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ABSTRACT

This paper reviews the literature on visual literacy over the past 25 years. The following areas of visual literacy are reviewed: theoretical foundations of visual literacy; establishing a research agenda; visual vocabulary; visual learning/visual teaching; visual thinking; visual-verbal relationship; and visible language. (Contains 158 references.) (JLB)

Twenty-Five Years of Visual Literacy Research

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Twenty-Five Years of Visual Literacy Research

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The visual literacy concept as an area of study has been plagued by an identity crisis from the outset. For one group of advocates a literal definition of the term has led to investigation of visual languages with a one-for-one analogy with the reading and writing aspects of verbal literacy. For others, more inclusive definitions have led to the study of visualization in all of its aspects of communication and education. The definitional controversy has been so much a part of the visual literacy scene that Cassidy and Knowlton wrote a major paper in 1983 entitled "Visual Literacy, a Failed Metaphor?," and in 1994 Moore and Dwyer included a chapter in their book titled "Visual Literacy: The Definition Problem." (Seels, 1994).

THEORETICAL FOUNDATIONS OF VISUAL LITERACY

The concept of visual literacy was crystallized by John Debes (Debes, 1968, 1969, 1970), but as Jonassen and Fork noted, "Visual literacy is eclectic in origin." (1975, p.7). Debes (1969) may or may not have coined the term visual literacy, but indeed he did provide its longest (and perhaps longest lasting) definition:

> Visual literacy refers to a group of vision competencies a human being can develop by seeing at the same time he has and integrates other sensory experiences. The development of these competencies is fundamental to normal human learning. When developed, they enable a visually literate person to discriminate and interpret the visible actions, objects, and/or symbols, natural or man made, that he encounters in his environment. Through the creative use of these competencies, he is able to communicate with others. Through the appreciative use of these competencies, he is able to comprehend and enjoy the masterworks of visual communication. (p.14)

In that early visual literacy work, "The Loom of Visual Literacy," Debes flirted with the idea of a visual language, and referred to the earlier work of Chomsky (1957) on syntactic structures and the work of Paul Wendt (1962) who had written about the language of pictures. Colin Turbayne, an early visual literacy theorist (1962, 1969, 1970a, 1970b) explored the syntax of visual language (1970b) and concluded that, "Unhappily the code of visual language is chaotic." (p.24). He was concerned that "Words are often ambiguous." (1970a, p.115) and that for an object or image to have language utility it must "...always suggest things in the same uniform way..." Turbayne, more than any other, laid the groundwork for an analogy of a visual language to verbal language. He wrote, "Just as a large part of learning to understand words consists in learning how to respond to them, so is it the case in learning how to see" (1970, p.125.). The notion that humans can be taught (thus learn) "how to see" has been central to visual literacists ever since.

Hortin has done the most intensive study of the theoretical foundations of visual literacy. His dissertation (Hortin, 1980a) was

subtitled *An Investigation of the Research, Practices, and Theories* [of visual literacy]. In that document and subsequent writings (Hortin 1980b, 1994, Braden & Hortin 1982) he has agreed with Jonassen and Fork (1975) emphasizing the eclectic nature of the origins of the field of visual literacy and of the range of interests that find a common bond under that rubric. Like the pseudopod metaphor advanced by Debes (1970a) as a description of the parameters of visual literacy, Hortin has portrayed visual literacy as a confluence of thought--incorporating linguistics, art, psychology, philosophy, and more. Incidentally, the first researcher to characterize visual literacy as "a confluence of theories" was Johnson (1977). In his doctoral dissertation he wrote:

> I was disappointed to discover that visual literacy is really nothing more than a "confluence of theories," brought together to form a vague, unorganized concept that tries to explain the notion of "visual sequencing." (p.141)

Visual sequencing is only one narrow aspect of visual literacy as it is viewed today. The point of view of the researcher is critical, of course. Hortin was fascinated by the metaphor of parallel languages, and concentrated much of his focus upon the contributions of linguist Noam Chomsky (1957, 1964, 1968, and 1975). However, Hortin's primary research interest was with "visual thinking," and therefore his interpretation of what constituted a confluence of theories was much broader than that of Johnson whose field was the English language.

While Johnson was delving into the nature of visual literacy as an approach to English instruction, Hocking (1978) was exploring the wider issue of the parameters of visual literacy. His study at the University of Colorado sought to determine visual literacy goals. The paper by Braden and Hortin (1982) also explored the boundaries of the field.

Braden and Hortin also offered a shorter definition than Debes'. They refined Hortin's own earlier definition (Hortin, 1980) and came up with this definition::

> Visual literacy is the ability to understand and use images, including the ability to think, learn, and express oneself in terms of images. (p.169)

Seels (1994) in her chapter on the "visual literacy definition problem" uses the Braden Hortin definition in her glossary, giving current support to defining the field in broader terms. Many other attempts have been made to examine the nature of visual literacy and to define the concept. Notable among them are the work of Case-Gant (1973), Lamberski (1976), Fork & Newhouse (1978), Sucy (1985), Sinatra (1988), Whiteside & Whiteside (1988), and the participants at the Twenty-second Annual Lake Okoboji Educational Media Leadership Conference (Cureton & Cochran, 1976).

A host of theories and diverging areas of specialization emerged in the dozen years immediately after the visual literacy movement was set in motion. Braden and Hortin (1982, p. 164) compiled a short list:

> Some of the theories have dealt with: **visual languaging** (e.g., Ausburn & Ausburn, 1978; Debes, 1972; 1974: Turbayne, 1970b), **visual thinking** (e.g., Arnheim, 1969; Haber, 1970; Wileman, 1980), **visual learning** (e.g., Dwyer, 1978, Jonassen & Fork, 1978; Randhawa, Back, & Meyers, 1977), **hemispheric lateralization of the brain** (e.g., Bogen, 1979; Ragan, 1977; Sperry, 1973), **mental imagery** (e.g., Fleming, 1977; Kosslyn & Pomerantz, 1977; Pylyshyn, 1973), **levels of abstraction** (e.g., Clark & Clark, 1976; Clark, 1978), **cultural interaction** (Cochran, Younghouse, Sorflaten & Molek, 1980), and the **interactive theories** dealing with **symbol systems** and **dual coding** (e.g., Levie, 1978; Levie & Levie,

1975; Paivio, 1971, 1975, 1983: Salomon, 1972, 1979). [Note: the list was not meant to be all inclusive then, and certainly is incomplete another dozen years later.]

Baca (1990) did the most recent and most comprehensive study to date, a delphi study in which visual literacy professionals collectively helped identify what is and what is not a part of visual literacy. After years of quibbling about the nature of visual literacy, Baca found that "There is a great deal of agreement regarding the basic tenets of visual literacy among the scholars who study it" (p.74). Baca listed 186 accepted constructs of visual literacy. Those regarding definition included:

> Visual literacy refers to the use of visuals for the purposes of:
>
> communication
> thinking
> learning
> constructing meaning
> creative expression
> aesthetic enjoyment (p.65)

Earlier Baca and Braden (1990) had pointed out regarding the Braden & Hortin definition, that "even that definition fails to directly address design, creativity, and aesthetics as they apply to visualization." The delphi study acknowledged the additions.

The primary contribution of the Baca study was that it affirmed the broad scope of interests that are subsumed under the visual literacy umbrella. The study also provided an organizational scheme for categorizing the constructs of the field, but it did not identify all of the legs of Debes' pseudopod. That is one objective of this paper -- to organize the research of the field into the sub-fields of visual literacy. Such a framework will help to clarify the focus of future visual literacy research and will aid future fledgling researchers to select an area for study.

ESTABLISHING A VISUAL LITERACY RESEARCH AGENDA

In the past others have attempted in sundry ways to facilitate the research of the visual literacy area. The first authors to undertake the task of building a framework for visual literacy research were Spitzer and McNerny (1975). Their emphasis was upon operationally defining visual literacy so that we could proceed with research to support the operational definitions. An extensive study was made by Hocking to determine visual literacy goals which in turn could become the basis for research (Hocking, 1978). At about the same time Levie (1978) offered the field a prospectus for instructional research on visual literacy. The link of instruction to visual literacy was important, and the bulk of all visual literacy research has been done with learning and instruction in mind.

Lida Cochran and her associates took a more pragmatic approach. The Cochran team held seminars and meetings with aspiring visual literacists and examined the possible avenues of visual literacy research. A direction for the field was recommended, and possibilities were outlined for a broader audience in their *ECTJ* article (Cochran et al, 1980). For those with a greater interest in the linguistic aspects of visual literacy Hennis (1981) pointed out the need for research in the area of visual language. More recently, other authors have provided their conceptions of an agenda for visual literacy research. For example, Hartley (1987) addressed the role of print based research in an era when we must accommodate to changes brought about by the emergence of electronic text.

Gnizak and Girshman (1988) turned the entire process on its head. Rather than concern themselves with doing research about visual literacy they undertook an experiment in visualizing during the research process. They encouraged students to "define a pressing social problem in visual terms and thereby develop student abilities to analyze, to

criticize, and finally to synthesize" (p.207). Levie (1987) lamented the fact that research on pictures was done in small topical islands, barely connected. He said that "an additional approach that brings together data and ideas from separate contexts could contribute much to our understanding of this pervasive, versatile mode of communication" (p.27). A list of Levie's "islands" is an outline of much of the research in visual literacy. His selected bibliography to accompany that list is broken into categories and is exceptional:

- Picture Perception (6 bibliography entries)
- Theoretical Approaches to Picture Perception (21 entries)
- Attention and Scanning (40 entries)
- Interpreting Figures and Pictorial Cues (40 entries)
- Perceiving Global Meaning (25 entries)
- Memory for Pictures (6 entries)
- Memory Models (25 entries)
- Recognition Memory (44 entries)
- Recall (20 entries)
- Other Types of Memory Research (27 entries)
- Learning and Cognition (7 entries)
- The Acquisition of Knowledge (48 entries)
- Problem solving and Visual Thinking (26 entries)
- Acquisition of Cognitive Skills (32 entries)
- Media Research (39 entries)
- Affective Responses to Pictures:
  - -Arousal and Emotional Impact (17 entries)
  - -Preferences (22 entries)
  - -Attitudes (25 entries)
  - -Aesthetic Responses (31 entries)

Obviously, many of the topics above are included in the research agendas of other fields. What is remarkable is that so much research in sundry fields has been found to have visual literacy implications.

VISUAL VOCABULARY

Although Levie's summary of the research on pictures covers much of the research relevant to visual literacy, Baca's study reminds us that the use of "visuals" touches other areas, including thinking and learning, and constructing meaning. To construct meaning from visuals implies that in some way the constructed meaning can be "read" by persons who view it. The notion that images can be "read" implies the existence of at least a rudimentary visual language which is made up of vocabulary components.

Study of visual representation has generally fallen into five distinct areas of inquiry: semiotics and film/video conventions; signs, symbols and icons; images and illustration (including the survey by Levie discussed above); multi-image; and graphic representation. Each of those areas has its own growing research literature.

Corcoran (1981) was one of the first to deal with **Semiotics and film/video conventions** in a way that is related to visual literacy. He pointed out that there are problems in the use of linguistic models or reader theories as they apply to reading the images of screen media. Others who have focused upon the relationship of Semiotics to visual literacy are Muffoletto (1982), Metallinos (1982), and Salomon (1982, 1983, 1984). The latter research by Salomon (1983, 1984) has focused upon demonstrating that it is much easier in terms of mental effort for an individual to view television than it is to read text. He characterized television as easy and print as tough. The implications for education are obvious.

The four other areas related to visual vocabulary have also been the subject of visual literacy researchers and theorists. For example, scholarship concerning **signs, symbols and icons** has been reported in the work of Salomon (1979), Griffin & Gibbs (1993), and Yeaman (1987). In the area of

images and illustration, including pictorial research, we find contributions by Alesandrini (1981, 1984), Duchastel (1978), Duchastel & Waller, (1979), Levie, (1978b, 1980), Levie & Lentz (1982), Petterson (1989, 1993), and the text on the basic research of the psychology of illustration by Willows & Houghton (1987). **Multi-image** is an area whose current popularity has spurred both articles in the popular press and research interest. In the later category are such works as those of Whiteside (1987), Didcoct, Ehlinger, Tierney, and Toler. Spread across several disciplines are many papers on **graphic representation** such as those of Jonassen, Beissner & Yacci (1993), Bertoline, Burton & Wiley (1992), Braden (1983), Whiteside & Whiteside (1988), Giffin (1989), Macdonald-Ross (1977a, 1977b, 1979), Moxley (1983), Pruisner (1992), Winn (1980, 1981, 1882, 1983, 1986, 1987), and Winn & Holiday (1982).

None of the research cited above has resulted in major new theory or in revelations of such a magnitude as to cause paradigm shift. Rather, the studies have resulted in the revelation of principles for image design and for instructional applications.

Four extraordinary books have been published which support research on illustration and graphic representation -- the two books by Houghton and Willows (1987) and the two books by Tufte. While the later are not research compendia, per se, Tufte's *The Visual Display of Quantitative Information* (1983) is scholarly, filled with principles drawn from the research, and is a definitive work on the subject. In a like manner, Tufte's *Envisioning Information* (1990) is a comprehensive, scholarly work that is a definitive book on how to use illustrations in support of concepts.

VISUAL LEARNING / VISUAL TEACHING

The visual literacy movement has been tied to the field of education from the outset. As noted earlier, Levie (1978) set a research agenda which had its focus upon learning and cognition. Prior to that Dwyer (1972) wrote his *Guide for Improving Visualized Instruction* which made widely known that he and his associates had been involved in a series of related experimental studies employing similar instructional materials since 1965. That program of ongoing research came to be known as the Program of Systematic Evaluation (PSE), and the 1972 report covered the results of the first phase of that program. The second phase was reported in Dwyer's 1978 book, *Strategies for Improving Visual Learning.* In 1987 Dwyer edited a volume of more than thirty research papers selected from the then one hundred fifty odd PSE experiments (the number has since passed two hundred). Dwyer himself (1994) characterized the 1987 book as a report on phase three of PSE. No other body of research rivals in size or scope the PSE series of experiments. Recently summaries of the PSE research have been made available (Dwyer, Dwyer, & Canelos, 1989; Dwyer, 1994). The findings of PSE have resulted in dozens of principles for visualized instruction and for visual design. For example, here are three (of nearly forty) generalizations from Dwyer's latest overview (Dwyer, 1994):

- Boys and girls in the same grade level (high school) learn equally well from identical types of visual illustrations when they are used to complement oral instruction. [a finding from Phase 1 of PSE].
- The realism continuum for visual illustrations applied to externally paced instruction is not an effective predictor of learning efficiency of all types of educational objectives. An increase in the amount of realistic detail contained in an illustration will not produce a corresponding increase in the amount of information a student will acquire from it. [a finding from Phase 2 of PSE].

- Achievement is enhanced when embedded cueing strategies are integrated into computer based instruction. [a finding from Phase 3 of PSE].

Other areas of study associated with visual learning and visual teaching have included **realism studies** which are closely related to the PSE program in thrust, but not in method. For a sample of this area of inquiry readers are referred to Knowlton (1966), Levie (1978), Levie & Lentz (1982), Wileman (1980, 1993), and Braden & Beauchamp (1987). A number of authors have concentrated upon **perception and critical viewing skills** (Adams & Hamm, 1987; Baron, 1985, Finn, 1980; Hefzallah, 1986, 1987; Lloyd-Kolkin, 1982; Watkins et al, 1988; White, 1980). Still others have concerned themselves with **visual aesthetics** (Arnheim, 1979; Curtis, 1987; Barry, 1994). A small but dedicated group of scholars has investigated visuals and visualizing as functions of **learning strategies and learner styles** (Ausburn & Ausburn, 1978; Canelos, 1980, 1983; Dwyer & Moore, 1992; Moore, D.M. (1986); Moore & Dwyer, 1991; Moore & Bedient, 1986, Streibel, 1980; and Ragan, 1978). In 1991 Mike Moore reported the results of a program of eight research studies by himself and his students at Virginia Tech involving field dependence-independence and a variety of media attributes. That program of research continues.

While many individuals have shown an interest in teaching with visuals, only a few have chosen to explore the effects of both teaching with and testing with visuals. Most of the **visual testing** research has been done in conjunction with the PSE program (DeMelo, Sazbo, & Dwyer, 1981; F. Dwyer & DeMelo, 1983; Szabo, 1981; Szabo, F. Dwyer & DeMelo, 1981; DeMelo, Hermes and F. Dwyer, 1983; C. Dwyer, 1985, 1985; C. Dwyer & F. Dwyer, 1985). In general the results of that research are that visualized testing provides better assessment and strengthens retention from visualized instruction.

VISUAL THINKING

Visual thinking is the most abstract concept that draws attention from researchers of visual literacy. Arnheim (1969) was one of the first to use the term. His theory of visual thinking has dominated the later work of such popular writers as McKim (1972), Dondis (1973), and Paivio (1971, 1975). Hortin (1982a) stretched the concept to add the dimension of visual rehearsal as a strategy for employing visual thinking in the learning process, and introduced the concept of introspection (is that a form of metacognition?) to the discussion of visual thinking (Hortin 1982b). Hortin also looked at the ways we use imagery in our daily lives (1983), connections of mental imagery to instructional design (1984), and the use of both internal and external imagery as aids for problem solving (1985).

Closely linked to the concept of visual thinking is the act of **visualization**. No one would argue that humans lack the ability to visualize, but how we do it and other details of the act have been the subject both of conjecture and of research. Recent articles on the subject have been published by Shepard (1978), and Hortin & Bailey (1983).

THE VISUAL-VERBAL RELATIONSHIP

When visual literacy was coined as a term an early outcome was to suggest the existence or possibility of a visual language(s). From the beginning comparisons have been made as if by second nature. Once we began to compare the communication aspects of imagery with written language it was inevitable that the relationship between traditional verbal language and visuals would be explored. Sensory redundancy studies were one of the results of this natural progression of inquiry. Several researchers have explored

the effects of visuals used alone and with written or spoken words. Some of the more interesting work along these lines has been done by Appelman, (1993), Duchastel (1978), Braden (1983), Fleming (1987), and Dwyer (1988). A general conclusion would be that visuals and verbal materials when used together are in most cases stronger message carriers than when either is used alone.

Another natural outgrowth of the "literacy" metaphor has been the level of interest by teachers of reading and researchers in the field of reading in the relationship of visual literacy to the teaching of reading. Mulcahy and Samuels (1987) have written an extensive history of the use of illustrations in American textbooks over the last three hundred years. They point out that only as printing technology has progressed has it been practical for publishers of textbooks to be concerned with semantic and syntactic text parallels between the illustration and the context to the text. Having the right images in the right places in a textbook is a concern that is as new as the visual literacy movement itself.

Scholars who have concerned themselves with visual literacy and reading include Sinatra (1987) who offered a technique to use pictures as tools to teach writing as well as reading, Haber & Haber (1981) whose primary interest was in the reading process, and Levie & Lentz (1982) who addressed the issue more directly as one of "pictures and prose."

VISIBLE LANGUAGE: TEXT AS VISUALS

The field of typography deals with the design and appearance of printed text. Typographical research has delved into such matters as readability of letterforms with resulting principles for using upper and lower case letters together, letter spacing, line length or column width, hyphenation, justified vs. unjustified margins, and so forth (e.g., Davenport & Smith, 1965; Waller, 1979; McLean, 1980). Some of that research applies to visual literacy and its application to instruction and to visual literacy has been made widely available to the field by Hartley (1978, 1985) and Jonassen (1982, 1985). Misanchuk (1992) has shown how those same principles apply to amateur typography -- desktop publishing. When visuals and verbal elements are used together they become symbiotic (Braden, 1982), and in some forms the words or letters themselves become the visual message.

CONCLUSIONS

The research and scholarly literature of the field of visual literacy is voluminous. The bibliography of Clemente and Bohlin (1990), available from Educational Technology Publications, is 37 pages in length, and contains about 400 entries from sources who by-and-large are not part of the visual literacy movement. Two bibliographies by Walker (1990 and elsewhere in this volume) contain entries from the IVLA books of readings for the past 12 years, totaling nearly 500 entries. The IVLA books are not widely disseminated, so they are in the process of being made available through ERIC.

There is, however, much research yet to be done. Those interested in finding a research topic would be well advised to consider Baca's (1990) list. "Visual literacy research...

- is needed to identify the learnable visual literacy skills
- is needed to identify the teachable visual literacy skills
- is needed to develop implementation of visual literacy constructs
- is needed to validate implementation of visual literacy constructs
- is needed to provide a rationale for visual literacy implementation in our

society

- is needed to provide a rationale for visual literacy implementation in our educational system
- is supplemented by research conducted in other fields, including psychology, education, learning, visual perception and eye movement studies, print literacy" (p.70)

Baca also lists a dozen or so other possible research options. As an eclectic field, visual literacy provides many avenues of investigation.

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