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ABSTRACT

Instructional systems design (ISD) is the integration of general systems theory, instructional theory, and communications theory. Edgar Dale, a leader in the fields of reading and journalism and a pioneer in the humanistic/communications tradition of the field of instructional technology, related the concrete to abstract continuum to media decisions in his textbook, "Audio-Visual Methods in Teaching." Dale believed that learning becomes more meaningful when abstract learning and concrete experience are related. Dale advanced the field theoretically through the Cone of Experience, a way to classify media experiences in relation to the concrete and abstract psychological dimensions of learning. The Cone of Experience was historically important in its attempt to connect psychological/instructional theory and communications media. While the direct to vicarious and purely symbolic experience continuum is still valid, the cone is dated in its description of media. The cone was introduced in a different time period when there were fewer theories and those that existed were used more uniformly. Today, there is no widely accepted theory which follows in the tradition of the Cone of Experience, and the result is a gap in instructional design theory. New directions in theory worth pursuing in order to close the gap include: more specialized models; new ways to test models; models which combine design, development, and evaluation; and message design theory which relates types of learning and other variables. (Contains 20 references.) (SWC)

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The Relationship of Media and ISD Theory:The Unrealized Promise of Dale's Cone of Experience

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Instructional design theory flows from three major sources: general systems theory, instructional theory, and communications theory. The integration of these theories produces instructional systems design (ISD) theory (Seels, 1989). Currently, instructional design incorporates theories related to areas such as ISD, instructional strategies, media selection, message design, and learner characteristics.

When instructional design theory begin? Did it start with Finn's arguments (1960) for the integration of general systems concepts in the field traditionally known as audiovisual communications? Perhaps, but Finn was publishing ideas that grew out of the systems approach to training used by the military during World War II. Did design theory begin instead with Skinner's 1956 article on "The Science of Learning and the Art of Teaching" which led to programmed instruction and the marriage of ideas of psychology and instruction? DeVaney and Butler (1996) suggest otherwise. They argue that texts produced during the 1930s and 40s provided the base for the field of instructional technology and for instructional design.

> A different type of text, however, emerges in the late 30s and continues through the 40s. It is a text that attempts to ground audiovisual instruction in a learning theory and describe the manner in which theory suggests certain pedagogical practices. It is both theoretical and applied. The rhetoric of these texts engages the dominant educational discourse of the period, mid-30s to late 40s. It was a Deweyesque, child-centered, humanistic learning, and curricular theory. (p. 6)

DeVaney and Butler report that Walt Wittich was writing about design elements in his 1944 dissertation on training manuals.

To some extent instructional design theory began with the interest in making connections between concrete and abstract learning that is exemplified by the theory of John Dewey (Dale, 1967) and Charles Hoban Jr. (Hoban, Hoban, & Zisman, 1937). It was Edgar Dale who took this interest further by relating the concrete to abstract continuum to media decisions in his textbook, Audio-Visual Methods in Teaching.

Although he was Jim Finn's mentor, Dale was solidly in the humanistic/communications tradition of the field of instructional technology (DeVaney and Butler,1996). He was a pioneer who served as president of the Department of Visual Instruction of the National Education Association, now the Association for Educational Communications and Technology. He was a also leader in the fields of reading and journalism. His Dale-Chall Readability Formula is well known (Dale & Chall, 1948). For 36 years he published "The News Letter" which was mailed to 20,000 people around the world. Some of these now classic essays on communications in these newsletters are compiled in Can You Give the Public What It Wants (Dale, 1967).

Dale was also my mentor, and I feel compelled to speak to misconceptions about his work because he has been labeled one of the realism theorists. He is said to have promulgated the theory that the more realistic the learning materials or experience the better. In fact, he said just the opposite. What he really said was that learning becomes more meaningful when abstract learning and concrete experience are related. He never said the more cues the better or the more realism the better. This is documented by his News Letter essays on "The Concrete and Abstract" and "Education as Conceptualizing" (Dale, 1967) and by his textbook Audio-Visual Methods in Teaching.

Dale advanced the field theoretically through the Cone of Experience, which was a way to classify media experiences in relation to psychological dimensions of learning, specifically concrete and abstract. The Cone of Experience was introduced in 1946 in Audio-Visual Methods in Teaching (Dale, 1946, 1996). This text was published by Dryden Press, which produced seven editions within the first three years. By 1969 the validity of the cone approach to media selection was being questioned by Tosti and Ball (1969) who argued that it is not just the media it is how instruction delivered through the media is designed. They questioned whether media had unique characteristics because design can affect media characteristics. Nevertheless, the theory continued to be helpful to many, especially to those from other countries seeking a simple way to explain design theory. Dale's text was translated into Spanish and Japanese.

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The historical importance of the Cone of Experience theory was its attempt to connect psychological/instructional theory and communications media. DeVaney and Butler believe that the cone was conflated, meaning two textual viewpoints were combined to create a new one.

> In this yearbook, we note a conflated discourse growing up around Dale-almost every author quotes Dale; and Brown and Vandermeer use Dale's Cone of Experience. Dale's own voice is conflated as he mixes the humanistic and experiential aspects of the child development curricular and learning movement with the sequential and hierarchical structure of task analysis proponents such as Charters'. (He worked on the Winnetka Plan and for Charters in the Payne Fund Study.) Dale's Cone of Experience stands as an example of this mixture. It is at once experiential and hierarchical in its listing of experiential events. And, while offering an intriguing and popular model, it was based on conflicting theoretical assumptions. (p. 24)

Dale would have loved the Latin derivation of the term "conflate," but he probably would have argued he was integrating ideas in to a whole instead of fusing them.

The Cone of Experience presents a list of media on a continuum of direct, purposeful experiences to indirect experiences and a continuum of concrete to abstract learning. Today, it is easy to point out that films often provide experience that is as concrete and real as it is abstract and symbolic. In 1946, however, the capability and use of some media differed. However, a direct experience differed from a vicarious experience then and still does today. Dale believed that the cone turned on its side illustrated a spiral curriculum.

Dale describes the Cone of Experience as a metaphor for concept development. As a model of conceptualization, it suggests that we have "sense-rich, purposeful, first-hand experiences" as participants. "As we move up the cone, the bands of experience become more abstracted" and we become spectators. "Finally, at the top of the cone we have the written name of the concept itself. It is an abstraction, a generalization. Its meaning depends upon what it stands for in the mind of the individual who reads or hears it." (Dale, 1956, p. 3) The cone, therefore, is tied to one type of learning, concept learning.

Dale's other writings reflect remarkable foresight in many areas. He argued for the library-media movement by speaking of a "cafeteria for learning" and tempered the enthusiasm for programmed instruction and experimental research in our field with common sense observations. He edited the National Society for the Study of Education (NSSE) yearbook on "Mass Media and Education;" yet he was always a voice for interpersonal communication being stronger than mass media and necessary for "sharing in a mood of mutuality" (his definition of communication). In doing so, he presaged the two-step flow models of communication exemplified by diffusion theory. His chapter in the NSSE yearbook on programmed instruction presented many of the arguments against linear instruction that the cognitive science and constructivist paradigms would raise. He wrote about the need for rich "learning environments" throughout his career even after he retired. Dale did not justify design using the concept of "efficiency." He justified it as offering equity and individualization. He preceded formative evaluation theory; yet he developed the readability scale and other techniques to formatively evaluate the World Book Encyclopedia and health education materials. Most of his ideas have been brought to fruition with time and the growth of the field.

However, the promise of his most important theory, the Cone of Experience, as a way to relate instructional psychology and communications technology is unrealized. While the direct to vicarious and purely symbolic experience continuum is still valid, the cone is dated in its description of media. The cone was introduced in a different period when there were fewer theories and those that existed were used more uniformly. Today, there is no widely accepted theory which follows in the tradition of the Cone of Experience. The result is a gap in instructional design theory which will be addressed next.

ISD models synthesize the elements required for good instruction into a whole. Thus, content, objectives, assessment and instructional strategies, and delivery systems become integrated through systems and instructional theory. When one explains theory related to these steps in ISD, it is easy to show one theoretical thread that connects task analysis, objectives, assessment, and instructional strategy. This theoretical thread is types of learning. We identify types of learning during task analysis and use this information during instructional analysis. We base assessment strategy decisions on types of learning and objectives on assessment. Instructional strategy differs depending on the type of learning desired. Although this theoretical thread dominates, it is difficult to relate types of learning to selection of delivery systems.

There may be other bases for connections between ISD steps and the delivery systems selection step. Certainly, the systems concept already provides one link. However, the link does not extend to instructional/psychological principles. There have been attempts to relate psychology and systems theory to communications media theory, but they have not been applied as theoretical links or procedures.

The descriptions of the technologies in the development domain in AECT's 1994 definition of the field (Seels & Richey, 1994) relates technologies to affinity for learning paradigms and linearity or non-linearity. Learning paradigms can affect steps in ISD other than delivery systems. For example, you can have a constructivist or a behaviorist approach to instruction for memorizing the Gettysburg Address. If you want someone to apply the writing style of the Gettysburg Address, you will have different objectives and assessment than you would have for memorizing the Gettysburg Address. but what objectives and assessment may still be influenced by a learning paradigm.

Media selection models, such as Reiser and Gagné's (1983) which incorporates types of learning as criteria for candidate media, are another basis for relating delivery system selection to other steps in ISD. Unfortunately, their procedure is tedious to apply and lacks the simplicity of appeal of theories such as learning paradigms or the Cone of Experience; nor is this theory clearly linked to conceptual theory.

We are left with a theoretical gap between delivery system or media theory and instructional strategy theory and other steps in ISD. This gap is inconsistent with the promise of Dale's Cone of Experience and the dreams of ISD model makers. At the same time there are complaints that models simply do not reflect reality. The reality is that delivery system selection and development is equally important as other design steps and therefore, needs conceptual theory in addition to procedural theory.

Are there new directions in theory worth pursuing in order to close the gap? Yes. Several. Here are some:

- more specialized models
- new ways to test models.
- models which combine design, development, and evaluation
- message design theory which relates types of learning and other variables

I will address these directions next.

Gros, Elen, Kerres, Merrienboer, and Spector have an article in the January 1997 issue of Educational Technology on "Instructional Design and the Authoring of Multimedia and Hypermedia Systems: Does a Marriage Make Sense." The article proposes that the relationship between ISD and authoring which links theory and practice be used to develop new ISD models. Furthermore, the authors suggest that such models can be made specific to types of learning. They recommend training to help designers translate general models to specific situations. The article states that in the context of the authoring of courseware:

> We have already argued that there are a variety of reasons for the apparent lack of integration of instructional design theories and practices. We listed five factors which make this integration difficult: (1) a mismatch between various ID models and the way developers actually work; (2) proliferation of ID models; (3) lack of specificity and the linearity of ID models; (4) absence of validation studies; and (5) the apparent linear character of ID models. (p. 54)

The authors are calling for more powerful models that recognize both the design and the authoring stages and more rigorous and independent evaluation of products including objective examination of the ID process used by developers. They believe that designers and developers must combine a better conceptual grasp of ID with support tools for ID and that using tools without better conceptual theory will not be helpful. The authors seem to decree more general models while requesting new models that connect the design process with the concrete situation. It is interesting that one cry often heard in the field "No new models!" may be wrong. Perhaps we have too few models or inadequate training on applying and adapting models.

In an article on "Instructional Design of Interactive Multimedia: A Cultural Critique" which appeared in Educational Technology Research and Theory, Lyn Henderson (1996) argues that we need ID models which allow for multiple paradigms to meet multicultural needs. Henderson contends that multiple paradigm models would allow us to relate design needs and development solutions more clearly. The article recommends new approaches to evaluation that would relate content decisions to navigation decisions.

These two examples substantiate need for more complex models which relate design, development, and evaluation sufficiently. This may be one way to realize the promise of the "Cone of Experience" link between media and instruction. Several recent models combine the step of design and development including Willis' R2D2 model (1995) and Seels and Glasgow's ISD Model 2 (Seels & Glasgow, in press).

Another way to provide conceptual links between media and instructional theory may be the development of conceptual and procedural models in areas where design and development are strongly linked such as message design. Seels, Mowery, O'Rourke, Proviano, Rothenberger, Tannehill & Yasin, 1996) have developed a conceptual structure and procedure which relates message design to types of learning, media, and learning paradigms. This theory has been

incorporated in a performance support system for message design (Seels, Mowery, O'Rourke, Rothenberger, Vasadevan, & Sibiya, 19[illegible]).

The technique of rapid prototyping (Tripp & Bichelmeyer, 1990) where design and development and evaluation steps are overlapped is another approach which may lead to closer links between the steps in ISD and the media selection step. The danger of this approach is there is a tendency to overemphasize procedural theory and to ignore design at the curriculum or macro level.

It is useful to ask "Why has does this theoretical gap still exist after so many years"? One answer might be that we have more procedural than conceptual theory. Another might be a general feeling that if we adopt one perspective or paradigm we have to reject others. It may be that types of learning and media have an affinity for a paradigm, but that it is a mistake to assume this means incompatibility with other paradigms. Probably however, we simply haven't found the way to theoretically link delivery systems with other ISD steps because it is difficult to do so. However, to paraphrase a familiar saying, what is hopeless the first decade, is impossible the second decade, becomes difficult the third decade, and probable the fourth. We are, therefore, overdue to solve this problem.

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