult to visualize. Each has a clear-cut counterpart, something that can be sensed, identified, and named. The symbolic leap is a short one: from object to name.  

An obvious problem with this "proper name" or one-word-referring-to-one-thing view is that for many words there is more than one object or even kind of object designated by a word. The word 'fruit', for example, may refer to an apple, an orange, or any number of various kinds of fruit. There is no one-to-one correspondence between words and things with the possible exception of proper names to people.  

A more persuasive view is that words are like common rather than proper nouns. Dale, for example, writes that, "The word pet is an abstraction. It is not just one animal--it may be a cat, a dog, a guinea pig, a gerbil" and "The verbal symbol table stands for the object at the rear of the hall or in your living room or wherever else such an object is found." Here a word stands for a class of things rather than a particular thing. The word 'table', for instance, does not apply to just one table but to any and every kind of table. What is referred to, moreover, does not have to be an object like a chair, but as Dale points out, may be a characteristic such as red, a
process such as osmosis, or any other "thing" designated by a word.42

Stated in this way, the view assumed in the textbooks seems rather persuasive. According to the authors, we know the meaning of a word when we know what class of things it refers to. Meaning is reference in the sense of word to things.

There is, however, a major problem with this assumption: some words do not seem to refer to anything yet have meaning. In order to be clear about the problem with this view of meaning, we need to consider this major objection.

To begin with, some common and frequently used words do not refer to anything. Conjunctions and prepositions such as 'and', 'or', 'however', and 'but' do not refer to anything but obviously have meaning. We understand, for instance, what the word 'and' means without thinking that the word might refer to something. Likewise, it seems odd to ask what things words like 'or' and 'for' refer to. We know what these words mean but not because we know the things they stand for.

Lewis Carroll playfully exposes the absurdities which can result if we apply the theory that words stand for things. In Through the Looking-Glass,
Carroll has the Red King treat the word 'nobody' as a name for somebody, as follows:

They're both gone to the town. Just look along the road, and tell me if you can see either of them.
"I see nobody on the road," said Alice.
"I only wish I had such eyes," the King remarked in a fretful tone. "To be able to see Nobody! And at that distance, too! Why, it's as much as I can do to see real people, by this light!"
All this was lost on Alice ...

Alice, of course, fails to see that the King is treating the meaning of the word 'nobody' as referring to somebody. Similar absurdities would result if we began treating such ordinary words as 'love', 'promise', and 'success' as names for classes of things to be searched out so as to understand the meaning of the words.

Beyond the ordinary or everyday words, terms such as 'mass', 'force', and 'elasticity' as used in physics, and 'nationalism', 'national income', and 'rights' as used in the social sciences, represent neither observable processes nor things. Yet such words are generally used in the schools because they have important meanings in their subject areas. The area of mythology also provides many words with little reference to substance. Words such as 'unicorn' and 'gremlin', for example, pose problems for the view that meaning is reference. Few people would say that
there are such things as unicorns or gremlins, yet most would agree on the meaning of such terms. Most of us know what unicorns are supposed to be without even having considered their possible existence.

The weight of this major objection should be enough to discourage acceptance of the proper and common noun versions of the view that meaning is reference. Meaning is not tied to reference as these versions suggest. We can know the meaning of a word without knowing its reference.

**Ideas and Meaning**

There is yet a third possible reading of the textbooks as to what is the meaning of a word. Dale, after all, does at one point say that "verbal symbols do not look like the objects or ideas to which they stand." Heinich et al. also write about words "representing things or concepts" and Kinder tells us that "pictures can clarify vague ideas." Words, therefore, may be said to have meaning because they stand for ideas or concepts rather than just things. This "idea" view of meaning is appealing in at least two respects. We do talk about trying to communicate our ideas with words and the idea of something like a unicorn exists even if the thing does not.
As appealing as this interpretation of meaning may appear, it is hardly free from problems. The first problem becomes apparent once we determine the meaning of idea. Turning to Edgar Dale, the only author to address this point at any length, we find him writing that ideas are mental images or pictures. He thus speaks of the difference in the ease of "picturing words" as follows:

Many words, such as efficiency, charity, interdependence, democracy, resourcefulness, represent mature abstractions of a variety of concrete experiences. They are not so easily pictured as are words such as ai, caryatid, or jackdaw.48

and quoting Jerome Bruner as support for his views, writes:

You read the word "knot" and its mental referent is now an image or picture ....49

This reading of 'idea' as a mental picture makes sense when we talk of 'apples' and 'oranges.' My idea of an orange is the image of an orange in my mind, and the word 'orange' stands for the image. This reading of 'idea' does not make sense with words like 'or', 'and', and 'however'. We do not seem to know what to picture to ourselves. If there are any ideas which accompany such words, they do not seem to be the same as mental images.
Yet let us restrict ourselves for the moment to words like 'orange' where it seems reasonable to assume that the ideas they stand for are mental images. Are there any problems with this restricted range of words? Consider the case of John, who has just returned from a fishing trip and tells Jim, "I caught a fish." The image John has in mind when addressing him is that of a twenty-pound Striped Bass. Jim, however, has the image of a twelve-ounce Catfish in mind upon hearing John. If the meaning of a word is the idea it refers to, then for John and Jim, 'fish' does not have the same meaning.

The fact that John had one kind of fish in mind and Jim another when the word 'fish' was used, however, does not show that the word 'fish' has a different meaning for these two people. A difference in meaning does make a difference in what we communicate to people, but a difference in mental images ordinarily does not. When we say, "I caught a fish," we may have a number of images in mind--an attractive person, dollar bills, a cold drink--or none at all. Whatever image we might or might not have in our minds makes no difference at all in the meaning of what we say.

It is a mistake to confuse the meaning of a word with what that word brings to mind. Not only can
different images accompany the same word but the same image can be associated with words of different meanings. The image of a resting lion might well accompany the utterance of 'jungle', 'dangerous', 'large cat', 'circus', 'royalty', 'courage', and 'roars', to mention only a few of the possibilities. Since these expressions stand for the same idea or image, they should be equivalent in meaning according to the idea theory of meaning. Yet these expressions are obviously not equivalent since they do not have the same meaning.

The idea theory of meaning fares no better than the "thing" theory of meaning. Words like 'for' and 'however' do not seem to have any corresponding mental pictures or images associated with them. The same word can have widely different images associated with it and the same image can be associated with words of different meaning. In the words of William Alston, "Ideas are not disturbed in the way required by the ideational theory." 50

The view that the meaning of a word is what it stands for, whether things or ideas, cannot account for the meaning of words. 51 The argument found in the textbooks which relies on this assumption of meaning is therefore unsound. We cannot know or clarify the meaning of a word from pictures "because" the meaning
of a word is what it stands for. Furthermore, as we shall now see, the other major assumption of the argument, that the "meaning" of a picture is what it stands for and resembles, is open to a number of fatal objections.

Pictures, Reference, and Resemblance

A number of textbook authors identify pictures as signs which refer to things which they resemble. Fleming and Levie write that "iconic signs, such as pictures and diagrams, do resemble, at least to some degree, their referents." In identical language, Heinrich et al. write that, "Visuals, however, are iconic. They normally resemble the thing they represent. As such, they serve as concrete clues to meaning." Dale, too, talks of the "pictorial (iconic) message" as those that "directly remind us of the things for which they stand." This assumption about pictures and their relationship to things is central to their argument for using pictures to know the meaning of words. Words and pictures, according to the argument we identified, have meaning because of their reference. Pictures have an advantage over words in resembling what they refer to and thus provide clues to meaning which words cannot. In the words of some, "pictures translate word meaning" because they so clearly resemble what words only arbitrarily stand for.
The assumption that pictures resemble the things they stand for is as fraught with difficulties as the view that words stand for things. First, not all pictures resemble let alone refer to things. Much of what goes by the name of Modern Art, for instance, was neither intended to nor does it seem to stand for and resemble anything we know. We can see this in Cubism, a school of modern art characterized by the use of cubes and other abstract geometric forms, whose members revolted against representational art and set out, in the words of Gombrich, "to baffle our perceptions." On a more specific level, we have Jackson Pollock's 1952 abstract painting "Number 12," which looks like a paint-splashed canvas and was certainly not intended to refer to anything. Even a photograph, especially when edited or oddly printed, may not resemble let alone stand for anything. The artist may have been interested in showing us something about color and light or about pictorial style or about some other matter.

Other problems exist even among pictures which can be said to resemble things. Pictures can stand for or represent something they do not resemble and resemble something they do not represent. Consider, for example, the picture of the lion which represents England or the apple which represents New York City.
In both cases, the pictures do not resemble what they refer to or represent. A lion looks nothing like England and no one would confuse the appearance of an apple with that of New York City. What the pictures do resemble—a lion and an apple—they do not represent.

Another major problem with the assumption that pictures resemble the thing which they represent exists because pictures resemble more than one thing. A picture of a person sleeping resembles a dead person as much as a resting or sleeping person. Which of these states the picture is intended to represent—dead, sleeping, or resting—cannot be determined by the picture alone. The ambiguity of resemblance exists even in the least detailed pictures. Whether we see, for example, the black wiggly line on white background before us as a diagram of a momentary electrocardiogram or a drawing of Mt. Fugiya by Hokusai cannot be determined by reading the cues of the picture. What a picture resembles, however, goes beyond the amount of detail or kind of picture. This is because more than one "thing" is depicted in a picture. Any picture "showing" a person to be tall, for example, must also show him to be many other things: clothed or naked, lying, standing or sitting, and so on. A picture of a tall man who is sitting down resembles a man's
being seated as much as it resembles a man's being tall. It is not clear what distinguishes a picture which represents height from one that represents posture.

Much can go wrong by assuming a simple relationship between what a picture resembles and what it might stand for or represent. A single picture, whether a sketchy drawing or a detailed photograph, can be used to stand for any number of things which it may or may not resemble. A picture of Los Angeles on a muggy day resembles smog as much as it does a large city or an overexposed photograph of the city on a cloudy day. The picture can be used to represent smog, which it clearly resembles, or the state of California, which it clearly does not resemble.

Much has gone wrong because people have either exploited or been ignorant of the indeterminant relationship between what a picture resembles and can represent. Riots resulted, for example, because some people in an underdeveloped country took the picture of a child's grinning face on the label of a can as representing what was in the can rather than the happy consumer of the canned goods.57 In another case, a photograph of a man and a woman drinking wine at a bar was convincingly used in three different French publications, each time with reference to something else--cafes, alcohol abuse, and prostitution. These presentations were so convincing
that the gentleman in the photograph, who had not been consulted, was awarded recompense by the courts for the effects of misrepresentation.\textsuperscript{58}

The exploitation of pictures goes beyond cultural differences and photographs. E.H. Gombrich, for example, has written about the re-use of woodcuts by fourteenth century publishers. He cites one case in which publishers re-used woodcuts showing a city devastated by a flood "to illustrate an earthquake or another disaster on the principle that if you have seen one catastrophe, you have seen them all."\textsuperscript{59} Gombrich writes in another context that the same re-used woodcuts of a city were found on a number of occasions, each time with the name of a different city. As it turned out, the publisher used the particular picture of a city to stand for a number of cities, none of which it actually resembled.\textsuperscript{60} If we go by children's books and television, things seem much the same today--"generic" pictures of cowboys, Indians, and catastrophes abound.

Not all words can be pictured as we showed when considering words such as 'however'. Moreover, not all pictures refer to things, let alone resemble what they might be used to refer to. Even a passport photo may, as is said, "look nothing like him." Almost anything can be used to stand for almost anything else,
and this is true with all pictures, whether photographs, drawings, or paintings. Pictures are also ambiguous in that they resemble more than one thing. The meaning of a word, therefore, cannot be known because pictures resemble in some simple way what they refer to and what words mean.61

**Knowing the Meaning of a Word**

Pictures can be used at times to "make verbal descriptions clearer." A simple diagram of a heart, for example, would help clarify the definition of 'heart' as a "hollow organ keeping up circulation of the blood by contracting and dilating." Pictures can also be used at times to clarify the meaning of words and avoid misunderstanding.

A teacher could use a picture of a mongoose to teach the meaning of the word 'mongoose' and in so doing, insure that students do not mistakenly believe the word 'mongoose' refers to some kind of goose. We might even agree that pictures can be used to "translate" the word 'pyramid'. Pictures can help us learn the meanings of some words. Yet they cannot help us for the reasons given nor can they be used to clarify or translate the meaning of many words.

The meaning of words, as we have seen, cannot be known through pictures as has been claimed. There
are many words which cannot be clarified or translated by pictures. In addition to conjunctions, prepositions, auxiliary verbs, and articles, there is a long list of words such as 'basic', 'creative', and 'freedom' on the one hand and 'please' and 'promise' on the other hand for which there are no corresponding pictures or things. You cannot show somebody a picture of freedom as you can a picture of a dove.

Words do not just pick out things in the world or ideas in our minds which can be pictured. This is not only the case with words just mentioned, but is especially true with words such as 'nigger', 'stupid', and 'intelligent'. The meaning of the word 'nigger', for example, is not translated by a picture of a black person. The word is used to do more than designate, it is used to evaluate in a way the picture does not. Misunderstandings over the meaning of words, moreover, are not reducible to not knowing what the word refers to. This is clearly evident when people discussing abortion argue over the question of whether a fetus is a human being. Comparing pictures of human beings with fetuses would not go very far in improving understanding on this question. Whatever misunderstandings may exist, they have nothing to do with what a human being or fetus looks like. The reason why
pictures cannot help us with these kinds of words can best be explained by another theory of meaning.

Pictures can sometimes be used to teach the meaning of words and avoid misunderstandings because words are sometimes "used" to stand for things and pictures sometimes resemble these things. Word meaning is not reference but is determined by conventions which govern the use of a word. Meaning is use. What is meant by meaning as use can be clarified by considering the meanings of a few words which are not handled well by the view that meaning is reference. First we can observe that the word 'the' does not refer to anything but has meaning. 'The' is used instead of 'a' when we want to indicate a specific instance of some kind (Where is "the" book John gave you?) or to indicate some person or thing already mentioned or under discussion (Is that "the" book?). Second, consider the word 'unicorn'. There is nothing in the world which the word 'unicorn' refers to. Unicorns do not exist. The word 'unicorn' is used to refer to a mythical animal with a horse's body and single straight horn. Third, we can observe that the word 'above' in the sentence, "The box is above the table," does not mean the same as it does in the sentence, "John is above that nonsense." While the use
of 'above' in the first is descriptive (place), the second is largely evaluative (better).

In accounting for the meaning of words 'the', 'unicorn', and 'above', we reported at least some of the ways we use the words. We described the conventions English-speaking people follow when they use the words. Meaning, according to this view, is the set of conditions that govern the way a word is ordinarily and hence properly used in a language. The meaning of 'unicorn' is "mythical animal with a horse's body and a single straight horn" and the word 'the' means in part, "indicates either a specific instance of some kind or some person or thing already mentioned or under discussion." With the word 'above', we can further see that words are used to do more than refer or convey information, they are also used to commend, condemn, command, or request, among other things.62

To know the meaning of a word is therefore to know how to use it. We would say, for example, that a student knew what the word 'cow' meant if she said cow upon seeing a cow but not upon seeing a horse or a goat. We would question whether she knew what 'cow' meant in the sentence, "Susan is a cow," if she tried to convince us that Susan was a cow by showing us a picture of a cow (providing, of course, that Susan was
not the name of an actual cow). A person knows the meaning of a word, moreover, even if he or she cannot state the conditions under which it is used—that is, a definition. This point is clearly stated by Munson in *The Way of Words* as follows:

> We know the conditions (under which a word is used) in the sense that we act in accordance with them. But this doesn't mean that we know them in the sense of being able to write them down.63

According to this account of meaning, we can better state why we can know the meaning of some words such as 'zebra' and 'aqueduct' through pictures because such words are typically used like common names to designate certain classes of things which can be pictured. We can use pictures to clarify the descriptive meaning of these types of words.

Further Remarks

Some further remarks need to be made about the distinction between knowing how to use a word and knowing a definition of a word. Being able to provide a definition for a word is often taken as evidence that a student knows "the" meaning of a word (its primary use). This is a mistake if either the definition is inadequate or memorized and not understood. For instance, if a student gave the definition "a large body of water" for 'ocean', we would say he did not
know an adequate (descriptive) definition of the word, since his definition would include at least lakes, which are not oceans. If, on the other hand, a student gave as a definition of 'ocean', "a great body of water surrounding the land of the globe," but was unable to tell us even roughly what 'globe' or 'surrounding' meant, we would have good grounds for believing that the definition was memorized but not known. Neither the inadequate definition nor the memorized and not understood definition, however, is sufficient evidence for saying that the student does not know the meaning of the word. He "may" know the meaning of the word or how to properly use it. He may, for instance, be unskilled in constructing definitions and thus either constructs a bad one or memorizes a good one, even though he might be very skillful in using the term. He might, for example, be able to use the word in a number of different sentences, be able to point out pictures of oceans or parts of a map which represent oceans, and even tell us what "oceans of fun" means. Being able to give a definition is thus not the same as knowing a meaning of a word.

Being able to correctly name a picture is also an inadequate test for knowing how to use a word. We need to distinguish the conditioned response of a
word to a picture from knowing the meaning of a word. If a student has learned to say 'whale' whenever the same picture of a whale appears, but is unable to say 'whale' when other pictures of a whale are shown, we would say the student does not know what 'whale' means. Knowledge would also be denied if the student was able to identify only some pictures--those used in the classroom--but not others. If the student could not identify new and clear instances of whale pictures and distinguish them from, say, fishes and elephants, we would have good reason to believe the person did not know what 'whale' meant.64 This is Harry Broudy's point when he wrote that, "however one learns a concept, the test for knowledge of a concept would tend to be the speed and accuracy with which one was able to classify new instances correctly."65

In assuming that meaning is reference, the textbook writers have treated knowing meaning as knowing what a word refers to rather than knowing how to use words. By their account, a person knows what a word means when they can identify an object or idea and correctly name it. Yet, as we have seen, words are used to do more than refer and knowing the meaning of a word is therefore not reducible to knowing what a word stands for. Yet they have identified an important kind of
knowledge for which pictures can be especially useful in acquiring. We want students to learn how to use language so that they can identify and classify things in the world. We want students to be able to recognize and talk about triangles, painting styles, pituitary glands, and so on. Pictures can be used in teaching students how to recognize many of the things we want to talk about.

There are, however, dangers involved in using pictures in the classroom to teach the meaning of words which have not been considered in the textbooks. Pictures, like words, can be used to do more than stand for things. A picture used to illustrate or clarify a concept may at the same time be used to do other things. To clarify the concept 'contrast', for example, an American textbook might use a picture of a line of well-dressed and well-fed American workers and a picture of a line of poorly-dressed and ill-fed Soviet workers. It is obvious in this example of 'contrast' that the inferiority of communism was at least as important an intended lesson as the learning of the concept 'contrast'. Even if we do not consciously intend to use pictures to teach something other than the descriptive meaning of a term, the kinds of pictures we select may result in such learning. Pictures of Native Americans as
ignorant savages and Blacks as menial workers, for example, have at least enforced negative stereotypes of those groups; and, as Marda Woodbury has observed:

One aspect of educational illustrations barely considered in these criteria (by textbook authors for evaluating pictures for classroom use) is the fact that pictures in texts have, over the years, presented a rather unbalanced portrait (most are of white males) that has led to subliminal stereotyping.66

What pictures we choose in clarifying the meaning of a word is for this reason very important.

Unfortunately, although we are told that pictures can help us understand words by identifying things, we are at best given contradictory advice about what kind and how many pictures to use in doing this. Locatus and Atkinson tell us to use more "realistic" or detailed pictures (photographs) while Heinich et al. advise us to use less detailed pictures (drawings).67 John Harrel tells us that large numbers of pictures will enable us to develop complex ideas (words) while James Kinder and Edgar Dale warn us that too many pictures confuse.68 This conflicting advice is due not only to a mistaken belief that pictures resemble what they refer to, but also a misconception about seeing. We therefore need to consider what it means to see and what we can do with pictures before we can say
what and how we ought to use pictures so that we can recognize and talk about things.

Summary

A frequent suggestion made in the textbooks is to use pictures in teaching the meaning of words. According to textbook accounts, pictures are useful in coming to know the meaning of words because words stand for things which pictures resemble and represent. Because of this resemblance, words are assumed to be more easily understood than words which are only arbitrarily linked to things.

The meaning of a word, it was argued, is not the thing or idea for which it stands and pictures do not simply visually resemble what they stand for. Many words have meaning but do not stand for things, so the meaning of a word cannot be explained in terms of some thing or things it stands for. The meaning of a word cannot be explained in terms of the idea it stands for because different ideas or images can accompany the same word and the same image can be associated with words of different meanings.

Pictures can stand for something they do not resemble or something they do not represent. Pictures, moreover, are sometimes highly ambiguous and always depict more than one "thing". The meaning of a word,
therefore, cannot be known because pictures resemble in some simple way what they refer to and what words mean.

Pictures can sometimes be used to teach the meaning of words and avoid misunderstandings because words are sometimes used to stand for things which pictures resemble. The meaning of a word, it was argued, is determined by the conventions which govern the use of a word. Knowing the meaning of a word is knowing how to use it.

Since pictures, like words, can be used to do more than stand for things, there is a danger in using pictures to teach the meaning of words. The use of pictures to teach the meaning of a word can reinforce negative stereotypes and result in the learning of unwanted values.
We do not gain information or knowledge from pictures by osmosis; we must at least "see" something if we are to gain anything by way of our eyes. As simple and straightforward as the preceding statement may appear, it is deceptively complex. An oversight of this complexity has led many textbook authors to assume that seeing is merely a kind of receiving and that pictures provide a common experience. The problems with these assumptions will be addressed and an analysis of 'seeing' explored so that we can better understand how knowledge is obtained by viewing pictures.

Textbook Accounts

Consider some statements about pictures made by textbook authors. If we look at Brown et al., we find the following advice in choosing pictures for classroom use: "Pictures should be clear in what they show. They should emphasize important details and convey a direct, readily interpretable message." Making roughly the same point, Edgar Dale writes that:
If a picture has no clear-cut point, the eye "doesn't know where to go" or "what to look for." In choosing pictures for teaching, therefore, make certain that the main idea emerges clearly and immediately.\(^2\)

Simonson and Volker also advise us to choose pictures for teaching which "convey meaning." They tell us that "a visual should hold together to convey its meaning or the total effect is one of disorder."\(^3\) Moving to Wittich and Schuller, we find them accepting the view that, "The better a picture is from an art standpoint, the better it is likely to transmit what it has to say to anyone looking at it."\(^4\) Gerlach and Ely claim "all visuals present more than one fact or concept" while Kemp and Dayton advise, "Do not clutter a picture or make it tell too much."\(^5\)

An important similarity among these statements is the passive role delegated to the viewer and the powerful role assumed by the picture. It is the picture which "transmits," "presents," "tells," "conveys," and "shows the eye what to look for;" all the viewer must do is look. These statements assume that if we want information from a picture, all we need to do is look at the picture and we have it.

According to these statements, what is meant by seeing is receiving. If we accept the claim that pictures in some way "present" or "transmit" information, then we would seem to "have" what the picture has to
give by merely looking at the picture. It is as though our minds were blocks of wax which, when directed toward a picture by our eyes, are stamped by that picture so that an exact copy of the picture is retained. Pictures cause us to have visual sensations, which by this account is seeing, and our contribution to the activity, like the clean slate to the chalk is negligible. We may interpret what we have once we see it, but seeing itself is direct and given.6

The idea of "abstraction" which figures so prominently in Dale's Cone of Experience and other textbook accounts of knowledge acquisition rests on the assumption that "raw information" is first gathered by the senses and then processed by the more central mechanisms of the brain. Dale, for example, writes,

All of us have two important ways of dealing with the world--directly through our senses and indirectly through our ideas,7

and further that,

Our specific vivid experiences make up the foundation upon which our usable concepts are constructed. They provide us with the rich material from which we shape our general ideas about life.8

Similarly, Wittich and Schuller state that:

Learners' perceptions result in cognitions or understanding of perceived events; these cognitions are the materials from which learners build concepts, which in turn are useful in building further concepts and solving problems.9
In this view, seeing is merely a passive process of receiving without judgment or prejudice. Thinking, on the other hand, consists simply in combining and separating sensory units which have been received directly and unaltered through the senses.

This passive view of seeing, however, is not consistently held by the authors. Some authors contradict themselves and several contradict each other. Williams, for example, begins by telling us that "Communication may break down with pictures as well as with words," yet several pages later writes that, "the Universal language of pictures makes them so uniquely important for teaching."\textsuperscript{10} Heinich \textit{et al.} advise us to use drawings because "they are easily understood by students of all ages," shortly after having written that "the ability to sort out the relevant from the irrelevant in a pictorial representation grows with age and experience."\textsuperscript{11} Heinich \textit{et al.} also tell us that "the videotape provides a common experience, one that is relatively concrete and shared by everyone in the same way," but also tell us at another point that, "How the receiver interprets the message depends upon his or her knowledge--that is, their field of experience."\textsuperscript{12} Pictures cannot both provide a universal language, a language everyone understands, and at the
same time require special learning or knowledge to understand. Even drawings, photographs, and videotapes cannot be seen and understood by all and at the same time require special learning or knowledge to understand.\textsuperscript{13}

Despite occasional claims that knowledge and experience affect what we see, suggestions for what kinds of pictures we should use and why we should use them assume otherwise. Advice about what kinds of pictures to use for teaching consistently assumes a view of seeing which requires little on the part of the viewer. This is true whether we accept Heinich's advice to use drawings which are "easily understood by students of all ages"\textsuperscript{14} or Locatus and Atkinson's suggestion to use the more detailed photograph which is not misleading, according to them, like the less detailed graphics and sketches.\textsuperscript{15} It is assumed when Dale tells us to choose pictures in which "the main idea emerges clearly and immediately"\textsuperscript{16} and when Kemp and Dayton write, "Do not clutter a picture or make it tell too much."\textsuperscript{17} When Wittich and Schuller claim that, "the better the picture is from an art standpoint, the better it is likely to transmit what it has to say to anyone looking at it," they are suggesting that we use good art (good by what standards and judged by what school of art we are not
told) so that all we need to do is look and we will "have the message." These suggestions for using pictures assume that at least certain pictures present what they have to anyone looking at them--some kinds of pictures "imprint" a mental image which leads to understanding.

Common Experience. The major reason given for why we should use pictures when teaching is, in the words of Gerlach and Ely, because "they provide a common experience for an entire group." Pictures, unlike words, are said to "present a clear, unambiguous message," a common experience, despite differences in what people know. This is the argument held by Brown et al. when they advocate using pictures to "communicate to (disadvantaged) students, despite handicaps of language and previous experience," and when Heinich et al. write:

Heterogeneous groups, including learners varying widely in their firsthand experience with the topic being discussed, can profit especially from an audiovisual presentation. The videotape provides a common experience, one that is relatively concrete and shared by everyone in the same way.

In terms of the motion picture, Dale tells us that, "the motion picture builds a common denominator of experience ... all will understand the story and the simpler meanings ... even illiterates can mine rich meanings from films." Kemp and Dayton echo the above claim
when they tell us that, "Each student seeing and hearing a media presentation receives the same message ... the same information can be communicated to all students." They then go on to say:

The instructional media field rests on the assumptions that people learn primarily from what they perceive and that carefully designed visual experiences can be common experiences ...

This belief about pictures providing a common experience is restated time and again. LaMond F. Beatty, writing about still pictures, claims that,

Still pictures can provide common experiences for an entire group of learners,

and further that,

Still pictures provide a universal avenue of learning for culturally deprived students who have difficulty with both oral and written language.

James Kinder joins in by stating that:

Modern advertising alone testifies to the ability of pictures to communicate as virtually a universal language,

while Cross and Cypher tell us that:

Everyone seeing a picture will be able to get something from it if the picture is clear.

According to these authors, pictures are superior to language for learning because they are basically understood by all.
In their most recent Sixth Edition, Brown et al. tell us that "motion pictures are the most universal of languages" and go on to explain this assertion as follows:

Films have unique characteristics that make them valuable for instruction: They reduce or overcome intellectual and physical barriers to learning; they permit students with diverse interests and abilities to have educational experiences that might otherwise be unavailable to them.

Edgar Dale joins Brown et al. and says:

The motion picture builds a common denominator of experience ... all will understand the story and the simpler meanings.

Taken together, these claims of a common experience are based, as Francis Dwyer observed, on the assumptions that "when students view visual illustrations they will all see the same thing and learn in the same way and at the same rate."

The assumed advantage of providing a common experience also leads many authors, as we have seen, to extol the virtues of using pictures over words. Wittich and Schuller, for example, write that:

Teachers can never be entirely sure that words they choose to describe an idea or process will be equally meaningful to everyone of their students .... One way to overcome this kind of communication problem is to deliver messages that are highly graphic, visual, and unmistakable. The more graphic and visual a message is, the more understandable the stimuli received are.
Unlike words, we are told, pictures which are carefully chosen do not result in misunderstandings because they present unmistakable messages—they provide a common experience. Pictures may not be easily understood at first but with some effort and critical observation, they will be understood by all. This is what Dale means when he writes that we must not assume "that just because pictures are so "real" they can be understood by everyone without effort and critical observation."

It follows from these statements that what we know is not always relevant to what we experience when looking at a picture. Pictures, unlike words, are understood by all.

Problems. In suggesting what kinds of pictures to use and why, the textbook authors have assumed that either all or some kinds of pictures will be understood by all. They have also assumed that these same kinds of pictures are best for all students. In identifying "the" best kind of picture, they have not distinguished between pictures which are good for initial learning and pictures which are good for more discriminating learning. By telling us to use just drawings or photographs or pictures with clearly emerging ideas, they have overlooked the difference between what kind of picture to use in teaching a first grader what a
heart looks like and in teaching a college student how to identify a heart in some small animal. In arguing that we should use pictures because they provide a common experience, the authors have assumed that the quality or kind of picture will determine whether we see the same things in the same way. Underlying the ways they have talked about pictures, the kinds of pictures they have suggested using, and the common experience argument for using pictures is a passive conception of seeing which locates the success of seeing in the picture. By reviewing an analysis of 'seeing', we can more clearly identify the problems with this conception of seeing and provide some important distinctions for the practice of teaching with pictures.

Soltis on Seeing

In an article entitled, "The Language of Visual Perception," Jonas F. Soltis presents what he takes to be the four basic ordinary senses of 'seeing'. These are, as he calls them, simple seeing, successful seeing, failure in seeing (unsuccessful seeing), and nonliteral seeing. The nonliteral sense of 'seeing', as in "seeing the solution to his problem" or "seeing the point of the argument," means no more than understand and thus has no direct bearing on our present concern with sight. Each of the three literal senses of 'seeing', however,
calls into question the three major assumptions of our authors; namely, seeing is receiving, at least certain kinds of pictures are always better for teaching, and at least certain kinds of pictures provide common experiences for an entire group of viewers regardless of differences in knowledge. This is because 'seeing' in all three senses requires more than a physical object to be seen and appropriate visual sensations had by the observer--seeing is more than looking at and receiving. In order to show that more is involved in seeing, we shall review Soltis' examination of the three cases of literal 'seeing' and then apply the results of the analysis in evaluating the major assumptions of the authors.

Simple Seeing. The first basic sense of seeing identified by Soltis is what he calls "the simple, literal sense of seeing" and is used "only when minimal requirements are met which allow that seeing has taken place." In this sense of seeing, Soltis tells us that a person who sees pink elephants in his room is not literally seeing. Simple seeing is not fancying or imagining one sees. There is more than a visual experience, there is some object present which brings about the visual experience. Yet, in this minimal sense, all that is meant by 'see' is that something
is seen but not identified or recognized. No knowledge is utilized by the observer. Minimally, then, there must be something to be seen which produces sensations in an observer in order to have seeing in the simplest literal sense.

Even with the simple sense of seeing, however, more is demanded than an object and appropriate sensations. First, Soltis notes that "within the peripheral limits of vision there are objects which we 'overlook' or 'fail to see,' even though in a physical sense they produce visual sensations in use." Soltis has identified a long-established fact that although the eye has a very large field of vision, only within a small and very narrowly confined part of that field, the foveal region, is a clear detailed image produced. Outside the foveal region, what is commonly called peripheral vision, our eyes are very responsive to movement but our ability to discriminate colors and shapes is diminished to the point of near blindness. Consequently, we often fail to discriminate stationary objects in our peripheral field of vision.

We can make an even stronger point than Soltis about the limits of the eyes by further considering the nature of vision. Although our ability to discriminate colors and shapes is greatly restricted
in the peripheral limits of vision, the movement of the eyes can easily compensate in many cases for this limitation. We are able to see many details which at first glance were largely undetected by rapidly focusing on selected features through a succession of glances.\textsuperscript{38} Except with certain moving objects, therefore, peripheral limits of vision do not necessarily lead to failures. Since our eyes are capable of moving and thus focusing on details at first overlooked, we need not fail to see what is in the peripheral limits of our vision. Yet the selective action of the eyes is neither errorless nor complete; we not only fail to see some features because we have poorly selected, but must ignore what is unimportant in selecting what seems to be important to us at any moment.\textsuperscript{39}

The failures to see due to the selective focusing nature of our eyes are well known. We often fail to see what is directly and clearly in front of our open eyes, something which can be seen reflected on our eyes, because we do not selectively attend to it. When Watson says to Sherlock Holmes, "You appear to read a good deal upon her which was quite invisible to me," and Holmes replies, "Not invisible, but unnoticed, Watson. You did not know where to look, and so you missed all that was important," the point is made
Such common directives as, "It is right in front of you" and "You are looking right at it" also attest to the fact. A master of sleight of hand, moreover, depends upon our inability to focus on what is important in order to deceive us.  

Soltis next argues that we can see something without correctly recognizing it, but we would not say someone saw something unless they could visually discriminate it. He rejects any attempts to equate seeing with recognizing because recognition does not include seeing in which we would say something is seen though a mistake is made about what is seen. For instance, we would count as seeing but not as recognizing the case of a man who sees a dog without taking what he sees to be a dog. The man may mistakenly believe the dog he sees from afar is but a shrub among many others. Furthermore, a man who sees his first dog without knowing what a dog looks like sees but does not recognize a dog. You must know the looks of something in order to recognize it. We can thus have seeing without recognizing. Yet taking an object to be something, even if correct, would not count as seeing, let alone recognizing in all cases. As Soltis points out, a deer hidden in the trees which our guide has us look but which we cannot discriminate from the
trees is not seen by us, even if we believe our guide and the deer is directly in our view. He concludes that seeing in the simple sense requires discrimination on the part of the observer in addition to a physical object and visual sensations caused by the object.

Successful Seeing. The second literal sense of 'seeing' identified by Soltis is what he calls "successful seeing." Seeing in this sense is used "to indicate not only that someone has literally seen something, but also that he is right about what he sees." An example given to illustrate this second sense is a man who sees a snake and is right in taking what he sees to be a snake. 'See' here is thus used in much the same way as recognize. If we claim that someone sees a snake (in the success sense), we mean someone saw something and correctly took it to be a snake. We would deny someone saw a snake in the success sense if they mistook it as being a tree branch.

There are several requirements for successful seeing (SS). Seeing (SS) first requires that the conditions of simple seeing be met. There must be a physical object, visual sensations caused by that object, and discrimination. In addition to these minimal conditions, seeing (SS) further requires that some knowledge possessed by the observer is utilized in
arriving at a true belief about what is being seen. In order to see in this sense, one must know what something looks like, whether that be knowing how to recognize something because of previous visual experiences or because of previous visual experiences plus related verbal information. For example, I may recognize a zebra because I have seen one before or because I have seen horses and certain patterned lines and a reliable person has told me that zebras look like horses with these certain patterned lines.

The relationship between prerequisite knowledge and seeing (SS) needs further clarification. First, not having the prerequisite knowledge for seeing (SS) will by definition rule out seeing (SS). You cannot see something and as a consequence acquire a true belief that it is a snake unless you know what snakes look like. Yet having the prerequisite knowledge for seeing (SS) does not guarantee seeing (SS). First, you may have the prerequisite knowledge for seeing (SS) but fail to see in the simple sense. You may know what snakes look like but fail to see the snake because it blends in with its surroundings. Second, you may see in a simple sense and have the prerequisite knowledge but fail to utilize that knowledge. Consider, for example, the detective who has committed to memory an
extremely detailed description of a suspect, yet upon seeing (simple) the suspect, fails to recognize the person as the suspect. Only after the suspect reappears and the detective is directed by his superior to "Describe that man to me," does the detective, having completed the description, realize the man he sees is the suspect. Successful seeing, therefore, requires in addition to prerequisite knowledge, that one sees (simple) the object and utilizes the prerequisite knowledge which he has. 45

**Unsuccessful Seeing.** In contrast to successful seeing, Soltis identifies the third sense of seeing as "failure in seeing" and what we will refer to as unsuccessful seeing. 'Seeing' in this sense is used to indicate situations in which something is literally seen, but the one who is doing the seeing is wrong about what he sees. A person who sees a piece of wire but believes he sees a snake illustrates what is meant by unsuccessful seeing. As with successful seeing, the observer must see in the simple sense and must utilize some knowledge in arriving at a belief about what is being seen. Unlike successful seeing, however, the observer acquires a false belief about what it is he sees. In our illustration, for instance, a prerequisite for unsuccessful seeing is knowledge about
the appearance of snakes. The knowledge of the appearance of snakes makes possible the false belief that a person is seeing a snake when in fact that person is actually seeing a piece of a wire. If you did not know what a snake looked like, you could not mistake the wire for a snake.

Summary. Let us briefly summarize the three types of literal seeing by applying them to a single ambiguous statement. According to Soltis, "seeing" is an ambiguous concept used in a literal sense to mean either simple (SI), successful (SS), or unsuccessful (US) seeing. This can be demonstrated by considering that from the true statement, "John saw Jesse James," we do not know whether: (1) John saw someone who was Jesse but did not recognize the person (SI), or (2) John saw someone and recognized him as being Jesse (SS), or (3) John saw Jesse but mistook him to be Jim Smith (US). In the simple sense of seeing (SI), all that is required is that Jesse James was present and caused visual sensations in John, from which John was able to discern something, possibly someone. In the successful sense (SS), John, in addition to meeting the requirements of simple seeing, must have known what Jesse looked like and have utilized that knowledge in arriving at a true belief about whom he saw. And in the unsuccessful
sense (US), John must have known what Jim Smith looked like, in addition to having met the requirements of simple seeing, and must have utilized that knowledge in mistaking Jesse as being Jim Smith.

'Seeing' in all three senses is open to certain failures which will affect what a person visually experiences. In simple seeing, there are failures in seeing which result when we are unable to discriminate something in our field of vision or when we simply overlook something in our field of vision. A person will fail to see in the successful sense if he does not possess the prerequisite knowledge to recognize what is seen or if he has the prerequisite knowledge but either fails to see in the simple sense or fails to utilize the knowledge he has in seeing.

Why Pictures Do Not Provide a Common Experience

Having reviewed and added to Soltis' analysis of 'seeing', we can now clearly state why it is a mistake to assume that all or even some kinds of pictures provide a common experience--a clear, unambiguous message--for an entire group. From our analysis, it is clear that even if everyone in a classroom is looking at the same picture under ideal conditions, the visual experience each can have varies greatly. In a simple sense, we cannot assume that because everyone in a
class sees the picture $x$, they also see the thing $y$ in picture $x$. Students may differ in what they are focusing on in the picture or differ in their ability to distinguish something even in a clear picture. In the success sense, they may differ in what they see because of three possible failures in seeing. They may fail to make the appropriate discriminations, not have the knowledge needed to arrive at a true belief about what they see, or fail to utilize the acquired knowledge necessary for recognition. A person cannot see a vase in a picture, in the sense of recognize, unless the person knows what a vase looks like and utilizes that knowledge. To take our example a step further, a person cannot see, in the sense of recognize, a 2000-year-old Ming dynasty vase unless that person has and utilizes certain knowledge about the Chinese and their culture. No one would say that a new student of archaeology has the same experience and gains the same information that a trained archaeologist does from seeing a picture of an ancient artifact; and this should be equally evident with students who differ in what they know.

Students can also have different experiences because, in the unsuccessful sense of see, they arrive at a false belief by utilizing the wrong knowledge in
the seeing situation. The fact that a person can mistake what he sees poses further problems for those who would assume that pictures provide common experiences for an entire class. If a class is shown a picture of a snake, and one student takes it to be a worm, another takes it to be a stick, and still another takes it to be a wire, the class is not having a common experience; there is no unambiguous message received by all.

As if the preceding problems were not enough, all the ways in which one can fail to see something in the picture also apply to seeing what the picture is about. An inability to discriminate among things in the picture, a lack of knowledge or failure to use the appropriate knowledge, and the misuse of knowledge will determine whether a person sees what the picture is of. Whether everyone sees the city of Florence, an old European city, or just a group of buildings when looking at a picture of Florence goes beyond the goodness of the picture and the physical normalcy of the students. What a picture has goes well beyond what meets the eye. 46

Pictures do not provide a common experience whether we are talking about photographs, drawings, or pictures that are "clear in what they show." What a person is able to distinguish, the knowledge he/she has, and the skill in utilizing that knowledge will all affect what
is seen. Clear, detailed photographs would seem to be especially open to discrimination failures while clear simple drawings may not provide enough information so that appropriate knowledge can be applied. From a photograph of a dissected abdomen, for example, it is difficult to identify the pancreas even when one knows where to look and what a pancreas looks like (graduation class pictures pose similar problems). A simple drawing of a Ming dynasty vase, on the other hand, may not provide enough detail for exact identification. These are failures to see which go beyond those due to differences in cultural understanding, inability to understand pictorial conventions, personal prejudices, differences in what people choose to look at, and what people conclude from what they see which a few authors have addressed.

In addition to the fiction of a common experience, there is no one kind of quality of a picture which is always better for teaching, let alone guarantees learning. For teaching the novice how to identify birds, for example, one might use a Peterson Guide drawing of a bird with arrows indicating distinguishing features or a Sierra Club photograph of the same bird with the same kind of indicators. For the advanced learner, we might want a photograph of a meadow where the person needs to search the picture to find the bird, or a
blurred photograph or painting which would better test the ability to discriminate birds in flight. The possibilities also include the use of modern art to teach different ways of seeing birds.

The assumption that pictures or certain kinds of pictures (such as clear photographs or simple drawings) provide a common experience or an unambiguous message to a group is as erroneous as believing that everyone in a class will walk away with the same knowledge after reading the same passage in a book. Even if we could assume that everyone had the necessary knowledge to recognize both what was in the picture as well as the subject of the picture, we still could have differences in ability to discriminate and skill in applying knowledge. The assumption also rests on a false belief, as we have noted, that pictures themselves are not ambiguous and can only be understood or seen in one way. In holding this common experience assumption, the authors have failed to distinguish between what a person can potentially see, given a picture and appropriate sensations, and what a person actually sees. These distinctions were not made because at best some authors assumed that the distinction between the process of looking and the achievement of seeing lay in the quality of kind of picture. In
so doing, they failed to recognize that we can look and notice something without recognizing it, recognize it without being able to identify it, or be mistaken about what we see. We may even overlook what we see no matter how good or what kind of picture we are looking at.

For all pictures, not just some, what we see is regulated by needs and prejudices and dependent upon skills in discriminating and utilizing knowledge. Seeing is not receiving. Nelson Goodman tells us that:

(The eye) selects, rejects, organizes, discriminates, associates, classifies, analyzes, constructs. It does not so much mirror as take and make; and what it takes and makes it sees not bare, as items without attributes, but as things, as food, as people, as enemies, as stars, as weapons. Nothing is seen nakedly or naked.49

We can add to this that what we know determines what we are able to see and we may err in our selection or be mistaken in what we believe we see.

We do not "learn by seeing" or more generally "learn by experience" unless we minimally possess the knowledge needed to interpret the experience. In Broudy's words, "Experience becomes intelligible only as we categorize it, conceptualize it, or classify it. In other words, experience becomes intelligible and intelligently manageable insofar as we impose form upon it."50 Similarly, Scheffler observes that
knowledge involves a conceptual apparatus and theory "not derivable from the sensory data but imposed upon them". Whether a person experiences (sees) a strata of igneous rock before him, for example, or just some wall of indistinguishable material depends on the knowledge he brings to his seeing. As has been repeatedly demonstrated, successful seeing involves more than simple seeing; or as John H. Chambers writes, "Bald sense experience may be the common property of all the people on earth, but experience that has meaning is not."

Problems With Some Specific Arguments

The assumption that a picture will provide a common experience has led some textbook authors to make several specific suggestions for using pictures to gain knowledge. Among other things, some propose the use of cartoons to convey messages easier and more quickly than the written word, the use of pictures to enable students to see the past, and the use of videotapes so that teachers can see how others view them. By briefly examining each of these specific suggestions for using pictures to gain knowledge, we can further demonstrate the problems with assuming that pictures provide a common experience and illustrate the
importance of a thorough analysis of 'seeing' for educational practice.

Cartoons. Let us start with the use of cartoons in the classroom. Brown et al. recommend their use because they believe students can comprehend the message of a cartoon far more quickly than they can by reading the same message. According to Brown et al.:

Almost all newspapers have cartoons on their editorial pages. People will look at them and comprehend their message far more quickly than by reading the same point of view expressed verbally as an editorial.53

Brown et al. do not provide any evidence to support their position; like the assumption of a common experience, it seems evident to them. There is even some question as to what 'message' means in terms of both the cartoon and the editorial. Is the message the argument (a conclusion with supporting statements), the conclusion alone, or a number of related statements? Whatever the case, it is clear that they believe some sort of message which can be expressed verbally will be comprehended more quickly through cartoons. The problems with this position and the more general belief that cartoons are easily and quickly read by all can be seen by considering other statements from the textbooks and then examining two cartoons.
A few of the problems encountered when attempting to understand cartoons have been addressed by Brown et al., as well as other textbook authors. Brown et al., for example, contradict their initial claim that cartoons will be far more quickly comprehended than the written editorial when they write:

Although the use of symbols may be an advantage to those who understand their meanings, it may also be disadvantageous to those who do not. Students will often need to be taught the meanings of stock symbols through the careful study of cartoons where they appear . . . .54

Heinich et al. also contradict their initial claim that, "Cartoons are easily and quickly read and appeal to children and adults alike" by stating that, "Today's immediately recognized caricature becomes tomorrow's nonentity. Be sure the cartoons you use for instructional purposes are within the experiential and intellectual range of your students."55 Understanding cartoons, however, goes far beyond a knowledge of caricatures and stock symbols, as we will see. Yet even if only an understanding of stock symbols and caricatures were required, this would be enough to insure that cartoons will not be easily and quickly understood by all.

The problem with believing that cartoons are easily comprehended becomes clear when we consider what must be known if someone is to understand certain cartoons. A cartoon which recently appeared in The New Yorker
magazine, for instance, depicted a raggedly dressed and poorly shaven man holding up a hat to a conserva­tively dressed businessman with a caption, "Of course I'm not hungry. Nobody's hungry. But I could use a drink." An understanding of the "message" of this cartoon requires, above all else, that the viewer know what President Ronald Reagan recently said about the poor in America: "No one is suffering from hunger in America." As essential as this knowledge is to an understanding of the cartoon, it is not enough. Unless our viewer also knew such stock symbols as an outstretched hat for begging and ragged clothes with unshaven face for poor, and could recognize these symbols in the picture, he would not understand the cartoon. Finally, even if our viewer knew what the President had said (and possibly the highly critical responses to those remarks and the political leanings of The New Yorker), and knew and recognized the stock symbols in the cartoon, he would not understand the cartoon unless he also knew how to read the caption. As with most cartoons, the caption poses additional problems for the illiterate or those with poor verbal skills.

An even more impressive example of a cartoon whose comprehension requires much in the way of
prerequisite knowledge is Vicky's cartoon depicting Italy as Hitler's Achilles heel (Figure 2). Gombrich points out that our understanding of this cartoon goes beyond an understanding of our language's stock figures of speech. As he says,

... Vicky's cartoon reminds us that Italy has a 'heel,' and what else could it be but an Achilles' heel? But even if we can count on some familiarity with the shape of Italy and the story of Achilles, the aptness of the cartoon might need a good deal of spelling out forty years after its initial appearance. 57

The "spelling out" which Gombrich speaks of is, of course, knowledge about the Second World War. We can add that even a person familiar with the shape of Italy and the story of Achilles can fail to utilize that knowledge by failing to notice the difference between the two legs of the figure depicted in the cartoon. Needless to say, a less skillfully drawn figure would increase the probability of error in seeing. All in all, it seems most probable that the statement, "Italy was the Achilles' heel of Germany in the Second World War" or some written editorial has at least as good a chance of being understood as seeing the "message" in a cartoon. 58

Whether the message of a cartoon can be comprehended more easily than its written equivalent is an empirical issue. That the cartoon cannot be comprehended
Figure 2. 'Vicky': Achilles' Heel.
at all without certain sorts of prerequisite knowledge and certain sorts of visual discriminations is a logical point. It is a logical point because we do not need a survey or statistical analysis to tell us it is true any more than we need them in determining whether bachelors are unmarried males. Finally, given the fact that political cartoons frequently utilize figures of speech and metaphors, it is unlikely that a person who is weak in language skills will comprehend the cartoon at all. Whatever advantages cartoons have over the unillustrated written word, if any, needs to be shown.

Surprisingly, Edgar Dale provides us with some information that suggests political cartoons, at least, are not understood as well as the written word. After telling us that, "The best cartoons make their point instantaneously," Dale then says that:

Cartoons are sometimes difficult to interpret. Research studies have shown that some newspaper cartoons are not easily grasped by high school students. Many students do not know that the donkey symbolizes the Democratic Party.59

If we cannot assume that students know a donkey stands for the Democratic Party, then it is unlikely that they would understand many cartoons, let alone, as Brown et al. claim, newspaper editorial cartoons in which political parties are often the subject. Because of stereotyping and caricature, moreover, cartoons
are typically poor sources of accurate and objective information.

An Ability To See Into the Past. In a chapter on photography, Hauenstein and Bachmeyer tell us that when people look at a photograph, they can see into the past. The sense in which they can 'see' is a rather strong one, as is evident in the following statements:

A camera is a kind of time machine. It captures history in the making on film. When people look at a photograph, they can see into the past.

Let us be clear about what is being assumed here in the way of seeing. The authors are saying that any person who looks at a photograph will see into the past. What is amiss here, aside from problems with the use of 'past', is a failure to consider that a person can look without seeing in the simple sense, see in the simple sense without recognizing what she sees, or mistake what she sees. The difference between a person who sees a picture of George Washington crossing the Delaware and a person who, when looking at the same picture, sees only a man standing in a boat is not to be found in the picture. It is the difference between one who successfully sees and one who simply sees; a difference of what the person recognizes when looking at the picture. Both persons see a picture of George Washington in a boat, but only one recognizes what he
sees. In order to see into the past, we must do more than look; we must see and recognize what is pictured as being from the past.

Seeing Yourself As Others See You. A third suggestion for using pictures to gain knowledge involves the use of videotapes. In the words of Brown et al., videotapes provide us with a way of seeing ourselves as others see us. As they write:

Perhaps the most immediate value of the low-cost portable videotape recorder/camera system is its capacity to record student performance for immediate replaying and evaluation. To "see ourselves as others see us" is a powerful influence in helping us to change our behavior toward desired standards. 61

More recently, Brown et al. have stated that, "you (teachers) too may benefit by seeing yourself as your students see you" when addressing the applications of videotapes. 62

Whether we take "see ourselves as others see us" as being literal or not, it is clear that the authors have not been careful to distinguish what potentially can be seen from what is actually seen when evaluating performances on videotapes. The same can be said about Heinich et al. when they claim that, "the videotape provides a common experience, one that is relatively concrete and shared by everyone in the same way." 63 The videotape can, no doubt, be helpful in evaluating
performances but not because it either literally enables us to see how others see us or provides us with a common experience.

There is in Brown et al.'s suggestion, first of all, an assumption that seeing a person teaching on videotape is no different from seeing the person actually teaching. Certain distinctions between being on film and being in person have therefore not received adequate attention. When we are aware of being videotaped, we often "perform" in a way we do not act when away from a camera. The performance is often conditioned by what we have seen others do on film, whether on television or videotape. Some people, moreover, are said to "photograph well" while we say of others, "the film does not do you justice." I suspect that part of what is meant when we make such a distinction is that seeing a person actually teach is not equivalent to seeing that person teaching on videotape.64

Apart from editing and the difference among viewers in distance and orientation to the person being taped which affect what others can see, there are many factors which affect what is seen. In a simple sense of seeing, the videotape cannot show what everyone in the audience or classroom is attending to during the presentation and thus how others actually see
ourselves. The performance in which the audience "attends to the performer's every move" is undoubtedly more a figure of speech than a matter of fact; at best it is a rarity and indeed is used to indicate a rare event. We often have neither the energy nor the knowledge of what is worthy of our attention to attend to even the important moves. Furthermore, to use a student-teacher example, a student who follows interactions between students and the teacher as well as among the students generally, sees something quite different from what is recorded by a video camera focused only on the teacher. What the teacher does when listening to the student and what the students do when the teacher is speaking are highly important in evaluating a teacher's performance but are not necessarily captured on the videotape.

How others see the presenter or how we see ourselves on a videotape is also affected by what is known and how that knowledge is utilized. We as observers can mistake affirmative shakes of the head as signs of weariness, pointing fingers indicating importance as pointing fingers of reference, and "I don't know" shrugs of the shoulders as meaning, "It doesn't matter." The tape will only show the former, not the mistakes. Apart from mistakes, the videotape will help me evaluate
my performance along lines I have already determined as being important. The tapes will not, by themselves, provide me with knowledge about what is important for a particular audience.

From the foregoing, it is clear that videotapes alone do not allow us to "see ourselves as others see us" nor do they provide a common experience. They do not, because in the simple sense of see, we do not all discriminate among the same things which we look at, and in the successful and unsuccessful senses, we differ in the knowledge we have and how we utilize that knowledge. Videotapes are no doubt useful in teacher education, but not because we can see ourselves as others see us by means of them. In fact, without some guides, it is possible that we will not see what others see when watching the same videotapes, let alone understand what we see in the same way.

Successful Seeing: A Closer Look

Distinctions resulting from Soltis's analysis of 'seeing' have been used to assess three major assumptions in the textbooks about 'seeing' and using pictures in the classroom. The aim here is to develop the responses to the textbook assumptions by becoming clearer about successful seeing or seeing as knowing.
Different kinds of knowledge which enter into seeing will be reviewed and pedagogical distinctions made.

What we see in a picture and what we can take from it depends heavily upon what we bring to it. Seeing is knowing, as Soltis argues, only if some knowledge is possessed and utilized when looking. The kinds of knowledge utilized in seeing can vary from looks and labels or names to such general knowledge as what will happen when certain things are done to it, and such specific knowledge as who owns it. Since pictures differ from things in being coded and removed from a context of time, place, and circumstances, they also require skills (know how) in interpretation. To know, for example, that there is a dwarf in the picture, we must not only know what dwarfs look like and utilize that knowledge when seeing, but must be able to correctly determine whether what we see in the picture is an average-sized man in the distance or a dwarf up close. These kinds of knowledge required to gain knowledge from pictures will now be examined in more detail and related to the practice of teaching with pictures.

Knowing the Looks of Something. In order to know what something looks like, to recognize it, we must possess and utilize knowledge about its looks when we see it. In order to recognize what we see before us
as a picture of a heart, we must know what hearts look like and apply that knowledge as we presently look at the picture of a heart. Knowing how to recognize something, in the sense of knowing what it looks like, however, does not require that we know how we recognize it, that is, what cues we use. A person who is able to distinguish visually between pictures of hearts and non-hearts, for example, knows what a heart looks like even if he is unable to say what it is that distinguishes hearts from other things.

A person knows what something looks like if they can discriminate it from other things. This is reflected in both the extended and more central uses of knowing the looks of something. We talk of some dogs, for instance, as knowing their owners and being able to distinguish them from other people by sight. This sense of knowledge we attribute to dogs seems to accord well with a sense of know found in the Oxford English Dictionary which applies equally well to people. The O.E.D. lists one sense of 'know' as "to distinguish (one thing) from another," as in, "I know a hawk from a handsaw (Hamlet)" and "we'll teach them to know Turtles from Jayes (Merry Wives of Windsor." More recent phrases that come to mind are, "He doesn't
know him from Adam," and "He doesn't know right from left."  

In both the extended and more central use of knowing the looks of something, performance rather than description or definition is the relevant test for knowledge. Knowing a description or definition may provide some indication of whether someone knows how to recognize something, but it is possible to know a description or definition of something without being able to recognize it. This distinction between what one is able to do and what one is able to say or write is not recognized in all the textbooks.

The appropriate test for knowing what something looks like is some nonverbal performance. This does not mean that we can only come to know how to recognize something through pictures or the things themselves. Contrary to what is suggested in some textbooks, neither an object nor some picture of an object is required in order to acquire knowledge of what the object looks like. Apart from showing a picture of an object, a teacher could draw upon a student's visual experiences in order to bring about recognition. A teacher could, for example, have students recall what horses and certain patterned lines look like so that they would acquire the knowledge necessary to recognize zebras.
We could use a picture, a combination of pictures, call upon past visual experiences, or even utilize pictures and descriptions so that students will know how to recognize the looks of something. Our goal will determine which means we choose, whether it is to develop imagination, visual skills, verbal skills, or some combination.

Although determining when a person knows how to recognize the looks of something will vary from context to context, there are some general remarks which can be made. First, when either distance is great or environmental conditions and orientation are less than ideal, we would be inclined to minimize the significance of error. That is, we would be likely to attribute the error to the conditions rather than to a lack of knowledge. A person may know what a bird looks like, for example, even if he could not distinguish a bird from a kite at a great distance or in a picture of the two taken at twilight. Not being able to distinguish a bird from a kite pictured close-up and in focus, however, would be good evidence that the person does not know how to recognize birds. Yet when a person knows how to distinguish one thing from another under less than ideal conditions, we would tend to say they know how to do it well. Knowing how to distinguish
one thing from another by sight is one thing, and knowing how to do it well, as Scheffler observes, is generally another. We can be more or less skillful in our ability to recognize; the difference has to do with training and practice as much as with the goodness of our eyes. "Much practice has made it second nature to her" is something we say of a person who has come to know something well.

Knowing What It Is Called. In moving from knowing what something looks like to knowing what it is called, we move from a basic to a more complex type of knowledge utilized in seeing. As our previous examples indicate, knowing what a thing looks like is different from knowing what it is called, and knowing an appropriate name for an object does not necessarily involve having any other knowledge about the object. Knowledge about what something looks like would therefore be the basic sort of knowledge which enters into seeing. Knowing an appropriate label and other sorts of knowledge adds to the complexity of what we can know when we see. How we combine these kinds of knowledge is no simple matter to sort out. It is possible, for example, to know what something looks like and even more without knowing what it is called. This is particularly true with me when I work with engine parts I recognize but
whose names I cannot even guess at. It is also possible to know the name and looks of something without knowing anything else about it. This seems particularly true of young children and beginning students in classes like anatomy.

The importance of knowing what something is called when seen is found in the enabling function of such knowledge. Knowing an appropriate label for what you see enables you to better communicate with others; it enables you to know what others are referring to when they speak and to more simply and precisely categorize something yourself. Furthermore, by using language to denote looks, the label has the potential of bringing additional knowledge about an object seen. Consider, for example, the highly learned but unwordly student who knows much about animals but has little knowledge of what they look like. Such a student would profit greatly by seeing animals and learning their names. As Soltis has insightfully put the matter, "The label is a trigger releasing knowledge associated with, and appropriate to, the named object." 71

The relationship between a thing and what we call it is not without its own store of complexity. As we saw earlier, there is not just one label or name per thing. A picture of what we would correctly call a
heart might also be called an organ, food, animal part, dark object, a symbol of love, and so on. The ambiguity also presents itself when we go from the general to the more specific, as from a heart, to a dog heart, and to a German Shepherd heart. It is thus misleading to speak of "the" label or name of a thing. Rather, there are certain contexts when one label is more appropriate than another. If we are identifying different organs of the human body in a class, then 'heart' would be a more appropriate label than 'organ' since all the objects from which we are to differentiate are organs.

An important educational distinction can be drawn on the basis of the complex relationship between a thing and what we call it. Following the example of others, we can call this the distinction between "capping" and "fitting the bill." In capping, we would have recognized the looks of something and wish to know what would be an appropriate label for it. In our classroom example, we capped the thing we recognized before us as a 'heart'. In fitting the bill, we have a word or label and wish to find something which falls under that word or label. Thus we are looking for food and we see that the heart in front of us fits this bill.

The distinction between capping and fitting the bill is based on the ambiguity of 'identify'. That is
to say, "identify it" may mean either "name what you see before you" (naming), or "given a name, point out which object before you fits the name" (instancing). Going back to our heart, we could present a student with a picture of a heart and ask the student to supply an appropriate label (What is this?), or we could present the student with a picture of an open chest of a man and ask the student to mark the heart (Which is the heart?). The distinction is important to make in educational practice for several reasons. First, by distinguishing between capping (naming) and fitting the bill (instancing), we can determine whether a failure to identify is due to a lack of knowledge at the basic level of looks or the verbal level of names. Second, we can first determine whether there is successful seeing in contexts demanding minimal skill in discriminating before going to more demanding contexts. Knowing what an isolated heart looks like does not imply that the person knows what it is called nor that the person can identify the heart among many other objects of a similar appearance.

Knowing a name or label of something is knowing a fact about that thing. When I say, for instance, "It is a calico cat," or "calico cat," or even "cat" upon looking at a picture, I am asserting something
which I believe and which is either true or false. If you ask me, "What is that?" while referring to the picture of the cat and I answer, "A dog," you would say that I did not know what you were referring to; at best, I did not know what the animal ordinarily was called.

More judgment is required in deciding whether a person knows what something is called. With pictures of dogs, cats, and other commonly known things, little more than true belief is required. If there is a picture of a cat, for instance, and upon seeing it, a person says "cat," we would normally say the person knows that there is a cat pictured. As long as the person has not become conditioned to say "cat" when shown the picture, as long as they believed what was true, we would say that they knew this was a picture of a cat. With a picture of, say, a Ming dynasty vase, on the other hand, there might indeed be pictured a Ming dynasty vase and a person upon seeing it might even say, "That's a Ming dynasty vase," yet we might deny that they knew this (even if they had not been conditioned to say "Ming dynasty vase" when shown this picture). We would probably require that they provide evidence for their belief that the picture is of a Ming dynasty vase before attributing knowledge; that they
be able to tell us something about Ming vases and the
cues they used in identifying this one. As with other
kinds of propositional knowledge, when the subject is
difficult, technical, or complex, we apply a strong
sense of knowing that. \(^7\)

**Other Kinds of Knowledge.** There are other kinds
of knowledge which enter into seeing in addition to
looks and labels. Soltis, for example, discusses both
expectation-producing and embellishment-producing
knowledge, which are either assumed or consciously
utilized in seeing. Expectation-producing knowledge
is defined as "knowledge we possess about how such
things act when acted upon" and embellishment-producing
as knowledge which "gives broader meaning and signifi-
cance to it in our eyes." \(^5\)

When a person says, "I can see that it could crack" when viewing an egg, or "I
can see that it will break when you drop it" when
viewing a mirror, the person is using knowledge about
what would happen if certain actions were taken. When
a person says, "That is Deb's pen," or "That is the
house my dad made," a less general sort of knowledge
is being utilized in seeing. In both of these cases
of seeing, 'see' could be substituted with 'know by
sight' (given the qualifications we have made between
a strong and weak sense of 'know'). I know from
seeing the pen that it is Deb's, and I know from seeing the mirror that it could break. In both cases of seeing, more is claimed to be known about what is seen than a label or look.

Although the extent and manner to which these other kinds of knowledge are utilized in seeing is not clear, there has been some discussion in this area which is relevant to teaching. Broudy, for example, contends that much of what we learn in the schools but are now unable to recall affects how we think and thus see. Referring to Polya's notion of "tacit knowing," Broudy suggests that facts once learned and forgotten still act like a pointing finger to guide what we attend to. If this is true, then there is good reason for teaching facts in the schools even though they may be forgotten in a number of years. Yet even if facts once learned and now forgotten do not serve to guide our perceptions, facts which we know and can state clearly do. Much that we know gives broader meaning and significance to what we see. And, as Gombrich notes, "Knowledge, a well-stocked mind, is clearly the key to the practice of interpreting (and understanding pictures.)"

What has been said about seeing as knowing thus far can be summarized by considering what we might do
and consider when teaching with pictures. Suppose, for example, that we show a group of students a picture of the Liberty Bell. In order to know what they see is the Liberty Bell, they would need to have at least some basic kinds of knowledge, namely knowing that and knowing how. They would first have to know that the Liberty Bell is a kind of bell and know how to distinguish it from other bells. They would need to know what the Liberty Bell looked like and utilize that knowledge when looking at the picture. Pictures of the Liberty Bell could be presented from various orientations and distances to see how well they knew what it looked like. Given that they know what the Liberty Bell looked like and utilized that knowledge correctly, they would need to know that it was called the "Liberty Bell." We might point to a picture of the Liberty Bell and ask, "What is this?" or, better yet, "What is the name of this bell?" to determine whether they know the name of what they see. At this point, given our desire that the students know that it is the Liberty Bell in a strong sense, we might require evidence or reasons for their belief that the bell pictured was indeed the Liberty Bell. At the level of expectation-producing knowledge, the students would need to know something about the property of bells, and the Liberty Bell in
particular, so that they could say, for example, what the bell was doing when shown being struck in a picture. Finally, we might require that they know that "This is the bell which rang in Philadelphia on July 4, 1776, to proclaim the independence of the United States," upon seeing the Bell.

Typically, we know or at least believe that a picture of a bell is the Liberty Bell from a caption and a highly conventionalized picture (stereotypic) of the Bell. Much of what we at least believe about a picture is based on captions and highly conventional presentations. We also often depend upon these captions and conventions to determine what details of the picture we should attend to. Knowing captions and knowing how pictures are used is at least as important in learning from pictures as knowing the looks of something. We will consider the uses of pictures and the relationship between pictures and captions in Chapter Five.

**Summary**

Underlying the ways the textbook authors have talked about pictures, the kinds of pictures they have suggested using, and a common argument for using pictures in the classroom is a passive conception of seeing which locates the success of seeing in the picture. 'Seeing', by the textbook accounts, is
receiving; if the picture is "good," all the viewer need
do is look in order to gain information from the picture.
The "good" picture, by this account, will "transmit"
the information and "show the eye what to look for."
Everyone who looks at a "good" picture, it is assumed,
will receive the same clear unambiguous message. Pictures,
unlike words, are said to provide a common experience.

An analysis of 'seeing' by Jonas F. Soltis was
reviewed in order to assess this view of seeing and the
arguments in which it is assumed. Soltis identifies
three literal senses of 'seeing'. Each of the three
literal senses of 'seeing' call into question the
assumptions that seeing is receiving and that at least
certain kinds of pictures provide common experiences
for an entire group regardless of differences in
knowledge. This is because 'seeing' in all three
senses requires more than a physical object to be seen
and appropriate visual sensations had by the observer.

As Soltis' analysis of 'seeing' makes clear,
pictures do not provide a common experience whether we
are talking about photographs, drawings, or pictures
that have a sharp focus and good contrast. What a
person is able to distinguish, the knowledge he or she
has, and the skill in utilizing that knowledge will
all affect what is seen. In holding this common
experience assumption, the authors have failed to
distinguish between what a person can potentially see,
given a picture and appropriate sensations, and what a
person actually sees. They have generally failed to
recognize that what we get from a picture depends
heavily on what we bring to it.

Other arguments for using various types of pictures
in the classroom also fail because 'seeing' is assumed
to be receiving. Cartoons are recommended for classroom
use because, according to some, students can comprehend
the message of a cartoon far more quickly than they can
be reading the same message. Such arguments do not
take into account the prerequisite knowledge and visual
discriminations necessary in order to understand many
cartoons. Similarly, arguments that we should use
photographs so that students can see into the past
and should use videotapes because they enable us to see
ourselves as other people see us, fail to take into
account the kinds of knowledge required to understand
both photographs or videotapes.

Seeing as knowing or successful seeing requires
that some knowledge is possessed and utilized when
looking. The knowledge utilized in successful seeing
varies from basic looks and appropriate labels to
various general and specific kinds of knowledge. At
the basic level of looks, all that is required is "know how". Various kinds of propositional knowledge or 'knowing that' enter into what we see and is often required in understanding pictures. Knowing a name or label for what we see was said to be important since labels act as triggers releasing knowledge associated with the name.
CHAPTER V
FACTS ABOUT THE WORLD

Claims about the advantages of pictures in coming to know facts about the world are frequently found in instructional media textbooks. These claims will be examined using distinctions resulting from the analyses of 'knowing' and 'seeing' examined in previous chapters. It will be argued that pictures by themselves neither make true statements nor do they misrepresent, mislead, or deceive as the textbook authors have assumed. Rather, pictures are used to mislead, deceive, and make true statements. An account of why the unusual photograph is likely to result in false belief, which differs from the account given in the textbooks, will also be presented. The aim is to assess the instructional media textbook claims and become clearer as to what is involved in teaching and learning facts through pictures.

Textbook Accounts
Pictures, we are told, are invaluable for classroom use because they provide us with facts and thus increase our knowledge of the world. Brown et al., for instance, inform us that pictures can help us deal with the
"current rapid expansion of knowledge" by enabling students "to learn more in less time, meaningfully."1 They also tell us that "a good picture should present facts."2 LaMond Beatly writes that, "still pictures can ... bring the outside world into the classroom for close scrutiny,"3 while Dale states that "television can bring the world of reality to the home and to the classroom."4 Both Brown et al. and Gerlach and Ely write that pictures can provide students with knowledge about places they have not been and things they have not seen when they write that motion pictures "literally bring the world into the classroom."5 Brown et al. go on to say that, "Probably the majority of classroom uses of filmstrips fall into this category of presenting factual data in visual form."6

A number of authors claim that pictures can not only provide us with facts but can correct our false beliefs about the world when they write: "Pictures can help to prevent and correct misconceptions,"7 "Pictures assist in the preventions of and correction of misconceptions,"8 "Visual evidence is a powerful tool,"9 and pictures "can be powerful aids for correcting false impressions."10

Among the textbook authors, Catherine Williams has written most extensively about the relationship
between pictures and facts. She tells us at one point that we can know about other cultures through pictures, that "pictures are helpful for building an understanding of other cultures." Williams clarifies this claim by writing more specifically that:

If a child believes, for example, that all Africans live primitively and savagely, pictures of life in cities will help him recognize that only some Africans live in an underdeveloped society.

and further that:

... pictures of homes in different parts of the world will reveal much about the cultures of the people who live in them. A special niche for display of pictures in a Chinese home indicates the high value of art there, just as the bathroom and kitchen in American homes reveal the importance we place on sanitation.

The knowledge we can gain from pictures is not, however, limited to the present. A number of authors tell us that pictures can provide us with knowledge about the past. Writing about pictures in general, Brown et al. tell us that, "Pictures can illustrate a sequence of historical events such as the development of transportation." While addressing the value of drawings, Locatis and Atkinson write that "a drawing of a market in ancient Egypt might be used to help students formulate hypotheses about its people, culture, climate, and geography." The ability of photographs to provide us with facts about the past is reflected
in various claims, such as, "Photographs provide exact record(s) of human events, knowledge, and messages," "a camera is a kind of time machine. It captures history in the making on film," "(photographs) are true, exact reproductions ... they do represent and reproduce reality," and "The camera brings faraway places into the classroom so that they are neither as remote nor as different in time and space as they once were." In more specific terms, Williams writes that,

... when a place as remote as ancient Egypt is studied, a set of study prints best helps the learners to visualize and understand early Egyptian civilization.

Williams demonstrates the preceding claim about knowing ancient Egypt through pictures with a drawing entitled, "Building a Pyramid in Egypt," which is accompanied by the following statement:

Pictures such as this are essential for preventing misconceptions and learning about events that are almost completely removed from the experience of today's children.

Historical facts, whether about ancient or more recent times, are thus said to be accessible through pictures.

A few authors have recognized that pictures can help as well as hinder our search for the facts. Just as pictures may lead us to believe what is true, we are told that they may likewise lead us to believe
what is false. Heinich et al., for instance, tell us that pictures "supply us with information (and mis-information)." We are instructed to evaluate pictures by asking such questions as, "Does the picture convey a generally true impression?" and "Is the information accurate (truthful, up-to-date)?" so that we are not led to false beliefs. Likewise, we are told that we should check the "authenticity and accuracy of the pictures" and use only pictures that "convey authentic and truthful impressions." More specifically, we are told to either "avoid pictures which might distort size and distance" or use "cues for establishing size and function to help in interpretation," presumably because without help these sorts of distortions will lead to false beliefs. Catherine Williams, moreover, suggests special care in using "pictures specially planned for propaganda purposes."

Misleading Pictures. Although we are told that pictures can lead us to believe what is false, only Catherine Williams and Edgar Dale have gone beyond passing comments to any sort of sustained discussion about this problem. They, moreover, have focused much of their discussion on the problems which accompany the unusual pictures. Under the heading, "Does the picture convey a generally true impression?"
Dale writes:

Although the camera does not lie, the user may and sometimes does. A photographer on an expedition to South America told me, "We picked out subjects because they were unusual, photogenic, interesting even though they were not typical!" As a teacher you will want to judge a picture in terms of its general truthfulness. Is it typical? If not, will it lead to wrong inferences?  

Dale then goes on to list some of the possible misconceptions which can rise from viewing the unusual picture as follows:

... we may be led to assume that rice is always raised in a flooded paddy, that all the Dutch wear wooden shoes, that all Africans live in huts in a tropical rain forest.

In the end he tells us that we should present several pictures "to give a balanced picture" because "any picture is only a sampling of an event or condition, a slice of life. In a sense every picture, no matter how good, is only part of the truth."

Williams has been more thorough in her discussion of the "unusual" picture but is in basic agreement with Dale. Under the heading, "A Picture Acceptable For Educational Use Should Convey Authentic and Truthful Impressions," for instance, she writes,

Because pictures are such powerful tools of communication it is important that those used for instructional purposes do not mislead. Frequently, the unusual picture creates or perpetuates a misconception.
She then goes on to support her point by noting that "Though peoples living in Arctic regions seldom occupy igloos, overuse of pictures of Eskimo igloos has led many children to believe the igloo to be a typical dwelling in these regions." The "misconception," we are told, is the result of a false generalization and can be avoided by using a collection of pictures and clearly identifying the unusual picture as being unique.

In her words:

Such misconceptions have their foundation in fact; they are an outgrowth of generalizations based on impressions from pictures showing the unusual rather than the typical. However, the unusual picture does have a place in a collection if it is carefully supplemented by the typical and clearly identified as being unique.

Like Dale, she is concerned about pictures which present "only part of the story" and "can readily lead to half-truths." Thus she warns that:

Children must be made aware of the danger in generalizing from a single picture when there is likelihood that it carries only part of the story,

and "An injudicious choice (of pictures) can readily lead to half-truths and fallacious conclusions."

Problems. Although the focus on the significantly distorted and the unusual picture is both important and helpful, there are several problems with the suggestions and comments made by the authors about gaining knowledge about the world from pictures. As was the case when we
considered 'seeing', the picture is given a strong role and the student a weak role in the acquisition of knowledge. Pictures are said to do such things as "supply," "present," and even "mislead" while the student is left to "generalize" from what is given. The authors, moreover, assume that pictures "make" statements which are true or at least partly true. This power attributed to pictures not only deemphasizes the importance a person's knowledge plays in seeing, but also leads the authors to give insufficient attention to the role of context in understanding pictures. Although pictures may be used to deceive or mislead, pictures themselves are neither statements nor are they true. Even the "good" pictures as defined by the authors--the accurate, authentic, up-to-date, and "typical" with cues for size and distance--can be misleading because knowledge of a picture's use is as important to our understanding as the picture itself. In what follows, therefore, we will focus on the relationship between truth, belief, and the context in which a picture is used.

Pictures As True Statements

A number of authors have written that pictures are at least equivalent to statements which are true or false. Williams, for instance, speaks of the
"well-composed, well-reproduced pictures that are honest statements about some aspect of life."\textsuperscript{38} Locatus and Atkinson tell us that "photographs can communicate the same message (as statements),"\textsuperscript{39} and Simonson and Volker write about "visual sentences" and actually diagram one as being equivalent to a sentence written in English.\textsuperscript{40} The kinds of statements which pictures are said to show are also clearly indicated. Pictures can "show" us that "the Dutch wear wooden shoes" or that "all Africans live in huts in a tropical forest" when they mislead, and that "children in the world are starving," "the Chinese place a high value on art," and "only some Africans live in an underdeveloped society" when they lead us to truth. By 'statement', therefore, they are not talking about an expression of feeling or emotion as in "a personal statement." Pictures are assumed to be equivalent to empirical or factual statements, as Brown et al. say, "A good picture should present the facts."\textsuperscript{41} This equivalence is clearly evident in Locatis and Atkinson's claim that the statement, "Children in the world are starving and need help" can be communicated by a picture better than words.\textsuperscript{42}

A particularly strong view of picture-statement equivalency is presented by Simonson and Volker. Under
the heading, "Understanding Literacy in Visuals," they write:

Visual sentences are collections of pictures that convey an idea the same way as a verbal sentence. Visual sentences have subjects, verbs (actions), and objects. They illustrate their claim with a photograph of a cat and dog facing each other over the caption: "sentence." This "sentence" or picture is then diagrammed into three pictures and accompanying terms: a close-up of the dog, labeled "the playful dog," a close-up of the dog facing the cat, labeled "challenged," and a close-up of the cat labeled "the angry cat." The picture is then shown as being equivalent to "The playful dog challenged the angry cat." There are, however, several other possible ways to describe the picture: "the playful dog is challenging the angry cat," "the large dog bullies the fearful cat," or even, "Animals play." Although these statements are equally appropriate in describing the picture, we are told that the particular statement chosen is the correct one. Given their assertion that visual sentences have subjects, actions, and objects just like verbal sentences, it is clear that these authors believe that for each object or action in a picture there is one and only one word or phrase. A picture is "a playful dog," according to
them, but there is no acknowledgement that the picture may also be a "pest" or simply "an animal in a prone position." Yet just as words are not related to things (including pictures) like proper nouns, as we have seen, so pictures are not mere abstractions from experience upon which some one statement fits. There is no one-to-one correspondence between a picture and a word.

The belief that pictures are equivalent to empirical statements is false. This is the case whether the objects and actions in a picture are believed to correspond with a word or not. Pictures and statements (whether expressed verbally, in writing, or conveyed via smoke signals, sign language, and the like) are not equivalent. Statements cannot be translated into pictures nor can pictures be translated into statements. Although a picture may depict a person sitting in a chair reading a book, a moment's reflection will reveal that the picture is not equivalent to the statement, "A person is sitting in a chair reading a book." We cannot express pictorially whether we mean 'the person' (a particular person such as Jane Doe) or 'a person' (any person). The statement, "A person is sitting in a chair reading a book," moreover, is but one possible description of the picture. Many other true
Descriptive statements are equally applicable to the picture, such as, "Some people look at books," and "This is how Jane Doe relaxes in the evening." These statements, moreover, are not equivalent for the truth of one does not entail the truth of the others. "Jane Doe looks at books" may be true while "Jane Doe reads books" may be false—Jane Doe may be illiterate and enjoys looking at the pictures. A picture, therefore, cannot be a statement in the sense that there is only one appropriate statement which is either true or false. 44

By showing that pictures are not equivalent to statements, we have also revealed that statements can be used to do things pictures cannot, particularly when it comes to describing facts. We can use statements to inform others whether some state of affairs is past, present, or future, actual or conditional, observable or out of sight. We can say it is, it was, it will be, it may be, or "if it is, then I will." We can do these things with language because of such words as 'if', 'then', 'either', 'or', 'not', 'therefore', 'all', and 'some', which enable us to formulate logical inferences. Pictures cannot be used to communicate in this way. There are no counterparts in pictures
That pictures are not true or false, let alone are statements, can be clearly seen by considering how the same picture can be presented as being true of the past or future but not the present. Imagine a picture of the city of Lincoln, Nebraska, in which there are buildings and trees which do not presently exist. The authors would say that this was not an honest statement, that the picture was not truthful or true. Yet consider the different ways in which this picture can be presented and the statements which could be true about it. If the picture was presented as an accurate representation of Lincoln today, we would say the presenter was wrong—"This is Lincoln as it looks today" is false when applied to the picture. If, on the other hand, this picture of Lincoln was presented as an historical record, we would not say the presenter was wrong—"This is what Lincoln 'looked' like" when applied to the picture could certainly be true. The same could be said about the picture if accompanied by the statement, "If we do such and such, Lincoln will look like this." We could easily determine whether certain changes would bring about a Lincoln as depicted in the picture. The picture remains the same in the
various presentations but the statements differ and along with them, truth. Truth, as Scheffler points out, is a property of statements when we are talking about factual or empirical knowledge. Pictures, by themselves, are neither true nor false statements.

The belief that pictures are honest or true statements is rooted in the assumption that pictures resemble what they stand for or represent. Yet as we observed when considering pictures and meaning, pictures may stand for any number of things which they may or may not resemble. A picture of a person sleeping resembles as much a person resting or dead as it does a person sleeping. What we use a picture to stand for, moreover, goes beyond resemblance. A photograph of the United States Capitol building may stand for a building, the city of Washington, the capitol of the United States, democracy, strength, or perhaps in the Soviet paper Pravda, "the enemy." Without knowing the context or use of a picture, we cannot be sure what a picture is to stand for or whether something true or false is being communicated, let alone whether something is being misrepresented. 46 This is clear when we asked whether the picture of the city of Lincoln was true or false. The most we can do is say that this
or that statement is true or false as it relates to some picture.

A failure to appreciate what a picture can represent has led Edgar Dale to say that a picture is "only part of the truth" and Catherine Williams to say that a picture is "only part of the story." They write at times as if pictures should only be taken as representing some "balanced" view. Dale writes that we should ask, "Does the picture convey a generally true impression?" when choosing a picture and that we should present several pictures "to give a balanced picture" because "any picture is only a sampling of an event or condition, a slice of life." Likewise, Williams instructs the reader to use only pictures that "convey authentic and truthful impressions" and then goes on to tell us how the unusual picture often misleads. Pictures, however, seldom represent the typical or usual and are not true or false, let alone partly true. For the most part, the usual picture does not interest us and few artists are as concerned about representativeness as is the scientist. Although a picture may be used to mislead us, it is how a picture is used and not the picture itself which misleads.
Truth and Fidelity

Since pictures are not statements, they cannot be true about anything. Our authors are in error when they speak of "pictures conveying truthful impressions," "truthful (information of a picture)," or that every picture is only "part of the truth." A picture may be "true to life" but not "true of it." We may ask whether a picture is "faithful," "accurate," or even "authentic" as some authors write. What is meant here by these terms is fidelity and for a picture to be faithful is, as Goodman argues, simply "for the object represented to have the properties that the picture in effect ascribes to it." Fidelity, moreover, does not get us very far in knowing what is true about a picture.

Whether an igloo in a picture is an example of a typical igloo or represents the kind of shelter in which most Eskimos live goes beyond the fidelity of the picture. Fidelity requires only that the picture be faithful to some "original," in this case some actual igloo. What is true of the igloo pictured, such as being a typical igloo or the kind of place most Eskimos live, goes beyond the information in the picture altogether. Furthermore, as Gombrich wisely observes, "However faithful an image that serves to convey
visual information may be, the process of selection will always reveal the maker's interpretation of what he considers relevant. We can, for instance, show accurate pictures of battle casualties and common soldiers or victory celebrations and generals depending upon what we want others to believe.

In asking whether a picture is faithful, moreover, we need to specify at what time and in what respects. A black and white photograph is not faithful in respect to color though it may be faithful in all other respects. Approaching fidelity from a different direction, we know that a close-up of the Capitol building which emphasizes the flaws of the building—the cracks, peeling paint, and dirt—is not the same as one taken at twilight, which appears flawless. Both pictures are faithful but in different respects. Whether we emphasize the micro, macro, or even the backside view of something in a picture does not affect fidelity and neither does the amount of lighting. Yet such factors have a powerful effect on what we believe from a picture.

A picture is, at best, one "image" of its subject—one version prejudiced by certain interests or beliefs. When choosing a picture, we should therefore ask, among other questions, "What is true of the picture" rather
than, as Williams and Dale instruct, "Does the picture convey a truthful impression."53

When we want to know whether "most Eskimos live in igloos" or "many children in the world are starving," we want to know whether certain statements about the world are true or false. These statements may be supported or suggested by pictures, but they are not equivalent to pictures. It is true, as Gerlach and Ely say, that "visual evidence (in the form of a picture) is a powerful tool." Yet pictures do not "tell" us anything nor are they empirical statements. They may be very faithful likenesses in certain respects and helpful in coming to know what certain things look like, but they are not true or false "about" things in the world.

Uses of Pictures

When determining whether something has been misrepresented or a picture is misleading, we must consider how pictures are used. Pictures by themselves neither make true statements nor do they misrepresent, mislead, or deceive. Rather, pictures are used to mislead, deceive, and make true statements. The context in which pictures are used, the language which accompanies them, and the conventional uses of an image make truth telling and deception with pictures possible. This
has been clearly shown by Ernest Gombrich when he focuses on pictures and truth and Terry Barrett when he considers the nature and uses of photographs.

Caption. In his book, Art and Illusion, Ernest Gombrich convincingly argues against the view that pictures are true or false statements. He begins by saying:

Logicians tell us—and they are not people to be easily gainsaid—that the terms "true" and "false" can only be applied to statements, propositions. And whatever may be the usage of critical parlance, a picture is never a statement in that sense of the term. It can no more be true or false than a statement can be blue or green. Much confusion has been caused in aesthetics by disregarding this simple fact.54

Gombrich then goes on to say that the error is understandable because we have become blind to the ubiquity of the caption. The caption has become so commonplace that we overlook its important function as an abbreviated statement. He writes:

It is an understandable confusion because in our culture pictures are usually labeled, and labels or captions, can be understood as abbreviated statements. When it is said, "the camera cannot lie," this confusion is apparent. Propaganda in wartime often made use of photographs falsely labeled to accuse or exculpate one of the warring parties. Even in scientific illustrations it is the caption which determines the truth of the picture. In a cause celebre of the last century the embryo of a pig, labeled as a human embryo to prove a theory of evolution, brought about the downfall of a great reputation. Without much reflection, we can all expand into statements the laconic captions we find in museums and books.54
Pictures by themselves are therefore neither true nor false but captions accompanied by pictures can be.

The claim that captions which accompany pictures are abbreviated statements is clear and straightforward. Employing an example of Catherine Williams, we can see that a picture of an igloo with the caption "Igloo" is a conventional equivalent to "This is an igloo" or "This picture is what an igloo looks like." Thus, when Williams has a picture of an igloo with the accompanying caption, "Eskimo Home," we get the statement, "An igloo is an Eskimo home" or "This picture is what an Eskimo home looks like." The statement resulting from the caption as it accompanies a picture is either true or false. Interestingly, given Williams' example, we may have either a true or false statement due to the ambiguity of the caption. If one takes the picture and the caption "Eskimo Home" to mean "An igloo is an, when an means one kind of, Eskimo Home," we have a true statement. If, on the other hand, the picture and the caption "Eskimo Home" are taken to mean "An igloo is an, where an means typical, Eskimo Home," we have a false statement. In either case, the picture is neither true nor false. We do not say of the picture that it is true but that it is true that this is a picture of an igloo. 55
Context. Caption and picture are not the only factors which need to be considered in determining whether a true or false statement is being given. In a continuation of the passage quoted above, Gombrich distinguishes between captions in museums, when he talks of "Ludwig Richter" under the landscape painting, and captions in books, when he tells of reading "Trivoli" under a picture. In the first case, the caption is about who painted the picture, and in the second, the name of the place seen. Context, where we find the picture being presented, is important in determining the statement formed by picture and caption.

Gombrich is more explicit about the role of context in his article, "The Visual Image." He states that, "the chance of a correct reading of an image is governed by three variables: the code, the caption, and the context." The role of context is illustrated through a comparison of a caption and picture in an art book with a caption and picture in a primer as follows:

In an art book the picture of a dog with the caption E. Landseer is understood to refer to the maker of the image, not the species represented. In the context of a primer, on the other hand, the caption and the picture would be expected to support each other.

Context is thus shown to be most important in determining what the abbreviated statement of caption and picture is to be. In this case, either "This is a picture
painted by E. Landseer" or "This is a picture of a dog." Whether we interpret the caption as being a statement about who painted the picture or a statement about what the picture represents is determined by certain cultural conventions governing the use of pictures.

Contexts alone, Gombrich writes, can make the visual message unambiguous even without captions or the use of words. A silhouette of a woman's figure on a door in some public building, for example, is conventionally used to mean, "This is a women's restroom." Yet these conventions are not without exception. The picture of a fruit, vegetable, or meat on a food container, for example, is generally used to indicate its content. Yet there are exceptions and these can lead to breakdowns in communication. Jonathan Kozol, in his book *Illiterate America*, tells us about a Detroit woman who bought a gallon of Crisco thinking it contained the chicken picture on the label. The picture of a chicken was neither misleading, deceptive, nor false, however it was not in keeping with a certain convention that many of us take for granted. Fortunately, many of us also have the ability and take the time to read labels so that we get the chicken and not just the fat.
Code. Labels and context are not always sufficient for gaining knowledge from pictures. All pictures, Gombrich reminds us, are coded, not copied. Looking at ancient Egyptian pictures, for example, we might come to believe that the rulers were chosen on the basis of their size if we did not know that differences in scale indicated differences in importance. Likewise, the color of the Egyptian in a painting had nothing to do with race. A pale yellow person was not Asian but a woman, and the dark brown people were men. Codes are not unique to the ancient Egyptian pictures but, as Gombrich amply illustrates, common to all styles of pictures up to and including the present. Various colors, thicknesses of line, uniformity of strokes, and the type of media used have been and continue to be used to indicate everything from moods and feelings to kinds of relationships.

As with other kinds of pictures, photographs also have codes which must be known if they are to be understood. We "read" the black-and-white photography, for example, without assuming that what is depicted is black-and-white. Even the type of film and developing paper we use will affect the color as well as the amount of detail. Foreshortening and smallness of size as signs of distance, moreover, are not restricted to
paintings and drawings. We do not ordinarily believe that buildings foreshortened in a photograph are shorter rather than further away, nor that skyscrapers pictured from above are bulging and expanding upward, though an earthquake might make them so.

Problems in understanding photographs taken from the surface of Mars illustrate the importance of attending to code. When pictures of the planet's surface were first taken in August 1976 by a camera aboard a United States landing craft, Mars appeared to be bright blue in color. After seeing these pictures brought some 212 million miles away by satellite, reporters from the major newspapers wrote that Mars was indeed blue. It was later discovered, on the basis of a color calibration chart accompanying the camera, that Mars was not blue but had a pinkish hue. Yet color was not the only information requiring code. The size of the boulders on ridges which were visible on the picture from Mars could not be determined without knowledge of their distance from the camera and distance could not be determined unless the size was known. The pictures were not false or misleading, even though they were difficult to understand.

The role codes play in a picture becomes much more obvious when we consider what it would take for
someone outside our culture to understand a picture. Nelson Goodman, for example, demonstrated the ambiguity of a smile when he quotes the anthropologist Ray Birdwhistell: "A 'smile' in one society portrays friendliness, in another embarrassment, and in still another, may contain a warning that, unless tension is reduced, hostility and attack will follow." The "language" of comic strips is rich in conventional symbols which range from the pseudo-naturalistic streaking lines indicating speed to the conventional dotted track indicating the direction of the gaze. Even the arrow, which is used to indicate direction, might not be understood by non-terrestrial beings if, as Gombrich carefully points out, they have not had the equivalent of bows and arrows. The coding of pictures again emphasizes what we bring to the picture; what it means to simply see as opposed to recognize.

Although Gombrich begins by considering caption, context and code in order to determine the intentional statement of the picture maker, he clearly states that what we can know from a picture is not dependent on those intentions. We can draw any number of conclusions from one picture and any one of these may be true or false. A picture of the president made for propaganda purposes can be used to provide new information for
a historian of fashion. Family portraits have been used by sociologists to study relationships among family members in a culture. A promotional brochure of California can be scrutinized by an intelligence officer preparing a landing. Yet in all of these undertakings, codes and contextual information are important in gaining information.

The Problem of the "Unusual Photograph"

Unlike Gombrich, Barrett is concerned with distinguishing photographs from other kinds of pictures and providing an analytic framework in which to understand them. Although he is not specifically concerned with the relationship between truth and pictures, his analysis is particularly useful in understanding photographs and the "unusual picture" problem which was identified by Williams and Dale. As we saw, both Williams and Dale were concerned with the unusual photograph which might "lead to wrong inferences" because they present "only part of the story." Though we have seen that truth is not a property of pictures and that pictures can only depict some aspect of what can be seen, their concerns are nevertheless well taken. Because of the unique characteristics of photographs, their use can more easily lead to false beliefs than
other sorts of pictures. Barrett not only addresses these unique characteristics of photographs but provides us with a method of rationally deciding how a photograph is being used in a particular context---whether a photograph is unusual, evaluatively slanted, or generally representative of what we could have seen had we been there.

Nature of Photographs. In A Conceptual Framework For Understanding Photographs, Terry Barrett argues that photographs are significantly different from other kinds of pictures and therefore need to be interpreted differently. Photographs are different from other pictures, he argues, because they are selective, instantaneous, and credible. They are selective in many respects. Most notably, the photographer must choose from a great many possible shots when looking through a viewfinder and then must select among the many pictures which have been taken. We are reminded that "a certain halo of credibility surrounds the photograph and affects our experience of photographs."66 We believe what we are presented with in a photograph in a way we do not with a drawing or a painting. Photographs appear, as Barrett aptly puts it, "anonymously authoritative" and "credible."67 As to being instantaneous, it is well known that when light meets film,
a picture (or least a negative) is made.

Given these unique characteristics of photographs, it is easy to explain why Dale and Williams were especially concerned with the unusual photograph. Photographs are believed to be objective copies of the world rather than the selected views which they are. The promotional brochure is a case in point. A brochure promoting New York City has photographs of clean, beautiful buildings, busy modern shopping districts, people smiling, and so on. Pictures of slums, vandalized subways, trashed alleys, violence, and the like have been excluded. These "negative" pictures would not fit with the written text inviting you to enjoy "Fun City." Yet we believe that New York or some other place looks so much like the supporting photographs that we often feel deceived when we see "the other sides."

We forget that promotional pictures are chosen to make the best possible impression.

Although neither true nor even partly true, photographs are particularly susceptible to deceptive use because they appear to be objective records of events. As Sissela Bok emphasizes in her book, Lying, someone who intends to deceive can play on our biases, imaginations, and tendencies toward self-deception. Here she correctly includes under 'deception' not only
"clearly intended" lies, but also "more marginal forms of duplicity," such as evasion, euphemism, or exaggeration meant to lead someone astray. Our bias toward a belief in the objectivity of the photograph has been used to deceive in both the stronger sense of lying and in the more marginal senses of deception. On the lying side, we have the notorious case of the German scientist Ernst Haeckel, who was accused of having tried to prove the parallelism of human and animal development by labeling a photograph of a pig's fetus as that of a human embryo. Somewhat similarly, Barrett writes about a 1951 American press photograph which reportedly cost Senator Tydings his Congressional seat. According to Barrett:

The photograph used a "trick effect" of framing Tydings as if he were in an intimate conversation with the Communist leader Earl Browder. Actually, the two were only in proximity to each other and not in conversation.

Given the Communist hysteria of the times and the use of the picture in a newspaper with the caption, "Senator Tydings and Communist Leader Earl Browder," it is clear that some members of the press intentionally misrepresented the scene to exploit the biases of the public and lead them astray.

In addition to the misuse of caption, photographic "trick effects," or the altering of negatives, photographs
are often selected in a way that can be deceptive. Barrett illustrates this selectivity in citing John Morris, the photography editor of Life magazine during World War II, as saying, "the faces of the severely wounded and the dead were taboo," and "the photographers did not show his side of the ghastly." Shown in the context of "this is what you would see if you were here," such omissions were certainly deceptive and misled the public which depended upon them. Clarice Stasz, in an article entitled "The Early History of Visual Sociology," provides a number of other cases where the selection of pictures were clearly used without regard for the truth. She notes that E.D. Moore, writing in the American Journal of Sociology, supported his claim that bars have social value with photographs of men in a bar laughing and engaged in friendly conversation with a poolroom and gym equipment in view. "Looking at Moore's pictures," says Stasz:

It is difficult to believe that alcohol could be the source of social problems, for both the drinker and his family. Of course, this is because Moore did not show fights, inebriates in corners, drunken men beating their wives, families going without food, and so on. But the choice of images flows from his framework --it is not the photographs in themselves that are the source of the inadequacy of the argu-ment.
Stasz also identifies the beginnings of the now popular "before and after" presentations where "writers selectively formed the images of their settings so as to persuade of their social ameliorative power."74

Some unusual photographs which Dale and Williams identify--the Eskimo igloo, the Dutch wearing wooden shoes, and the African thatched huts--frequently lead to false beliefs, not so much because they were intended to deceive, but because of the way they are used. For many, the belief that the igloo is the type of shelter in which most Eskimos dwell is due to their isolation from the Eskimo and the fact that the igloo has evolved into a stock symbol for the Eskimo, not because the picture is unusual. Just as Chinese are "supposed" to drink tea, so Eskimos are "supposed" to live in igloos. In similar fashion, the cornfield has come to represent Nebraska; the oil wells, Texas; the pagoda, China; and so on. The fact that few Eskimos live in igloos or that much of Texas is without oil wells surprises people who have come to take the stock symbol for more than it is worth. The probability of misconceptions resulting from stock symbols such as the igloo is increased when it is accompanied by an ambiguous caption such as "Eskimo Home," which can be read as meaning "typical home."
Types of Photographs by Use. In focusing on the use of photographs—the contexts of the photographs—Barrett provides us with some guidance on how to avoid photographs which are likely to mislead or are being used to deceive. He goes beyond Dale's suggestion of using several pictures and Williams' additional suggestion of identifying the unusual picture by providing a conceptual framework for understanding photographs. As have Dale and Williams, Barrett tells us that photographs are not used just to describe. Yet he goes beyond this and argues, as does Gombrich, that "the meaning of any photograph is highly dependent on the context in which it appears." More specifically, he says that the meaning of a photograph, like words, is determined by use. He writes:

What I am proposing here is consistent with the Meaning As Use Theory of Language. One needs to consider how a photograph functions differently in different situations.

He argues that photographs are analogous to language statements in that they may be classified according to use as either descriptive, explanatory, interpretative, ethically evaluative, aesthetically evaluative, theoretical, or some combination of these.

Barrett's classification of photographs is useful in separating photographs used to present facts from those which are used to do other sorts of things.
Photographs used to present facts about the world are called descriptive and explanatory. Although all photographs are descriptive, it is to such paradigms as the NASA space exploration photographs which Barrett identifies as descriptive because they have been "painstakingly produced to be accurately descriptive." Explanatory photographs, on the other hand, are those "which are made to explain" rather than being used "as the bases of explanation." The Muybridge photographs used to explain how horses move--i.e., these (photographs) show that on the way to a full gallop, all four of a horse's hooves are off the ground at the same time--are presented as a paradigm case of explanatory photographs. In contrast to these largely descriptive categories there are the evaluative and interpretational uses of photographs. Photographs such as those found in Eugene Smith's book, Minamata, which were used to persuade the Japanese government to help people suffering from industrial mercury poisoning, are ethical evaluations. According to Barrett, this is because:

They always describe, often attempt to explain, but also, and most importantly, imply moral judgements, generally depicting how things ought or ought not to be.

A photograph may have been painstakingly produced to be accurately descriptive but if it is used to persuade what ought or ought not be, it is also an ethically
evaluate photograph. Such "trick" photographs as a
double exposure which suggests spirits leaving the body,
on the other hand, are called "interpretations" in that
"an intentionally subjective understanding of phenomena"
is intended.\textsuperscript{80}

This classification allows us to more clearly
identify the kind of photographs we would use when we
want a "balanced" or objective view. Insofar as we
wanted to know something about the world from pictures,
we would be wise to choose from those that are descriptive
or descriptive and explanatory. These are the types of
pictures which have been accurately produced for
objective use. Facts could be learned from other types
of photographs, but error and the learning of undesirable
values are more likely with those in which accuracy and
objectivity were not intended. Furthermore, as Barrett
observes in another context, teaching with photographs
from magazines such as \textit{Vogue} and \textit{Mademoiselle}, which
are clearly evaluative, may lead to learning values of
an undesirable sort.\textsuperscript{81}

Telling us what categories to use does not help
us much unless we know how to decide which category a
photograph belongs to. Fortunately, Barrett provides
us with some direction on how to categorize photographs.
He tells us that through an analysis of the contexts
of a photograph's use we can make reasonable judgements on the category to which a photograph belongs. Barrett argues that we need to consider the internal context or "that which is given in a photograph, that which is evident," the external context or "what has happened to the photograph after it was made," and the original context or "that which was physically and psychologically present to the photographer at the time" in order to identify what type of photograph we have. Citing Gombrich and Goodman, he goes on to remind us that even with the most recognizable of photographs, a working knowledge of codes and systems of representations are presumed at the level of internal context. He specifies what is meant by external context as being:

How and where it is being presented, how and where it has been presented, how it has been received, how other interpreters have understood it.

Under original context he includes:

the photographer's intent, if it is available, the photographer's biography; the intellectual, imagery, and stylistic sources of the work; the relation of the photograph to others which are contemporary to it, both those of the photographer and those pictures by other photographers and artists; the social and political character of the times; and the philosophical and religious milieu of the times.

In defining context, Barrett has thus specified what questions need to be asked and what sources examined
when trying to determine what sort of message is intended by a photograph.

Barrett provides us with questions to ask and sources to examine in order to determine whether a picture is unusual, generally representative, evaluatively slanted, or clearly deceptive. In this respect, he provides us with adequate guidance for dealing with the problem of the "unusual photograph." He clearly shows us that we need to be concerned with more than just the picture, that a knowledge of selection, code, presentation, and when the picture was taken is needed in order to understand the "message" of a photograph. To these we can add a clearly written caption as a means to avoid misconceptions. A picture correctly labeled as being deceptive will not be deceptive.

Other Kinds of Pictures. It is also clear that Barrett's classification of photographs according to use and his specification of content is equally useful in evaluating other kinds of pictures such as drawings and paintings. We can determine, for example, whether a drawing or painting has been accurately produced to describe or has been produced to show what ought or ought not be the case. Even portraits have been painted with an eye toward condemnation, though more often with a sympathetic eye. The specification of context
provides us with a means to identify the type of picture. In fact, many of the questions and sources Barrett identifies under content are related to a mosaic by Gombrich as follows:

A mosaic found at the entrance of a house in Pompeii shows a dog on a chain with the inscription "Cave Canem" (Beware of the Dog) .... the picture effectively reinforces the caption that warns the potential intruder of the risk he is running. Would the image alone perform this function of communication? It would, if we came to it with a knowledge of social customs and conventions .... But if we could forget what we know and imagine a member of an alien culture coming on such an image, we could think of many other possible interpretations of the mosaic. Could not the man have wanted to advertise a dog he wished to sell? Was he perhaps a veterinarian? ... The purpose of this exercise is to remind ourselves how much we take for granted when we look at a picture for its message.88

While Gombrich helps us to clarify the relationship between truth and pictures by focusing on code, caption, and context, Barrett helps us to identify those pictures which were intended to help us learn what is true with a more robust analysis of context.

Motion Pictures

Ernest Gombrich and Terry Barrett have emphasized the importance of the knowledge an individual brings to a picture and the need for contextual interpretation in understanding a picture and gaining knowledge about
the world. Both have characterized truth as a property of some statement made about or with a picture. Pictures themselves are not statements and were shown to be neither true nor false. Though they have limited their focus to drawings, paintings, and photographs, it is clear that what they have to say applies equally to motion pictures.

Motion pictures, like photographs, are selective and credible. The distinction made between photographs being "taken" and motion pictures being "made" emphasizes the amount of selectivity which goes into the motion picture. Selectivity—both in how pictures are selected and in how they are presented—will determine whether a motion picture is descriptive or ethically evaluative as defined by Barrett. Motion pictures of animals made in the psychology laboratory of the University of Wisconsin, for example, have been painstakingly made to be accurate descriptions, while pictures of starving African children have been used by religious relief groups to show us what should be changed.

Selection has also resulted in misleading if not clearly deceptive motion pictures. Minorities such as Blacks, Chinese, and women have been stereotyped repeatedly. During the late 1960s, for instance, Ralph McGill, the publisher of the Atlanta, Georgia
Constitution and winner of the 1958 Pulitzer Prize for editorial writing, observed that, "Almost the only times you see Negroes on Los Angeles television is when they are rioting or doing something 'bad'." Not only have Blacks been misrepresented but so has violence. The incidence of violence depicted on television has been shown to be much higher than the actual incidence of violence. The credibility of motion pictures is reflected in the findings that television viewers falsely believe that the incidence of violence in the United States corresponds with the inflated amounts of violence shown on television.

Contrary to what has been claimed in the textbooks, the motion picture does not "bring the world into the classroom" so that we can "see and hear for yourselves." Motion pictures are rarely made to be accurate descriptions and a motion picture at best provides only one view of the world. Every film, even a documentary, is either largely staged or edited in such a way that it cannot literally be said to "re-present". The acceptability of film content, moreover, most often depends on its adherence to film convention and formulas rather than on what in fact is the case. Sol Worth makes this point especially well when he writes:
... a shopgirl is depicted in films in a certain way. Everyone "knows" that real shopgirls do not look or act that way. If a real shopgirl were to be cast in a film, we might recognize her correspondence to life, but would reject her because of non-correspondence to film. What we call "true to life" must be a stereotype if it is to be recognized ... 94

Thus, while the sounds and movement of the motion picture distinguish them from other kinds of pictures, these properties do not make the need for contextual interpretation any less important.

Belief and Pictures

Photographs are believed in a way other kinds of pictures are not and we may arrive at false beliefs through the use of any kind of picture, particularly the inaccurate or unusual. Yet what about true beliefs which are based on pictures which do not support them? Would we or the authors be satisfied with using just any picture as long as our students arrive at a true belief? The concern with accuracy and with a "balanced view" shows that the authors at least would not be satisfied. This is an important point, for it means that in spite of other statements made by many of the authors, they believe that knowledge is more than just true belief.

If our only concern when speaking of knowledge is true belief, we would not need to be concerned with
the skills and knowledge of the student or the accuracy of the picture. For example, suppose we wanted our students to know that there are modern cities in Africa. By 'know' we mean believe something which is true from a picture. Being short of pictures of African cities, we decide to slip in a picture of New Orleans taken in an ethnic neighborhood where English is rarely found on signs. We then tell our students this is an African city. Our students, on the basis of the picture and our saying that it is an African city, come to believe that there are modern cities in Africa, or as Catherine Williams says, not all Africans live "primitively." Since they believe something which is true, that there are modern cities in Africa, they would have knowledge as defined above (true belief).

The problem with our imagined example is that few if any of our authors would wish to say that knowledge resulted. This is particularly true since they laid such great stress on the need for accurate and representative pictures in order to gain knowledge. They would therefore admit that inaccurate pictures can lead to true beliefs, but that knowledge was not gained. In going from the picture to a true belief there was a false belief about a picture which was sufficient to rule out knowledge. What this analysis demonstrates
is that the authors are assuming a stronger sense of knowledge when they address the use of pictures to gain knowledge about the world. By demanding that the student form a true belief on the basis of a picture which provides adequate evidence for that belief, the authors believe that knowledge about the world is a sort of "justified" true belief.

There is a question of how justified one ought to be in order to know something from a picture. Edgar Dale, for instance, places the burden on the teacher to select the appropriate picture for the student. The student's knowledge is to be based on good authority--the teacher. Locatis and Atkinson, on the other hand, call for "visual literacy" and suggest that students should "understand the motives, biases, and intentions of the people who created the visuals, and know what techniques were used to create different effects." They would have students justify their choice of pictures in the direction of Terry Barrett's proposal. The difference here is whether we want to teach students so that they would know in a weak sense or a strong sense. In the strong sense, we, as teachers, would not only provide pictures which are an adequate basis for a true belief, but also teach our students how those pictures
need to be evaluated before they are accepted as supporting a belief.

Summary

According to textbook accounts, pictures are invaluable for classroom use because they provide us with facts and thus increase our knowledge of the world. Facts about the recent and ancient past as well as the present are said to be provided by pictures. Some authors have in addition written that pictures may lead to mistaken beliefs. We are told to avoid pictures which are unusual and mislead and to use pictures which convey a generally true impression so that we will be informed rather than misinformed by pictures.

A major assumption behind these accounts about gaining knowledge through pictures is that pictures "make" statements which are either true or false. Pictures, however, are neither statements nor are they true or false. Pictures cannot be translated into statements nor can statements be translated into pictures. This is because there is no one-to-one correspondence between a picture and a statement (or even a picture and a word). Any number of statements may be true or false about a picture but pictures themselves are neither true nor false. 'Truth' is a
property of statements, not things like pictures, when we are talking about factual or empirical knowledge.

Although pictures may not be "true of" something, they may be "true to" something. That is, pictures may be accurate or "faithful". Fidelity, however, does not get us very far in knowing what is true about a picture. Any number of pictures may be faithful in their representation of an object or event, yet vary greatly in what respect they are faithful. A picture is, at best, one "image" of its subject--one version prejudiced by certain interests and beliefs. Which version is selected will have a powerful effect on what we believe or can know from a picture.

When determining whether something has been misrepresented or a picture is misleading, we must consider how pictures are used. Pictures by themselves neither make true statements nor do they misrepresent, mislead, or deceive. Rather, pictures are used like language statements to mislead, deceive, and make true statements. The context in which pictures are used, the language which accompanies them, and the conventional uses of an image make truth telling and deception with pictures possible.

Even if a student obtains information or a true belief from a picture, such information may not be
knowledge. A picture must be an adequate basis for a true belief if knowledge is to be obtained in even a weak sense.
CHAPTER VI
CONCLUSION AND IMPLICATIONS

Three questions were raised at the beginning of this study, namely, "What can be known through pictures?", "What is required to obtain that knowledge?", and "What are the limitations or possible dangers in using pictures to obtain knowledge?". These questions were answered in part as the textbook assumptions were identified and examined in succeeding chapters. As a way to draw together the various points made in this study, the answers given to these questions will be summarized in the first part of this chapter. In the second part of the chapter, some practical implications of the study will be considered in terms of reading and reasoning from pictures.

Summary and Conclusions

What Can Be Known. In answering the question of what can be known through pictures, it was useful to begin by asking what is 'knowledge'. The textbook authors gave two general kinds of answers to this question: 'knowledge' is information and 'knowledge' is
a special sort of doing like naming or identifying. It was assumed that we can obtain information or facts from pictures and that we can learn to identify things through the use of pictures. The question at issue, however, was whether these were kinds of knowledge.

Learning information from a picture, it was found, is not the same as obtaining knowledge. Apart from obtaining misinformation from pictures, information can be learned through the use of pictures which do not support it. Students may come to believe truly, for example, that there is poverty in Japan on the basis of a picture of poverty in China. As was argued in Chapter Two, knowing that something is the case from a picture requires at least a picture that is an adequate basis for the belief. In order to know that something is true in a strong sense, moreover, we must be able to appropriately back up our beliefs. In the strong sense which Scheffler argues is appropriate for the classroom, a person's true belief must be based on a picture which supports that belief and the person must be able to evaluate the picture as being an adequate basis for his belief, if we are to say he knows. If information is obtained through a picture, therefore, knowledge is not necessarily obtained. Knowledge of facts can be
obtained through pictures but this means more than just arriving at true beliefs through pictures.

Skill or know how is also a kind of knowledge that can be obtained through the use of pictures. We can come to know how to recognize and identify things through pictures. Yet being able to respond to some picture with a name is not the same as knowing how to identify what the picture is being used to represent. A person can learn to say 'horse' when shown a picture of a horse, for example, without knowing how to identify horses or horse pictures. Minimally, one must at least be able to distinguish clear cases of horses from non-horses if we are to say the person knows how to identify a horse from a picture. Judgment is called for in the case of knowledge but not in a conditioned response to a picture.

One important skill that can only be obtained through the use of pictures is the skill of evaluating and reasoning with pictures. In focusing on the ease and efficiency by which we can obtain information from pictures, the textbook authors have not generally singled out the importance of evaluation and reasoning skills necessary for learning from pictures. Even if learning from pictures was more difficult than learning from words, we might still want to use pictures in
order to learn how to learn from pictures. On the other, hand, it should be added that even if information could be more efficiently learned through pictures than words, as was claimed in arguments for using cartoons in Chapter IV, we are not forced to conclude that pictures should be used. If our goal is to improve our skills in communicating with words, then we would not use pictures even if they were more efficient. Efficiency is not the only basis for choosing learning materials.

Pictures were also said to be useful in coming to know the meaning of words because words stand for things which pictures resemble and represent. Since the meaning of a word is not what it stands for and because pictures do not resemble in any simple sense what they represent, words cannot be known through pictures for the reasons given in the textbooks. Yet since the meaning of a word is determined by its use and some words are used to stand for things, we can come to know the descriptive meaning of many words through pictures. Yet the meaning of such important and frequently misunderstood words as 'education' and 'teaching' are not likely to be clarified let alone known through pictures.
In summary, we can come to know that as well as know how through the use of pictures. Knowing how to reason from pictures, moreover, can only be learned through the use of pictures. We can also know the descriptive meaning of some but not all words through the use of pictures. In many cases, the kinds of knowledge are not neatly separated as was seen in the case of a strong sense of 'knowing that' which requires knowing how to support one's belief. Although there are various logical and pedagogical ways of distinguishing knowledge, none of these include rote learning and not all conditioned behaviors would be counted as knowing.

Good Pictures. Having addressed the question of what can be known through pictures, the question of what is required to obtain that knowledge will now be considered. According to the textbook accounts, certain kinds of pictures are required if we are to obtain knowledge through pictures. What kinds of pictures should be used to gain knowledge? The textbook authors have provided us with a variety of answers to this question, many of which we found unacceptable. In Chapter Four, we considered suggestions that we choose pictures which "convey meaning," "are clear in what they show," "show the eye what to look for," "do not mislead," and "do not tell too much."¹ Since pictures
do not do any of the above, we found this advice of little help. For much the same reason, the advice to use better art (however that is defined) since it is "more likely to transmit what it has to anyone looking at it" was determined to be unsound. Any advice to use pictures because of what "they do" was established as being based on faulty assumptions about the power of pictures.

Another answer proposed by the textbook authors focused on the ability of students to understand the picture. Heinich et al., for example, advise us to use drawings which are "easily understood by students of all ages" and Williams states more generally, "A good picture, like a good explanation, is simple and easy to interpret." An initial problem with the understandable suggestions is the disagreement over what pictures are more understandable. While Heinich et al. claim that drawings are more understandable for all, Locatis and Atkinson claim, on the contrary, that photographs are more understandable "than less detailed pictures." A more significant problem with these kinds of suggestions is the assumption that one kind of picture is good for everyone, one which calls upon the least amount of skill and knowledge on the part of the viewer.
It is true that certain pictures require minimal knowledge for understanding, but it does not follow from this that these are the kinds of pictures we should use in teaching. We do not want to use pictures for the advanced learner which are only appropriate for the novice. In teaching the novice about the human heart, for example, a simple drawing might be appropriate. For an advanced student, however, a detailed photograph which requires more skill in discrimination would be more appropriate. We do not always want pictures which have "a strong center of interest," are "uncluttered by irrelevant or distracting material," "contain only key details," or are "strong, simple, and to the point." We may not even want a focused picture. To use a previous example, we might want a photograph of a meadow where the advanced learner needs to search the picture to find a bird or a blurred photograph or painting which would better test the ability to discriminate birds in flight. It was even noted that clear simple drawings may not provide enough detail so that appropriate knowledge can be applied (e.g., identifying a Ming dynasty vase). We can agree with Brown et al. that pictures ought to be chosen "at proper levels of difficulty and sophistication for the student to whom
Another answer to the question of what is a good picture has to do with the relation of the picture to its subject. Pictures which are "true," "authentic," "accurate," and "up-to-date" are said to be good pictures for teaching.

Truth, as we saw, was not a property of pictures and therefore provides no guidance in identifying a good picture. On the other hand, the suggestion that pictures be "up-to-date" is not, on at least one interpretation, always a relevant consideration. Unless we want to know about a recent event, we would not need an "up-to-date" picture. Historical photographs, for instance, are not less useful for teaching because they are not "up-to-date." Yet if we interpret "up-to-date" to mean "reflects the latest research findings," this would generally seem to be sound advice. Paleontologists, for example, have recently discovered that the wrong skull was mounted on the brontosaurus. Consequently, using an older picture of the brontosaurus which does not reflect this discovery would not be helpful in teaching students what this dinosaur looked like. Such an interpretation of "up-to-date" is
close to what is meant by at least one sense of 'accurate'.

Although accuracy is generally desirable in a picture, it is not always or completely so. There is often good reason to use pictures which are not completely accurate. Using simple and somewhat inaccurate drawings of birds, for example, would be better understood by young students (according to Heinich et al.) and thus better to use in first teaching the meaning of 'bird'. Anatomy and physiology drawings are favored over photographs, to use another example, because function can be more clearly understood by leaving out details and depicting the body in ways it is not normally found. Complete accuracy is sometimes unnecessary as when we want students to know what a brontosaurus looks like and use a picture in which the brontosaurus drags his tail. The appearance of the dinosaur is accurate and that is all that is needed. The fact that the dinosaur did not drag his tail is not relevant to the purpose of the lesson.

Finally, accurate pictures do not always meet our teaching needs. We may use an inaccurate picture of a brontosaurus so that students will know what people thought this animal looked like before the crucial discovery. We may even want to use such a picture so
that we can test the student's ability to detect the error in the earlier picture. Accuracy, while generally desirable, is not always appropriate in pictures used to teach and test for knowledge.

It is significant to point out that although the textbook authors have, almost without exception, identified accuracy as being a criterion of a good picture, many have suggested the uncritical use of pictures from popular magazines. Gerlach and Ely, for instance, write:

Beyond the normal magazine and textbook, commercial, and free sources of pictures, there are local and personal sources which should be exploited. Almost any popular magazine offers excellent pictures, often in color. For example, National Geographic, People, and Sports Illustrated are rich in visual materials.8

No doubt such pictures are "good" in the sense of having popular appeal, but in terms of accuracy, they are not always reliable. Even the paragon of accuracy, National Geographic, recently computer-altered a photograph of the Great Pyramids of Giza (moved one of the Pyramids) for aesthetic purposes.9 Yet in addition to the problems of accuracy, many of these pictures are highly evaluative in promoting the desirability of a product. Evaluative pictures, as was argued, ought to be a last option in teaching, particularly when the values promoted are
undesirable. We do not want students to become a captive audience for market advertising, and as Brown et al. remind us, "unfavorable attitudes can be developed simultaneously (with facts) and this is what we want to avoid."10

Objectivity is another criterion of a good picture mentioned by a few of the textbook authors. Objectivity has been addressed in two ways. First, Edgar Dale and Catherine Williams have advised against the use of an unusual picture.11 Here, as we saw, they meant stereotypic pictures which were likely to mislead (e.g., a picture of an Eskimo in an igloo is likely to lead students to believe all Eskimos live in igloos). Although we need to be careful in using such pictures, we observed that if presented correctly, they need not mislead. Carefully constructed captions, in fact, were said to be important for preventing these problems. Some stereotypic or stock figures, moreover, seem to be useful at times as cues for understanding a picture (e.g., Eiffel Tower to indicate Paris).

The other sense of objective relates to propaganda. Catherine Williams, for example, suggests that pictures specially planned for propaganda purposes should be carefully used by teachers.12 When reviewing Terry Barrett's analysis of photographs, moreover, accurate
and objectively produced pictures were identified as being generally desirable for teaching. We can make the further stricture that no pictures used for propaganda purposes which are clearly inaccurate should be used except to specifically study propaganda. Any picture can be used for propaganda purposes; those specifically produced for propaganda purposes, however, fall on a continuum from clearly inaccurate (e.g., picture of Hitler with President Ronald Reagan used to project guilt by association), to accurate (e.g., picture of President Ronald Reagan actually crying used to suggest his weakness as a President.) The latter is a problem of misuse but the former is a "mis-made" picture. Since we can correct the use but not the making, the clearly inaccurate picture with its attending values would seem to be of limited value in teaching. In any case there are better options open to us than such potentially dangerous pictures.

In summary, pictures which are made to be accurate and objective are generally the best kind of picture to use in acquiring knowledge. The pictures we use in teaching, however, need to be tied to our goals and the knowledge already possessed by the student. There is no "good picture" for all learners because of differences both in what is known and how it is known.
Advantages and Limitations. The advantages and limitations as well as dangers of using pictures have been addressed to some extent in the preceding paragraphs of this chapter. Pictures were said to be useful in gaining skills, in coming to know facts about the world, and in clarifying the meaning of some words. The meaning of many important words, however, cannot be known through pictures because their meaning is not tied to things or pictures of things. There is, moreover, a danger in using pictures to clarify word meaning. Students may become less attentive to the evaluative meaning of words as well as come to believe that the meanings of all words are tied to things. Misunderstanding of what is spoken or written may thus result from an injudicious use of pictures to clarify the meaning of words. Since the same picture can be used to evaluate as well as describe, there is also a danger that undesirable values will be learned along with the information.

Other limitations of using pictures to obtain knowledge are found in the requirements of obtaining knowledge from pictures. Some knowledge must be possessed and utilized by the viewer in order to successfully see something in a picture. More specifically, a knowledge of context, code, and caption
were found to be important in obtaining information from pictures. To put this matter in another way, a person must be able to "read" a picture in order to get anything out of it. In the section that follows, an attempt will be made to clarify what is involved in "reading" a picture.

Some Practical Implications - Reading A Picture

There is a danger in pushing the analogy between reading a book and "reading" a picture. This was pointed out when the view that pictures are statements with verbs, subjects, and objects was criticized in Chapter Five. Pictures do not form sentences like words and differences in size, shape, color, and thickness of line affect the meaning of a picture in a way they do not affect the meaning of words. Yet the analogy is helpful in providing some general guidance in how to learn from pictures. A framework for "reading" pictures will therefore be proposed on the basis of the distinctions made in this study and the writings of Edgar Dale on "reading" pictures.

The proposed framework for "reading" a picture begins with a partial adoption of Dale's account of "reading" a picture. Dale writes that "We read a picture in the same general way that we read a page of words:
we derive meaning from the medium by putting meaning into it." He goes on to say that we do this by "studying a picture on three levels - enumeration, description, and interpretation." Dale further explains what he means by this in another context as follows:

We can do three things in "reading" a picture. We can simply enumerate the objects in it. We can say, "I see a grass hut. There are four people in front of it." Or we can go beyond this and describe what the people are doing. Or we can go still further and interpret what we see.

To interpret a picture, and this is our chief interest, you must infer certain things that may not be visually present. You fill in certain things from your own experience. You infer that the climate is a wet one because of the sharp slope of the roof. You infer that the agricultural methods are advanced because you see a tractor in the picture...16

In order to clarify and comment on Dale's observations, each level of reading a picture identified above will be examined in light of what has been presented in the previous chapters of this study.

**Enumeration.** In reading a picture, we begin by simply enumerating the objects in the picture. At this level of reading, students merely identify objects in the picture. In Dale's example, for instance, a grass hut and people were identified in the picture. No attempt is made to determine how a picture is being used (e.g., to describe or evaluate) or what is true
about the picture in general. In Barrett's terms, we are only concerned with the internal context of the picture or what is given in the picture; not with intentions, the way the picture has been used, nor with what was available to the picture maker when the picture was made or taken. "Reading" is not critical at this level; it is like the straight literal reading of a line in a book.

Beginning a study of a picture by enumerating the objects in it before dealing with how the picture is being used or what is generally true about the picture is useful advice. We can, for instance, identify an apple in a picture as an apple before determining what it is being used to represent. In this way, we can both insure that errors in discrimination are minimized and identify a minimal basis for describing and evaluating a picture. Yet there are some important ways in which the analogy between pictures and words breaks down which makes it clear that the results of enumeration will differ significantly according to the conceptual framework employed.

There are important differences between reading the lines of a book and "reading" a picture which bear on what is involved in enumeration. Words are organized on a page so that we know where to look for a word.
Objects in pictures are not organized in such a way. What counts as a word is also relatively clear even if one does not know what the word means. With pictures, however, we do not always know whether a mark is an extraneous mark or an object. It is not always obvious whether a line in a picture is extraneous or the track of a snake or a piece of wire. Even when we think something is an object in a picture, we need to judge whether it is important enough to be enumerated. Objects do not emerge pre-classified and when we classify, we do it selectively and for a purpose.

As was argued in Chapter Three, a person sees with a purpose, not neutrally or without prejudice. Where a person looks and what a person recognizes depends upon what a person is looking for and what a person knows. A geologist and an historian, for example, do not see the same picture in the same way. One sees history through rocks of geological time and the other identifies the points of confrontation on an ancient battlefield. Whether we say the picture is of a field, a battlefield, or a stratum of sedimentary rock depends upon our point of view. It is not that something is first seen and then interpreted, but that there is different knowledge being utilized in the seeing.
Objects can be enumerated or classified in a picture from any point of view; from that of the geologist, the historian, the physicist, the artist, or even the man in the street. In all cases, what is counted as an object and how objects are classified will depend on the concepts used. Only when the point of view is chosen does the question of right and wrong choices of objects seem to make sense. Therefore, before enumeration begins, a "view" should be taken and some concepts of that view learned.

In summary, it does seem useful to enumerate objects in a picture before determining what they are being used to represent or what is generally true about the picture. Yet we first need to identify the point of view by which the picture will be seen as a general guide for enumerating and often a specific purpose for viewing the picture as well. Even if we only want to enumerate types of buildings from a non-technical point of view, a prior knowledge of concepts and facts is required.

Description and Interpretation. After enumeration, Dale writes that we describe and then interpret in "reading" a picture. In the example we began with, Dale writes that we enumerate "a grass hut" and "four people in front of it," describe "what the people are doing," and infer "that the climate is a wet one because of the
sharp slope of the roof." Dale distinguishes inference from description on the basis that inference deals with "certain things which may not be visually present." A major problem with this account of "reading" a picture is that the role of interpretation in enumeration and description is not sufficiently recognized. It is unclear, for example, how Dale's own example of "describe" differs from interpretation since we literally cannot see "what people are doing" in a photograph or a drawing. Except in motion pictures, objects do not move in a picture.

Despite the problems with Dale's account of "reading" from a picture, his suggestion that we do something like describe the picture after enumeration seems reasonable. That something like description is making some statement about the picture in general. After enumerating a grass hut and four people, for example, we may conclude that "This is a picture of a small village in Nigeria" on the basis of what we have enumerated and perhaps an accompanying caption. Like reading a book, we make some general conclusion about what we have first "read" in the picture and this typically involves an understanding of the intentions of the presenter.
At this "determining the statement" level of "reading" a picture, the focus is on the use of the picture. In terms of Gombrich's analysis which was reviewed in Chapter Five, we are examining captions and context to determine what kind of statement is being made with the picture. We want to know how and where it is being presented. In this way, our focus is on what was identified by Barrett in Chapter Five as the "external context" of a picture. Unlike enumeration, we want to determine what the objects in a picture are being used to represent. Yet at this stage, we are not critically "reading" a picture in the sense of evaluating the truth of the statement, though we will want to know if it is being used evaluatively.

Once the statement being made through the use of the picture is determined, the picture is "read" for evaluation. If a picture is being used to make some descriptive statement like "An igloo is a typical Eskimo dwelling", for example, then we can check the facts (Barrett's "original context") to determine the truth of the statement. If, on the other hand, the picture is being used in an ethically evaluative way to say "We ought to help the starving in Africa by giving to the X charity", then the statement needs to be evaluated on moral grounds. Aesthetically evaluative
and interpretive uses of pictures, to use Barrett's classification from Chapter Five, would likewise call for different kinds of evaluation. In "reading" a picture, it is necessary to first determine what kind of statement is being made with the picture before the method of evaluation can be established.

Three levels of "reading" a picture have been purposed on the basis of Dale's writings and distinctions made in the previous chapters of this study. On the first level, objects in a picture are enumerated to insure that errors in discrimination are minimized and a basis for further "reading" is made. Before enumerating objects in a picture, however, a "point of view" or conceptual framework has to be identified and a specific purpose for reading determined to guide enumeration. After enumeration, the statement being made with the picture is identified. At this "determining the statement" level, the focus is on how the picture is being used. Once the use of the picture is identified, the third and critical level of reading, evaluation, takes place. In terms of obtaining knowledge through pictures, this third level is important since truth and logical validity are assessed here. Because of the importance of critical reading in obtaining knowledge from pictures, it will be discussed in more detail.
Critical Reading: Reasoning With Pictures. Little has been said about reasoning with pictures in the textbooks. When reasoning has been at least alluded to, the picture, not the person, was singled out as being important. Dale and Williams, for example, write about the unusual picture which "will lead to wrong inferences" or "creates or perpetuates a misconception."\(^{19}\) If, for example, we see a picture of rice being raised in a flooded paddy (to use Dale's example), we will be led to believe that all rice is raised that way. The only advice we receive for dealing with such "problems" comes from Williams, who says:

> Children must be made aware of the danger in generalizing from a single picture when there is likelihood that it carries only part of the story.\(^{20}\)

Yet Williams does not heed her own advice when she writes that, "A picture of a special niche for display of pictures in a Chinese home indicates the high value of art there."\(^{21}\) Surely one picture of a Chinese home is not enough to generalize about all Chinese homes; and the jump from a special niche for the display of pictures to a high value of art is blindly taken. There are many other reasons why a person might have a special niche for display of pictures which have not been ruled out (e.g., Are picture displays of party leaders and symbols "required" in the home?).
What is concluded from a picture and claimed to be known frequently goes beyond what is given in the picture. When a person concludes that all Eskimos live in igloos from a picture of an Eskimo standing next to an igloo, that person has gone beyond what is given in the picture. The person has concluded that the Eskimo lives in the igloo because he is standing next to one, and further, that all Eskimos, not just this one, live in igloos. When a person, on the other hand, sees the lines of a tree in a picture and says, "That is a picture of an old tree," he has gone beyond what is given in the picture. His conclusion about the tree goes beyond what is in the picture. Even a person who sees a documentary film of a Spanish village with workplaces closed on Sunday and concludes that people do not work there on Sundays goes beyond what is given in the documentary. Pictures at best are samplings and typically only "part of the story" we want to know. Many true and false conclusions, moreover, can be drawn from a single picture. We therefore reason from pictures, whether poorly or well.

The importance of reasoning in gaining knowledge from pictures can be underscored and the role knowledge plays in seeing further clarified by examining the way two well-known pictures have been misinterpreted. We
can begin with Yousuf Karsh's famous wartime portrait of Winston Churchill with cigar clamped in mouth. To many viewers, it seemed to capture the essence of the man's defiant spirit--one can practically hear the resounding words. "We shall never surrender," echoes off the walls. That is, of course, if we know of Churchill, his times, and that he said such things. Removed from the context of time, place, and circumstances, however, the expression on Churchill's face is ambiguous. What is interesting in this case is that people knew about Churchill. They were very much affected by the war, and his words "We shall never surrender" were well publicized before the picture was taken. When people first saw the picture it was therefore not surprising that they interpreted his expression to be defiance. According to Karsh's account of the sitting, however, the expression was induced by removing Churchill's freshly lighted cigar from his mouth. Irritation, rather than defiance, is showing on the great man's face. A false conclusion was drawn by many about the expression pictured.

A more dramatic example of reasoning from a picture is taken from the use of pictures during the Vietnam War. A highly publicized picture showing the execution of a Viet Cong prisoner in 1969 became a symbol of an
ally's brutality. In this picture, taken by Eddie Adams, a Viet Cong prisoner is standing contorted, his hands tied behind his back, with South Vietnam's General Loan's revolver raised to his cocked head. The act suggested by the picture is brutality, but that was not the conclusion to be drawn. The picture was used to convince people that America's ally was brutal--more so than the enemy--and this is what many people believed from the picture. By ignoring other possible interpretations of the picture, people drew the conclusion some journalists wanted them to. What the picture did not show, however, was that the prisoner had slaughtered a police major who was a friend of Loan's, as well as the officer's wife and their six children. What would have been concluded if the viewers had seen the picture of the consequences of this latter act or knew of that information? The picture was not false; the reasoning was faulty and the conclusion probably false.

People reasoned poorly in the examples just considered, partly because other people used pictures to mislead them. Only some of the available information--indeed, only one of many available pictures--was used in order to influence the interpretation of the pictures presented. The verbal equivalent of what took place is called the fallacy of accent because it is an error of
reasoning which depends upon the accenting or emphasizing of certain parts of statements or arguments so that their meaning changes. Thus, we might say a critic said "liked all of the play" to persuade others that the play is good, when the critic in fact said, "liked all of the play except the acting." Unless the person being persuaded asks, "Is that all that the critic said?" he is likely to be misled. The same is true with pictures. Unless the person being persuaded asks, "Is that all that was seen or known?" he or she is likely to be misled.

Accent is but one kind of fallacy used in arguing with pictures. A political cartoon which appeared in the Chicago Tribune, for example, has President Richard Nixon as a boiling teakettle and Ted Kennedy as a boiling stew pot with the words, "Kennedy Watergate Probe," across the pot. Given the public knowledge at the time, it is clear that the cartoonist was suggesting that Kennedy's involvement in the Chappaquiddick incident was the same as Nixon's involvement in Watergate. As with false analogies of a strictly verbal kind, this false visual analogy suggests that the events compared do not differ in significant ways—both men are guilty of comparable crimes and both were involved in a "cover-up." Unless the viewer asks herself whether the two
events differ in significant ways, she will probably be misled.

Even the pictorial chart, or pictograph, can be used to mislead in spite of the many advantages of their utility enumerated in the textbooks. In his book, *How to Lie With Statistics*, Darrell Huff explains how pictorial charts can be and have been used to mislead. He tells us, for example, that a picture of a cow whose height is three times that of an accompanying cow could be used in a chart to show that the number of cows in the country has increased threefold. The effect, however, will be much more impressive than the threefold increase, since the difference in size of the cows would be much greater than the difference in height. Pictographs can be used to lead people into believing that changes are much more significant than they actually are.

It is clear from even this brief examination of reasoning with pictures that cameras do not lie and pictures are neither true nor false. A person who is misled by pictures has himself to blame for making the step from picture to interpretation too hastily. What is pictured or filmed may actually have happened, but may not be all that has happened or what typically happened. The videotaped commercial in which brand x
is chosen, for example, may be the fiftieth scene taped before some consumer thought brand x was better.  

"Documentary films usually deal with 'reality'--with things as they are," as Brown et al. say. But what "reality" has been edited by the documentary and to what extent have people been prompted and scenes arranged? As with other kinds of pictures, moving pictures can be used to deceive as well as inform, and therefore require careful evaluation.

**Final Remarks**

We began this investigation with some claims by Brown, Lewis, and Harcleroad about the "current rapid expansion of knowledge." Although there may be some debate about the explosion of knowledge, there unquestionably are more pages and pictures today than ever before. Given this explosion of pictures and words characteristic of our age, the ability to make reasonable judgments and to avoid errors due to fallacious reasoning has never been more important. We cannot tell students what is true or false about the many pictures which continue to surround them, but we can teach them so they can appraise the adequacy of a picture for a position offered. We can teach students to critically evaluate pictures so that they can know facts about
the world in a strong sense and avoid being misled. This is not the only kind of knowledge about pictures we can teach, but it is an important one.
NOTES

CHAPTER I: INTRODUCTION


3 Craig Locatis and Francis Atkinson, Media and Technology for Education and Training (Columbus, OH: Charles E. Merrill, 1984), p. 154.

4 Dean Hauerstein and Steven Bachmeyer, The World of Communications: Visual Media, 2nd ed. (New York: McKnight, 1974), pp. 262 and 15, respectively.


7 Gerlach and Ely, p. 267.

8 Williams, p. 9.


10 Williams, p. 8.

11 Heinich et al., p. 64.


13 Gerlach and Ely, p. 41.
It is important to note that I have not restricted myself to these two analyses. I have used analyses by

other philosophers of education as well as philosophers such as Nelson Goodman. Outside of Philosophy, I have drawn heavily on the works of Ernest Gombrich.


33 In her book Guardians of Tradition (Lincoln, NE: University of Nebraska Press, 1964), Ruth Elson, after studying more than one-thousand textbooks used in the first eighty years of schooling in the United States, concludes that:

In the histories and geographies the cruelty of Indian warfare is abundantly illustrated; indeed, the entire colonial period is treated largely as a detailed chronicle of the evil deeds of Indians. It is not so much the proliferation of statements that the Indians were cruel which would appeal to the imagination of the child reading these books, as the profuse illustrations of their cruelty in highly dramatic tales of Indian warfare (pp. 73-74).


38 See, for instance, Michael Ruse, "Are There Gay Genes? Sociobiology and Homosexuality," Journal of Homosexuality, 6 (Summer, 1981), pp. 5-34.

39 Michael Scriven, Reasoning, p. 86.
Michael Scriven lists the following to consider in determining how to correctly formulate the unstated assumption: the assumption has to be strong enough to make the argument sound, it should be no stronger than it has to be, and we should try to relate the assumption to what the arguer would be likely to know or would believe to be true (p. 85).


Israel Scheffler, Conditions of Knowledge, and Jonas Soltis, "The Language of Visual Perception".

Green, The Activities of Teaching, p. 16.

For the purposes of this discussion, "definitions" means "reportive definitions" which are supposed to be reports of the conditions that regulate the use of a word.

Ennis, Logic in Teaching, pp. 154-161.


Edmund Gettier, "Is Justified True Belief Knowledge?," Analysis, 23 (June, 1963), pp. 121-123.
CHAPTER II: KNOWLEDGE


2Ibid, p. 61.

3Ibid.


5Ibid.

6Brown et al., p. 83. For the moment, we shall ignore Brown et al.'s further stricture that information will be "up-to-date" in order to be qualified as knowledge. There are two reasons for this. First, Brown et al. are inconsistent on this point themselves. This is borne out when they write about "old knowledge" which is "outdated" (p. 88). Second, it seems peculiar to speak of what is true as being outdated. The fact that the earth is round is an old piece of true information but hardly outdated. See, also, Scheffler on absolute truth in this chapter.

7Hauerstein and Bachmeyer, p. 25.

8Several recent textbooks have adopted Bloom's definition of knowing as remembering or recalling information. In their most recent Sixth edition (1983), for example, Brown et al. write that, "a careful study of the categories classified by Bloom and others is helpful in any consideration of instructional objectives" and then go on to distinguish between knowledge, attitudes, and skills in the Bloom fashion (pp. 5-6). Both Mary Robinson Sive in Media Selection Handbook (Littleton, CO: Libraries Unlimited, Inc., 1983) and Ronald H. Anderson in Selecting and Developing Media for Instruction, Second Edition (New York: Van Nostrand Reinhold Co., 1983, p.
13) refer to Benjamin Bloom's taxonomy when discussing educational objectives which need to be identified when choosing pictures.

Even when Bloom is not cited, the "mere recall of information" is considered to be knowing. Marda Woodbury in Selecting Materials for Instruction: Issues and Policies (Littleton, CO: Libraries Unlimited, 1979), for instance, writes that "Textbooks are written for knowledge, not thinking," because "Textbooks test for memory rather than understanding" (p. 241).


11 Ibid, my emphasis.

12 Heinich et al., p. 42; and Kemp and Dayton, p. 15.


16 Ibid, p. 41.

17 Ibid, pp. 41-42.

18 Ibid, p. 42.

19 Although Gerlach and Ely claim that identifying, naming, describing, ordering, and constructing is not a complete listing of intellectual skills, they treat the five "tasks" as an exhaustive listing of intellectual skills. They say, for instance, that "There are many other words which you can and should use once you have mastered those identified here (identify, name, describe, order, and construct)" (p. 98). Yet they treat the "other words" as synonyms (e.g., identify means the same
as select, discriminate, mark, match, point out, classify, and recognize) (p. 100). The synonyms, moreover, are treated as being merely different names for the same activity, which can be substituted "whenever it would be awkward to use one of the words in the classification scheme previously described" (p. 100).

20 Gerlach and Ely, p. 125.

21 Ibid, p. 130.

22 Israel Scheffler, Conditions of Knowledge: An Introduction to Epistemology and Education (Glenview, IL: Scott, Foresman and Company, 1965).

23 Ibid, p. 65.

24 During the past decade, this traditional analysis of knowing has been the subject of intensive scrutiny. Much of this controversy can be traced back to the publication of a brief paper by Edmund Gettier entitled, "Is Justified True Belief Knowledge?" (Analysis, 23 (June, 1963), pp. 121-123). In this paper, Gettier proposed two original counterexamples to the sufficiency of the conditions in the traditional analysis of knowledge as justified true belief.

One of Gettier's examples concerns a man, Smith, who has adequate evidence for the conjunction,

(1) Jones is the man who will get the job, and Jones has ten coins in his pocket.

Smith is justified in believing (1) since the president of the company, a thoroughly reliable person, has told him that Jones will get the job, and Smith has just counted the number of coins in Jones' pocket. Now, Gettier notes, (1) entails:

(2) The man who will get the job has ten coins in his pocket.

Moreover, Smith sees that (1) entails (2), reasons from (1) to (2), and accepts (2) as a result of this reasoning. Thus, Gettier claims, Smith is justified in believing (2). It happens, however, that Smith himself will get the job and, coincidentally, but unknown to Smith, he has ten coins in his pocket. Thus, (2) is true and Smith justifiably believes (2). However, Smith does not know (2), so Gettier argues, the traditional justified true belief analysis of knowledge is inadequate.

Many philosophers have agreed that the Gettier examples defeat the traditional analysis. Other philosophers, however, have maintained on various grounds that
the Gettier examples fail. Scheffler himself believes that the Gettier examples, or at least a similar counterexample offered by Bertrand Russell, do at least call for some clarification of the traditional analysis. After making reference to the Gettier and Russell arguments concerning the sufficiency of the conditions, he writes,

Russell's example (though he does not himself develop it this way) is as follows: A man "looks at a clock which is not going, though he thinks it is, and ... happens to look at it the moment when it is right." He acquires a true belief as to the time which is, moreover, justified if we assume he has good grounds to suppose the clock is going. Yet it seems wrong to hold that he knows that it is (say) three o'clock. Shall we, perhaps, tighten the requirements so as to demand that his intermediate assumption of the clock's proper functioning be true; or shall we allow that the man does know it is three o'clock, but simply deny the normal presumption that he likewise knows the clock to be functioning properly? Or is some other approach preferable? (p. 112).

It is clear from the above that Scheffler believes that we need to "tighten the requirements" of the traditional analysis. We could, for example, make our criteria of evidence more rigid in order to make sure that they are not satisfied by the Gettier and Russell counterexamples. Alternatively, we could qualify our definition of knowledge in order to make sure that it is not satisfied by the counterexamples. Scheffler, however, is not overly concerned with this problem so far as it bears on the problems of education. He writes:

Attributions of propositional knowledge do, in any case, seem (at least in the strong sense of knowing that) to involve as necessary conditions relevant assertions of belief, of truth, and of the possession of appropriate credentials for belief (p. 91).

All three conditions of knowledge—truth, belief, and the right to be sure—are necessary even if they are not sufficient for knowing that in the strong sense.

We can add that as long as we exclude appeals to the teacher as an authority, as Scheffler argues, a case of justified true belief will rarely fail to be knowledge in the strong sense. There are not very many cases of justified true belief which are not knowledge and even
fewer if we exclude appeals to authority (the probability of coincidences leading to counterexamples is extremely low, especially if appeals to authority are excluded). Teaching so that the student is justified in believing what is true, moreover, will fulfill our goal of "interiorizing within the student the subject--its methodology as well as its content." Pedagogically, we have fulfilled our responsibilities if because of our efforts, students have justified true belief, even if it turns out to be a weak sense of knowing.

25Scheffler distinguishes the "discovery use" of learning from the "tutorial use." 'Learned that' in the sense of "found out that" or "discovered that" is learning in which we would say a person has come to know and this is called the "discovery use." The "tutorial use," on the other hand, refers to what people come to believe but not necessarily to know because of schooling (p. 8).

26Ibid, p. 23.
27Ibid, p. 47.
29Ibid, p. 49.
33Ibid, p. 68.
34Ibid, p. 67.
35Ibid.
37Hauenstein and Bachmeyer, pp. 15 and 262.
38Gerlach and Ely, p. 267.
39The concept of 'visual information' is not carefully dealt with by the textbook authors. On the one hand, pictures are said to provide information in the sense of
"facts" which can be known from seeing the picture (see Gerlach and Ely, p. 299). At other times 'information' is used in the sense of "amount of detail" (see Francis Dwyer, Strategies for Improving Visual Learning (State College, PA: Learning Services, 1978), pp. 6 and 33). Hence some pictures are said to be saturated with information and drawings are said to provide less information than more detailed photographs of the same objects. Yet surely additional detail need not result in additional information in the sense of facts. The detail may be extraneous or unrelated to what the picture is of or about. A simple line drawing may be more informative than a detailed photograph of the same subject and color may be unimportant in knowing what a picture is of. Whether one picture provides more visual information than another from which facts can be known cannot be determined on the basis of detail alone. There are redundant details, accidental or extraneous marks, and uninformative pictures which need to be taken into account. We must appeal to relevant, important, or informative details.

40 Scheffler, Conditions of Knowledge, p. 80.
42 Scheffler correctly points out that in some cases of 'knowing that' there is "no logical room" for the evidence condition (p. 6). If somebody believes that she has a headache or feels sad, and it is true that she feels sad or has a headache, we say she knows in a strong sense without requiring evidence. When talking about their own feelings or pains, people are in "a position to know" or "have the right to be sure."
44 Ibid.
46 Ibid, p. 70.
48 Jonas F. Soltis, An Introduction to the Analysis of Educational Concepts, 2nd ed. (Reading, MA: Addison-Wesley, 1978), p. 51. Soltis argues that since 'knowing that' in Scheffler's strong sense requires such complex
skills as gathering evidence, supporting our assertions, and producing an argument, it requires 'know-how'.


50 Ibid, p. 92.

51 Ibid.


Gradgrind, the schoolmaster, drills Sissy Jupe, a young student, whom he addresses as "girl number twenty." Sissy, on the demand of Gradgrind, reveals that her father breaks horses for a living, whereupon Gradgrind asks for a definition of a horse. Sissy is unable to present a definition. Mr. Gradgrind then addresses the class as follows:

"Girl number twenty possessed of no facts in reference to one of the commonest of animals! Some boy's definition of a horse. Bitzer, yours."

"Quadruped. Gra\-ini\-vorous, forty teeth, namely, twenty-four grinders, four eye-teeth, and twelve incisive. Sheds coat in the spring; in marshy countries, sheds hoofs, too. Age known by marks in mouth." Thus (and much more) Bitzer.

"Now girl number twenty," said Mr. Gradgrind, "you know what a horse is."


57 Ibid, p. 65. Scheffler also discusses this kind of knowledge as "knowing norm statements". See Conditions of Knowledge, p. 91-92.

Broudy's distinction between 'knowing why' and 'knowing that' appears to be the same as Scheffler's distinction between knowing that in a strong sense and knowing that in a weak sense. In contrast to Scheffler, Broudy argues that the weak sense of knowing is appropriate in the context of the classroom. In Democracy and Excellence in American Secondary Education (Chicago: Rand McNally, 1964), Broudy (along with Smith and Burnett) argues that the ordinary citizen, the non-specialist, must understand science but not to the degree of being able to use knowledge to make advances in the field. He must know, for example, that $E=mc^2$ in a weak sense but not in a strong sense of being able to provide a good case for his belief. The uses of knowledge will be discussed in more detail in Chapter VI.

Broudy, "Mastery," pp. 82-83.

Ibid, p. 79.
CHAPTER III: WORDS, PICTURES, AND MEANING


3Ibid.


5Dale, p. 441.


7Dale, p. 440.


10Ibid.

11Craig Locatis and Francis Atkinson, Media and Technology For Education and Training (Columbus, OH: Charles E. Merrill, 1984), p. 79.

12Dale, p. 442.

13Locatis and Atkinson, p. 154.

14Heinich et al., p. 92.
15 Dale, pp. 89-92.
16 Ibid, p. 127.
17 Brown et al., p. 220.
18 Wittich and Schuller, p. 15 (my emphasis).
19 Robert Bullough, Creating Instructional Media (Columbus, OH: Charles E. Merrill, 1974), p. 20.
20 Heinich et al., p. 65. The publishers claim in the opening pages that over 250 colleges and universities adopted the book soon after introducing the 1982 first edition.
22 Bullough, Creating Instructional Media, p. 20.
23 Brown et al., p. 221, also talk of a picture as being an iconic sign or "one that resembles that for which it stands."
26 Heinich et al., p. 88.
27 Michael Simonson and Roger Volker, Media Planning and Production (Columbus, OH: Charles E. Merrill, 1984), p. 35.
A.J. Cross and Irene Cypher make a similar claim in their book *Audio-Visual Education* (New York: Thomas Y. Crowell, 1961). They write that an advantage of using pictures is that pictures are "Nearer to reality than written descriptions or other symbolic representations" and thus easier to learn (p. 349).
Ibid, p. 14. See also Robert Bullough, Creating Instructional Media, who illustrates as well as describes words as "triggers" for pictures in the mind which represent things, p. 4.


It should be noted that these theories or views of meaning are quickly dismissed by people who have seriously studied the meaning of 'meaning'. See C.K. Ogden and I.A. Richards, The Meaning of Meaning (1923; rpt. New York: Harcourt, Brace and Co., 1947). This classic work has had a marked effect on thoughts about meaning, especially with their distinction between "descriptive" and "emotive" language.

Fleming and Levi, p. 46.

Heinich et al., p. 65.


Gombrich, Art and Illusion, pp. 68-69.

Resemblance has been found to be neither sufficient nor particularly helpful in understanding pictorial representation. Not sufficient because, as Goodman notes, any two pictures of the same person may resemble each other more than they do the person they represent. Not very helpful because all objects resemble each other in some respects and not in others. Knowledge about the
intentions of the producer, styles of representation, and the look of the picture as it appears to a competent viewer all seem relevant at times in judging that a picture represents some object which it resembles. For more on this issue see: Nelson Goodman, Languages of Art, Chapter 1; Max Black, "How Do Pictures Represent?" in Art, Perception, and Reality, ed. M. Mandelbaum (Baltimore: Johns Hopkins University Press, 1972); Robert Schwartz, "Representation and Resemblance," Philosophical Forum, 4 (Summer, 1974), 499-512; as well as Chapter V of this paper, "Facts About the World."

It is also instructive to note that a picture may lead us to perceive the world differently by informing our habits of looking. What may at first be taken to have little resemblance may become the model of resemblance. Robert Schwarz, for example, points out that Picasso's picture of Gertrude Stein was first criticized as not looking anything like Stein. Later, however, Picasso's Stein was acclaimed by all as an admirable likeness and is now taken as a correct representation. Robert Schwartz, "The Power of Pictures," The Journal of Philosophy, 82 (December 1985), 711-720.

See, for example, John Wilson, Language and the Pursuit of Truth (1956; rpt. London: Cambridge University Press, 1974), pp. 18-22. As a further illustration of this, to call someone 'poor' in the modern way of thinking is to speak pejoratively of his condition, while the substitution of 'disadvantaged' or 'underprivileged' indicates that poverty was not the person's fault. If people were to disagree about whether someone was poor or not, the disagreement might center around the evaluative uses of this word.

By knowing a term, in this sense, we mean something much less than knowing everything that it applies to. I understand the term 'whale' in that I know of some things that they are whales, and of others that they are not whales, even though I do not know of still other things whether they are whales or not. There may be borderline cases which do not clearly fall into one category or the other (i.e., whales and non-whales).

Relating this to pictures, we can say that unless a person can identify pictures of things to which a given word definitely applies and pictures of things to which the word definitely does not apply, we would say that the
person does not know the meaning of the word in this ostensive sense.

65 Broudy, "Mastery," p. 79.


67 Locatis and Atkinson, p. 154; and Heinich et al., p. 92.

68 John Harrell, p. 16; James Kinder, p. 30; and Edgar Dale, p. 447.
CHAPTER IV: SEEING, PICTURES, AND KNOWLEDGE


3Michael Simonson and Roger Volker, Media Planning and Production (Columbus, OH: Charles E. Merrill, 1984), p. 35. See also Catherine Williams, Learning From Pictures, 2nd ed., p. 18.


6The qualities of a picture, the orientation of the observer to the picture, or such environmental factors as lighting, which can prohibit us from discriminating objects or recognizing them are not what is at issue here. For the purposes of our present discussion, we can assume that the above factors which can affect whether we see are negligible.

7Dale, p. 70.

8Dale, p. 71.


10Catherine Williams, Learning from Pictures, 2nd ed. (Washington, DC: NEA-Department of Audiovisual Instruction, 1968), pp. 26 and 64 respectively.

12 Ibid, pp. 36 and 16, respectively.


14 Heinich et al., p. 92.

15 Craig Locatis and Francis Atkinson, Media and Technology For Education and Training (Columbus, OH: Charles E. Merrill, 1984), p. 154.

16 Dale, p. 469.

17 Kemp and Dayton, p. 94.

18 Wittich and Schuller, p. 3.

19 The passive sense of seeing is expressed by a number of metaphors. In addition to the impression metaphor there is the osmosis metaphor first mentioned in the chapter. This latter metaphor is found in the following remarks by Kemp and Dayton: "Most media presentations require a short time to transmit their messages. But during this brief period, a large amount of information can be communicated to and absorbed by the learner" (p. 4, my emphasis).

20 Gerlach and Ely, p. 277.

21 Brown et al., p. 15.

22 Heinich et al., p. 92.

23 Dale, p. 396.

24 Kemp and Dayton, pp. 3 and 12, respectively.


29 Brown et al., p. 233.

30 Ibid, p. 263.

31 Dale, p. 396.


33 Wittich and Schuller, p. 11.

34 Dale, p. 430. See also pp. 436-7 where Dale writes that we first see a picture and what is in it and then interpret or "read" into the picture. By this account we all have a common experience which we can then interpret.


In this article, Soltis limits his analysis to "the three literal uses of 'seeing!'" (p. 85). The reason for this limitation is clarified in his book Seeing, Knowing, and Believing (Reading, MA: Addison-Wesley, 1966) where he acknowledges that the concept of seeing is exceedingly complex and his definitions should be viewed more as "a system of classification which provides the necessary descriptive power to separate various types of seeing situations from one another, and also allows for the clear solution of the puzzles presented ..." (p. 60).

Indeed, the many uses of the word 'see' are difficult to sort out. Such phrases as "I will see what I can do for you (inquiry)," "I will see you home (escort)," "He saw it necessary to leave (judge)," and "I will see you five dollars (meet your bet)" indicate the enormous range of the term's use.

36 Ibid, p. 84.
Experiment has shown that scanning, the moving of the eye relative to what it sees, is necessary for normal vision. See, for example, R.M. Pritchard, W. Heron, and D.O. Hebb in "Visual Perception Approached by the Method of Stabilized Images," *Canadian Journal of Psychology*, 14 (1960), pp. 67-77.

'Focus' is being used here to refer to both the field and depth of view. In the "field of view" sense, 'focus' refers to the movement of the eyes across a plane and the detecting of certain details within the plane by such movements. This sense of focus is Soltis' concern when he addresses the limits of seeing in the peripheral field of view. The "depth of view" sense refers to the ability of the person to detect certain details either close to or far away from the eye. In this depth of field sense, if I focus on a flower close to my eyes, I will be unable to focus at the same time on objects further away even though the distant objects fall within the foveal region of my field of view. Likewise, a flower two feet from my eyes will become a blurred image if I choose to focus on some flowers fifty feet away. Optical instruments, whether telescope or microscope, will increase the effects.


That we do not see all that we look at is a conceptual point; it has to do with how we use the words 'see' and 'look'. This distinction has been clearly stated by Hanson, who wrote that, "There are indefinitely many ways in which a constellation of lines, shapes, patches may be seen. Why a visual pattern is seen differently is a question for psychology, but that it may be seen differently is important in any examination of the concepts of seeing and observation" (Norwood R. Hanson, "Observation," rpt. in *Theories and Observation in Science*, Ed. Richard E. Grady (New Jersey: Prentice-Hall, 1973), pp. 144-145).

Psychologists, however, can and do help increase our understanding of conceptual distinctions. Ulrich Neisser, for instance, has provided evidence, through a number of recent experiments employing videotapes, that people do not see what is clearly in front of their eyes
while engaged in certain visual tasks. When, in one experiment, persons were instructed to attend to a basketball game on videotape, they failed to see an equally visible handball game which was superimposed on the basketball game. These experiments were designed to demonstrate that selective attention was not due to some unconscious filter which blocked certain perceptions, but to what Neisser calls a "constructive process." The meaning of this process is made clear by Neisser when he concludes on the basis of his experiments and others that "The perceiver ignores information simply by not doing anything with it. Such information is just not perceived, in the same sense that objects currently lying on my desk are not being grasped and my pipe is currently not being smoked" (Ulrich Neisser, "The Control of Information Pick-up in Selective Looking," in Perception and Its Development: A Tribute to Eleanor J. Gibson, Ed. Anne D. Pick (New York: John Wiley and Sons, 1979), p. 203).

42 Although its use has enlarged considerably, it is interesting to note that the word 'camouflage' was coined by the French to apply to the art of concealment and deception which developed during the First World War. The fact that people can fail to see what they are looking at was utilized with considerable success during the war. Cf. M. Luckiesh, Visual Illusions (1922; rpt. New York: Dover, 1965), pp. 210-247.


44 I am not suggesting that we must do more than one task if we are to recognize something; that we first look, see (simple), and then recognize. To borrow from Ryle, just as winning is not doing some task in addition to running a race, so recognizing an object is not doing a task in addition to seeing (simple) the object (Gilbert Ryle, The Concept of Mind (1949; rpt. New York: Barnes and Noble, 1976), pp. 150-153).

45 There are, of course, different levels of success. A person can see a Ming dynasty vase and rightly take it to be a vase even if completely ignorant of Ming dynasty vases. What the person is successful in seeing, however, is a vase, not a Ming vase.
There is an important conceptual distinction between having sensations, a physical state, and a visual experience. As Hanson noted: "Seeing is an experience. A retinal reaction is only a physical state--a photochemical excitation. Physiologists have not always appreciated the differences between experiences and physical states. People, not their eyes, see. Cameras, and eyeballs, are blind. Attempts to locate within the organs of sight (or within the neurological reticulum behind the eyes) some nameable called "seeing" may be dismissed. That Kepler and Tyco do, or do not, see the same thing cannot be supported by optic nerves or visual cortices ..." (Norwood R. Hanson, Patterns of Discovery (London: Cambridge University Press, 1958), p. 7).

I am here distinguishing between the usefulness of certain kinds of pictures in relation to what a person knows and knows how to do as well as the task at hand. Unlike Dale, I do not believe for the reasons given that you can evaluate a picture's goodness for teaching, apart from the task and a person's knowledge. Dale, for example, says, "A picture can have so many details that the central idea is obscured, or it can have so little detail that it is not worth using" (p. 469). His concern with "the central idea" blinds him to the distinctions of task and knowledge.

Williams, pp. 23-24; Dale, pp. 17-19 and 430-434; and Heinich et al., pp. 67-79.

Nelson Goodman, pp. 6-7.

Susan Sontag expresses a similar view about photography: "The photographer was thought to be an acute but noninterfering observer: a scribe, not a poet. But as people quickly discovered that nobody takes the same picture of the same thing, the supposition that cameras furnish an impersonal objective image yielded to the fact that photographs are evidence not only of what's there but of what an individual sees, not just a record but an evaluation of the world" (On Photography New York: Farrar, Straus, and Giroux, 1978, p. 88).

Compare these claims with the statement of Edgar Dale that "unfortunately, as adults we tend to lose the child's habit of unprejudiced perception" (p. 74). Dale is here claiming that children, at least, are not selective in what they see.


53 Brown et al., p. 172. By their Sixth edition Brown et al. have changed their statement by qualifying it as follows: "If the observers are familiar with ideas behind the message, they will comprehend the cartoon more quickly than they would an editorial or long article discussing the same subject" (p. 117). See also Williams, p. 12, where she says that few communication devices are as effective as political cartoons.

54 Brown et al., p. 172. A dependence on stereotypes or "stock symbols" is not limited to cartoons. Movies depend upon them, as is evident in the use of the Eiffel Tower to represent Paris. The problem with stereotypes of this sort is their potential to misinform. For instance, in the movie Giulietta of the Spirits, a whole bevy of young nuns is played by boys Fellini selected from the beach at Fregens. When asked why, Fellini is said to have responded, "Because they walk more like nuns than nuns do."

For more about the use of "stock symbols" and figures of speech in cartoons, see E.H. Gombrich, "The Cartoonist's Armoury," in Meditations on a Hobby Horse (London: Phaidon Publishers, 1963), pp. 127-142.

55 Heinich et al., p. 96.

56 The New Yorker, 6 February 1984, p. 118.


58 It is one thing to understand the "message" of the cartoon and another to know whether the cartoon is misleading or not. What one knows from the cartoon goes beyond what knowledge one must have to understand the cartoon. This distinction will be taken up in the next chapter.
These distinctions were brought to my attention by my brother, Bill Petrick, who has produced a number of professional videotapes for people around the country.

For a somewhat different and more in-depth treatment of these types of knowledge utilized in seeing, see Jonas Soltis, Seeing, Knowing, and Believing.

It is true that we may know what we see before us is a heart even if we do not possess knowledge of what it looks like. We can identify it if we know where it is among other parts of the body we can recognize, i.e., lungs, liver, and so on. Recognition, however, is our concern at present, not identification.

There seems to be no contradiction in saying, "I know what it looks like but cannot describe it." Police 'lineups' and 'mug shots' seem to be based on the distinction between knowing the looks and knowing something more about a person. We also meaningfully say, "I'll know it when I see it."

In a textbook intended as a supplementary text for audiovisual instruction courses, R.M. Travers asserts that evidence "suggests that the human permanent memory system is mainly a verbal memory system. Incoming information, if it is to be effectively stored, is recorded as verbal information before it is placed in the storage system." Man's Information System (Scranton, PA: Chandler, 1970), p. 148.

Taken literally, this implies that visual knowledge, too, must be verbal, since it involves permanent memory. Memory for the looks of things simply becomes a descriptive memory.

See "Words, Pictures, and Meaning" (Chapter III) where the primacy of "looks" is sometimes assumed.
70 Scheffler, *Conditions of Knowledge*, p. 96.

71 Soltis, *Seeing, Knowing, and Believing*, p. 96.

72 The distinction made here is somewhat different than that made by Soltis and Austin before him. Instead of defining "fitting the bill" as "finding a thing to fit the label" as I have, Soltis means, "finding an object to fit the look of the thing one has in mind (non-verbal match)." Jonas Soltis, *Seeing, Knowing, and Believing*, pp. 97-99.

73 Knowing the label for something, as we pointed out in Chapter II, is not mere recall as Gerlach and Ely assume (p. 7).

74 See "Knowing That--A Strong Sense" in Chapter II.

75 Soltis, *Seeing, Knowing, and Believing*, p. 91.


CHAPTER V: FACTS ABOUT THE WORLD

1Brown et al., pp. 15-16.
2Ibid, p. 466.
5Brown et al., p. 263; Gerlach and Ely, p. 344.
6Brown et al., p. 222.
7Gerlach and Ely, p. 277.
9Gerlach and Ely, p. 277.
10Williams, p. 7.
11Williams, p. 91. In Selected Materials for Instruction (Littleton, CO: Libraries Unlimited, 1979). Marda Woodbury writes of Williams' book that "it is still the basic authority on picture selection and utilizations" (p. 70).
14Brown et al., p. 213.
15Locatis and Atkinson, p. 133.
16Gerlach and Ely, p. 15.

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17. Haenlein and Bachmeyer, p. 262.


21. Ibid.

22. Heinich et al., p. 64.


25. Heinich et al., p. 90.


28. Williams, p. 21; see also Dale, p. 440; Kemp and Dayton, p. 94; and Heinich et al., p. 90.

29. Williams, p. 19.


31. Ibid.

32. Ibid.

33. Williams, p. 19.

34. Ibid.

35. Ibid.


37. Ibid, p. 35.


40. Simonson and Volker, p. 44.
Brown et al., p. 466.

Locatis and Atkinson, p. 154. By 'statement' I mean no more than that statements are true or false and sentences express statements. Different sentences can express the same statement as, "This is a man," "C'est l'homme," and "Hic vir est." We could use sign language or Morse code to express the same statement. The same sentence may be used in making different statements as when I say, "It is mine" and you say "It is mine."

Simonson and Volker, p. 44.

According to James Kinder in his book Using Instructional Media (New York: D. Van Nostrand, 1973), "Proponents of visual literacy speak of the syntax of pictures, of vocabulary and of the relationships between visual and verbal communication. Emotions, for example, can be communicated by words and phrases, but a picture or pictures can communicate the same emotions equally well. When words join together in sentences, they become subject, predicate, object, and possibly modifiers. Pictures, too, can show subject, action, object, and modifiers" (p. 73).

I.A. Richards argues that pictures are as open to misinterpretation as any verbal description and are not equivalent to statements. He writes, for example, that "/." is but one possible visual representation for the statement, "A point is beneath a line." Furthermore, if we do not think of the visual representation "/." as being two objects on the same plane but as objects in space, they become very much open to misinterpretation. I.A. Richards, "Powers and Limits of Signs," in David Olson, ed., Media and Symbols: The Forms of Expression, Communication, and Education (The Seventy-third Yearbook of the National Society for the Study of Education) (Chicago: University of Chicago Press, 1974), pp. 99-124.


Whether someone has misrepresented something in a picture because of misinformation or weak skills or is not representing anything cannot be determined by the picture alone. A picture of a distorted face may be a
misrepresentation of a person's face, a representation of how a face will soon appear, or an image of "how one feels."

47 Dale, p. 465.

48 Williams, p. 19.


50 In Meaning and Truth in the Arts (Chapel Hill: University of North Carolina Press, 1946), John Hospers identifies a number of concepts which are confused with "truth." These include sincerity, acceptability or persuasiveness, value for mankind, consistency, and greatness or deep significance (pp. 141-161).


After examining a number of albums of Civil War photographs, Trachtenberg concludes that the photographer-authors emphasized certain aspects of their photographs to advance their views of war. Some collections included few pictures of casualties or of the common soldier, while all depicted blacks, if at all, as laborers. Trachtenberg also demonstrates how photographs are "vulnerable to exactly the same obscurities of other forms of evidence" and that Oliver Wendell Holmes was wrong when he said "Let him who wishes to know what war is look at this series of illustrations."

53 Contrary to those who argue for fidelity and clarity in a picture for teaching, these qualities sometimes retard if not prohibit learning. Heinich et al. suggest the use of drawings rather than the more detailed and therefore more faithful photograph, for example, because the research they cite suggests that the young students learn better with less "confusing" detail (p. 92; see also Kemp and Dayton, p. 19). Gombrich has noted that, "the demand for an easily legible x-ray image may conflict with its informative function" and that "anatomical drawings which suppress certain features can record selective information a color photograph cannot" (The Image and the Eye, pp. 147-148).
54 Gombrich, Art and Illusion, pp. 67-68.

55 Williams, p. 92.


57 Ibid.


59 Gombrich, Art and Illusion, p. 115.

60 Ibid, p. 120.


69 Ibid, p. 256.


71 Barrett, p. 48.

72 Ibid, p. 52. Wilson Hicks, Life's first picture editor, writes that the editor and writer plan the picture, the photographer then tries to obtain one of these "prior images," and another person often writes the caption. Wilson Hicks, Word and Pictures: An Introduction


74. Ibid, p. 122.


76. Ibid, p. 75.

77. Ibid, p. 147.

78. Ibid, p. 49.


83. Ibid, p. 128.

84. Ibid, p. 121.


86. Ibid, p. 128.

87. Ibid, p. 121.


91 Comstock et al., pp. 79-82.
92 Ibid, p. 69.
93 Brown et al., p. 263; Gerlach and Ely, p. 344; and Dale, p. 357.
94 Worth, p. 183.
95 Locatis and Atkinson, p. 133.
CHAPTER VI: CONCLUSIONS AND IMPLICATIONS

1Chapter IV, pp. 1-2.

2Heinich et al., Instructional Media, p. 92.

3Williams, Learning From Pictures, p. 21.

4Locatis and Atkinson, Media and Technology for Education and Training, p. 154.

5Wittich and Schuller, Instructional Technology: Its Nature and Use, p. 54; Heinich et al., Instructional Media, p. 90; Kemp and Dayton, Planning and Producing Instructional Media, p. 108; and Michael Langford, Visual Aids and Photography in Education, p. 97, respectively.

Others have suggested that we choose pictures that are "simple and uncluttered," "free of conflicts and distractions," and "clearly recognizable and easily understood." See, for instance, Ronald Anderson, Selecting and Developing Media for Instruction, pp. 38-39; James Kinder, Using Instructional Media, pp. 58-59; and Carlton Erickson, Fundamentals of Teaching with Audiovisual Technology, p. 99.

6Brown et al., p. 76.


8Gerlach and Ely, p. 283; see also Beatty, p. 73.

9Fred Ritchin, "The Future of Photojournalism," Aperture, No. 100 (Fall 1985), p. 49. Ritchin also noted that Rolling Stone magazine recently used a computer to remove a shoulder holster and gun from one of the stars of a television show to provide a less violent cover image.


11See Chapter V under "The Problem of the Unusual Photograph".

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Dale does say that "some" interpretation is involved in all three levels.

Dale, Audiovisual Methods in Teaching, and Williams, p. 19, respectively.

Williams, p. 20.

Ibid, p. 92.


Time, April 15, 1985, p. 57.


The evidence against Nixon was far greater than against Kennedy. Kennedy was guilty of drinking and driving, which led to a loss of life, while Nixon was about to be impeached as President of the United States for betraying the trust of his office.

Brown et al., for example, write that "Graphs show numerical or proportional relationships which enable readers to grasp quickly the specific meanings of masses of complex data" (6th ed., p. 107). Locatis and Atkinson, after telling us that pictographs "can add meaning, simplify, and motivate," warn us that they "also tend to be less accurate and more difficult to interpret" (p. 123).
No mention has been made in the textbooks about the use of pictographs to mislead.


27 For more on reasoning from commercials, see Michael Scriven, Reasoning, pp. 104-105.

BIBLIOGRAPHY


Bullough, Robert.  **Creating Instructional Media.** Columbus, Ohio: Charles E. Merrill, 1974.


Gettier, Edmund. "Is Justified True Belief Knowledge?" Analysis, 23 (June, 1963), 121-123.


The New Yorker, 6 February 1984, 118.


Simonson, Michael and Volker, Roger. Media Planning And Production. Columbus, Ohio: Charles E. Merrill, 1984.


Time, April 15, 1985, p. 57.


