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Whole-Part-Whole Learning Model

Richard A. Swanson
Training and Development Research Center
University of Minnesota

Bryan D. Law
Training and Development Research Center
University of Minnesota

ABSTRACT

The Whole-Part-Whole (WPW) Learning Model goes beyond the present holistic, behavioristic, whole-part, and part-whole learning models. The WPW Learning Model purports that there is a natural whole-part-whole rhythm to learning.

Through the "first Whole," the Model introduces new content to learners by forming in their minds the organizational framework required to effectively and efficiently absorb the forthcoming concepts into their repertoire of expertise. The supporting expertise and component behaviors are then developed in the classical behavioristic style of instruction found in the "Parts" aspect of the WPW Learning Model. After learners have successfully achieved the performance criteria for the individual "Parts," or components within the whole, the instructor links these parts together, thus forming the "second Whole." The whole-part-whole learning experience provides the learner with the complete understanding of the content at various levels of performance and allows for higher order development.

The WPW Learning Model can be considered systematic on several counts. One is that the model can be utilized from initial program design to real-time (just in time) instructional adjustments during a live presentation.

Introduction

Human learning is one of the most complex subjects of the scientific and scholarly world. While it is easy to demonstrate how little we know about the human mind, it is important to acknowledge the sheer volume of research and common sense available to us in better understanding the learning phenomena. We are not ignorant about the learning process, in fact, we know quite a bit about how people learn.

The origins of this paper go back to 1972. At that time the senior author was contracted by Johns-Manville Corporation to talk to the corporate training and education personnel about the psychology of learning. It became apparent that these people had a real desire to improve their practice and that they wanted to be

theoretically sound. They were not theoreticians, yet they had an appreciation for the practical potential of sound theory. Two elements from that early presentation remain as key elements to the Whole-Part-Whole Learning Model (WPW Learning Model) presented in this paper. The first element depicted the field of learning psychology as basically two camps - the behaviorist (connectionist) camp, and the gestalt (cognitive) camp. The second element sought to acknowledge the value of *each* camp and to integrate them through Tolman's concept of "purposive-behaviorism" (1959).

Model Overview

This WPW Learning Model goes beyond the present holistic, behavioristic, whole-part, and part-whole learning models. The WPW Learning Model purports that there is a natural whole-part-whole rhythm to learning. The basic WPW Learning Model is shown in Figure 1.

Through the "first Whole," the Model introduces new content to learners by forming in their minds the organizational framework required to effectively and efficiently absorb the forthcoming concepts into their repertoire of expertise. The supporting expertise and component behaviors are then developed in the classical behavioristic style of instruction found in the "Part" aspect of the WPW Learning Model. After the learner has successfully achieved the performance criteria for the individual "Parts" or components within the whole, the instructor links these parts together, thus forming the "second Whole." The whole-part-whole learning experience provides the learner with complete understanding of the content at various levels of performance and even allows for higher order cognitive development to the levels of improvement and invention (Swanson, 1991).

The WPW Learning Model can be considered systematic on several counts. One is that the model can be utilized all the way from program design to real-time instructional adjustments during a live presentation. The following review of the literature supports both the psychological foundations of whole-part-whole instruction and its systemic nature.

Beyond the superficial rhetoric of broad purpose and goals, most education and training thrives on the

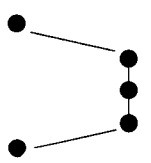

Figure 1. Basic Whole-Part-Whole Learning Model.

"parts"— the details of knowledge, expertise, and activity (Skinner, 1954; 1968). Even though this behaviorist perspective on learning has been under intellectual attack, the pragmatic requirements of education and training in our culture see to it that the "parts" and the mastery of the "parts" are as strong as ever. Without diminishing the behavioral stronghold on educational and training practices, it is the gestalt psychology concept that the whole is greater than the sum of its parts that is being more fully explored through this treatise. Our approach is not to attack behaviorism. Behaviorism (the "parts") is seen as a critical aspect of the WPW Learning Model. Instead, we focus on the "first Whole" and "second Whole" that envelope the "Parts."

The First Whole of the Whole-Part-Whole Learning Model

There are two main purposes of the "first Whole." One is to provide a mental scaffolding through advance organizers and schemata alignment to prepare the learners for the new instruction that they will be receiving. The "first Whole" also provides motivation for the participants to want to learn by revealing the meaningfulness and connectedness of the content.

Advance Organizers

The concept of an "advance organizer" was originally introduced by Ausubel (1968) as a technique for helping students learn and retrieve information by making it meaningful and familiar. This is accomplished by introducing the basic concepts of the new material, from which the students are able to organize the more specific information that will follow (Luiten, Ames, & Ackerman, 1980).

The need for advance organizers comes from the psychological principle that previous knowledge and experiences form their own mental structures at a given level of development (Di Vesta, 1982). These individual structures are called schemata. "We have schemata for eating in restaurants, attending hockey games, and visiting our grandmothers. The knowledge associated with each of these activities is our schema for the activity" (Gage & Berliner, 1988, p.293). The participant's orientation, encompassing previous consequences and interpretations of experiences, represent that person's current world view (Di Vesta, 1982).

Understanding that differences in individuals are present is important for an instructor. For example, an instructor giving a lecture on quality management in industry to thirty learners is in the room with thirty different schemata, or mental structures, of what quality management in industry means. A unified concept in the classroom between the instructor and each of the learners becomes an essential foundation for the instruction that follows.

A simple and powerful example of a unifying concept can be the editorial cartoon found in most daily newspapers. The effective editorial cartoon presents a clear concept to thousands of readers, each having their own personal schemata regarding that topic. Through the cartoon, the reader has a common starting point from which to discuss the concepts with another reader whether they agree with the original cartoon or not. Other ex-

amples of creating a unifying concept are video productions, literature (in the forms of essays, articles or research), pictures or diagrams, and even music. All of these could be used in an instructional setting for the purpose of schemata alignment among students.

The act of creating a basic construct and/or framework for the learner at the beginning of instruction is a way of introducing the content and focusing the learner. These ideas are supported by Hilgard and Bower (1966) and Knowles (1988). The organization of knowledge should be an essential concern of the teacher or educational planner so that the direction from simple to complex is not from arbitrary, meaningless parts to meaningful wholes, but instead from simplified wholes to more complex wholes (Knowles, 1988).

Organization of knowledge in the beginning stages of instruction also serves the even larger purpose of memory retention and retrieval upon completion of instruction. "We have made it appear probable that association depends upon organization, because an association is the after-effect of an organized process... Learning amounts to association, and association is the after-effect of organization" (Kohler, 1947, p.163-164).

Motivating the Learner

Motivation on the part of the learner is an important aspect of the WPW Learning Model because if learners don't value the new content that is being taught, there is little hope for retention or transfer to the workplace. Many instructors whose results are less than optimal leave student motivation in the hands of the students as their own responsibility. Support for the idea that motivation should be incorporated into a structured and systematic form of instruction came first from Lewin (1951). "Learning occurs as a result of change in cognitive structures produced by changes in two types of forces: (1) change in the structure of the cognitive field itself, or (2) change in the internal needs or motivation of the individual" (Knowles, 1988, p.23).

The potential for change in the motivation of an individual is rooted in the fact that human behavior is goal oriented. One of the distinguishable characteristics of human behavior is its purposeful, goal-directed nature (Gage & Berliner, 1988). Lindeman (1926), as cited by Knowles, gives a key assumption about adult learning that has been supported by later research. "Adults are motivated to learn as they experience needs and interests that learning will satisfy" (Knowles, 1988, p.31).

Clearly, the opportunity to motivate learners comes from capitalizing on the learners' own internal desire for goal attainment and personal achievement. "Perseverance can be increased by increasing the expectation of reward and the bad consequences of failure" (Gage & Berliner, 1988, p.334).

Motivation is also enhanced through the clear statement of learning objectives at the beginning of instruction. While much has been written about the value of clear, student-oriented terminal objectives for the purpose of evaluation, they also enhance motivation. Recent research identifies the following two instructional motivational variables: "These two cognitive variables are self-effi-

cacy (one's belief that one can execute a given behavior in a given setting) and outcome expectancies (one's belief that the given outcome will occur if one engages in the behavior)" (Latham, 1989, p. 265).

Clarifying instructional objectives for the component instruction and the overall terminal objective helps achieve the first component to motivation. By clarifying the purpose and rationale for instruction as it relates to the learner, then by detailing the how, what, and why of the instruction through clear objectives, the learner is fundamentally prepared for the instruction to follow.

It is not only the mastery of each individual part of instruction that is important, but the relationship between those "Parts" through the "second Whole" that provides the learner with the complete understanding of the content.

To summarize, the importance of the "first Whole" is found in the preparation of the learner for the instructional events to follow. This preparation will prove instrumental in promoting the learner recognition and recall on which the "second Whole" is based (Kohler, 1947).

The Second Whole of the Whole-Part-Whole Learning Model

While it is true of any system that each element within the system is critical to the success of the system, it is postulated in this paper that for the Whole-Part-Whole Learning Model, the "second Whole" must be considered the major component. Based upon the tenet in Gestalt psychology that the whole is greater than the sum of its parts, it is here in the "second Whole" that we contend that complete understanding occurs.

The "second Whole" links the individual "Parts" back together to form the complete Whole. It is not only the mastery of each individual part of instruction that is important, but the relationship between those "Parts" through the "second Whole" that provides the learner with the complete understanding of the content.

Wolfgang Kohler, in his book titled *Gestalt Psychology* (1947), provides the basis for the "second Whole" in his writings on association and recall. Kohler, using research done with animals, explains how, due to the large amount of information that must be processed and stored, a simplification effect occurs. Through simplification, large quantities of stimuli are narrowed down to just the most outstanding features. These outstanding features remain as the only traces of the original stimulus. "Hence, only some effect of the first process (part) can remain when the process (part) itself has subsided . . . All sound theories of memory, habit and so forth must contain hypothesis about

memory traces as psychological facts" (Kohler, 1947, p.149).

Knowing this about our cognitive capabilities, Whole-Part instruction becomes illogical. Ending instruction upon the completion of the final part leaves the learner with unorganized and vague traces of the preceding parts. The learner is faced with the difficult task of reorganizing those parts back into a whole on their own in order for the new knowledge to become useful. Kohler (1947) said of the organization of traces that, "They must be organized in a way which resembles the organization of the original process. With this organization they take part in processes of recall" (p.150).

The organization of the traces should be facilitated by the instructor, thus aiding the student in a comprehensive recall of the instructional material. Kohler speaks to the interrelationship between the organized traces (or Parts). "When the members of a series are well associated, they prove to have characteristics which depend upon their position in the whole series—just as tones acquire certain characteristics when heard within a melody" (Kohler, 1947, p.158).

To summarize, unless the interrelationship between the "Parts" of the content is made apparent, only traces from the full amount of instructional material will remain upon completion of instruction. It is essential for the instructor to go back and strengthen those traces by forming the instructional whole (e.g., the whole concept, whole definition). Upon the formation of the instructional whole, the "Parts" of instruction take on new meaning *within* the whole just as tones acquire certain characteristics within a melody.

After the formation of the cognitive whole, the instructor must facilitate the transfer of this new knowledge from short-term memory into long-term memory. Only information that is rehearsed is likely to be encoded for storage in the long-term memory (Gage & Berliner, 1988). Instructors can support this rehearsal by incorporating active learning (Gage & Berliner, 1988) into the "second Whole." Active learning, where learners take a participative role rather than a passive role, is regularly incorporated in the "Parts" instruction to aid in the mastery of the individual components. Continuing to utilize active learning in the "second Whole" allows the students to practice all of their skills in one continuous procedure. Production facilitates both learning and retention (Campbell, J. 1988; Perry & Downs, 1985).

Repetitive practice of the whole procedure not only aids in the transfer to long-term memory, but also provides the learner with a sense of security, and eventually, confidence in the procedure as a whole. Just as driving an automobile for the first time was a nervous collection of individual part performance, after a number of times behind the wheel, driving an automobile became a single procedure.

It is at this stage that the next step in the "second Whole" may be pursued. The successful attempts by the learner on the complete procedure create in the learner a readiness for further understanding that until now

was not available. According to Rosenshine (1986), further cognitive development can take place after automaticity, which he explains as follows:

After substantial practice, students achieve an automatic stage where they are successful and rapid and no longer have to think through each step. The advantage of automaticity is that the students who reach it now can give their full attention to comprehension and application (Rosenshine, 1986).

The full attention that the learners are now able to give provides the instructor with the opportunity and the responsibility to develop the instructional whole further through the introduction of the higher-level cognition that the learner is now ready for. The learner who has become successful at driving an automobile is now ready for further development with such topics as driving in poor weather, night driving, and the dangers of speeding. Previous to automaticity this would not have been as effective. As instructors, we become ethically responsible for pursuing this further development of learning. For just as the driving instructor knows that operation of an automobile does not only occur on dry pavement during the daytime, successful practice in the classroom is not a guarantee of success in the workplace.

A pattern will not often be repeated in precisely the environment in which it occurred when the corresponding associations were first formed. Later, even a slight change of the surrounding field may make a given pattern unable to stimulate recall of associated items. This is because the change introduces a new organization in which the experiences corresponding to that pattern are no longer present (Kohler, 1947).

The Whole-Part-Whole Learning Model lends itself to the practical work of designing education and training programs while holding on fiercely to learning theory and research.

Kohler (1947) argues that instructors should prepare learners for the differing applications. Bloom (1956) classifies differing cognitive applications as analysis, synthesis, and evaluation. Swanson's (1991) taxonomy of performance consists of five application levels: understanding, operation, troubleshooting, improving, and inventing. By developing the learner to a desired application level, the instructor has not only formed the complete content whole in the learner's mind, but has also provided a deeper understanding of that content whole to which the learner can keep adding and refining as experiences dictate. The "second Whole" provides the opportunity, to the delight of both the instructor and the learner, of moving from knowledge to

wisdom. Dewey (1933) and others see this reflection as a major prerequisite to wisdom.

The Parts of the Whole-Part-Whole Learning Model

The "Parts" component of the Whole-Part-Whole Learning Model relies on the standard systematic and behavioristic approach to instruction. Thousands of books and articles have been written regarding the effectiveness of this approach to teaching specific, structured material. To argue for what has already been established would be redundant. There are, however, some important points that should be addressed regarding this component of the WPW Learning Model. The first is that mastery of each "Part" must be attained by the learner in order for the "second Whole" to be effective. If the learner does not understand one of the "Parts," there cannot be a full understanding of the whole. Next, each "part" within the WPW Learning Model can (and should) be structured in a whole-part-whole fashion. Thus, within the larger whole-part-whole instructional program design, there are sub-set whole-part-whole unit designs being created. This provides the learner with the same benefits in the individual lessons that the larger program design provides.

Conclusion

The Whole-Part-Whole Learning Model provides a systematic design framework for the instructor to follow. It lends itself to the practical work of designing education and training programs while holding on fiercely to learning theory and research. It provides a general whole-part-whole learning template. This learning template can be used at both the program design and lesson design levels. From a systems perspective, each of the program segments, whether they are classified as a part or a whole, can then constitute a subsystem. In curricular language, each program segment is a lesson. The initial lesson would therefore be focused on establishing the "first Whole." Following lessons would then take on the logical "Part(s)" and the concluding "second Whole" func-

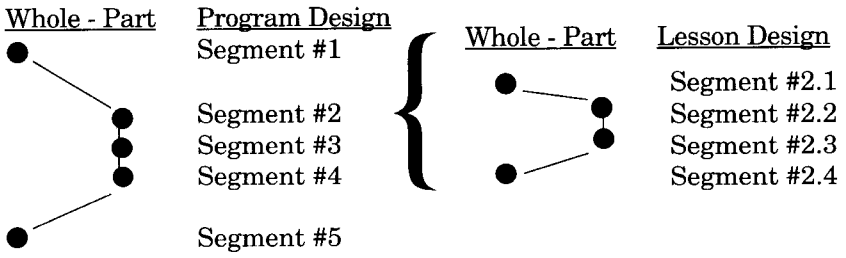

Figure 2. Whole-Part-Whole Learning Model applied to program and lesson design.

tions. Each of the program lessons (or subsystems) are then designed utilizing the same whole-part-whole template (see Figure 2).

The general program design of whole-part-whole lessons has been applied to the practical problem of differentiating between three types of training—management, motivational, and technical training. Through a series of structured observations of good training practices, general WPW program design templates were developed for these three types of training. The general program template for lessons is illustrated in Figure 3.

It is interesting to note the unique roles of the "first Whole" among the three types of training programs.

Technical Training Template of Lessons

Whole-Part

1. Operation/equipment/system overview
2. Start-up
3. Operation
4. Shut-down
5. Defects/faults
6. Troubleshooting
7. Solo Performance

Management Training Template of Lessons

Whole-Part

1. Objectives/Purpose of training
2. Illustration of good/bad performance
3. Conceptual model
4. Elements of the model
5. Techniques
6. Practice/role playing
7. Managerial implications discussion

Motivational Training Template of Lessons

Whole-Part

1. Acceptance of group/individuals
2. Problem/opportunity
3. Fear/greed illustrations (with role models)
4. The solution
5. Solicit commitment to solution
6. Vision success

Figure 3. General program design templates using the Whole-Part-Whole Learning Model.

Most technical training is focused on closed systems that are external to the learner. These learners typically understand and accept the fact that work systems get revised and/or replaced. In contrast, most management training is an attempt to alter the personal internal systems managers operate by and that they often resist changing. Thus, the "first Whole" for management training has the critical role of dealing with program objectives and purpose, while overviewing the new system is more typical of the job of the "first whole" in technical training. In motivational training (efforts at altering basic values and beliefs), the "first Whole" addresses the critical need to accept the group and/or individuals. The templates and their proposed elements provide a logical springboard for establishing the specific whole-part-whole lessons that make up a particular learning program.

As noted in the introduction, the Whole-Part-Whole Learning Model goes beyond the present holistic and behavioristic (whole-part and part-whole) learning models. The WPW Learning Model purports that there is a natural whole-part-whole rhythm to learning. The WPW Model is an effort to acknowledge and utilize theory and best practices to design sound learning programs.

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RICHARD A. SWANSON is Professor and Director, Training and Development Research Center, University of Minnesota. The TDRC is a part of the College of Education's Department of Vocational and Technical Education. The mission of the TDRC is to conduct research on the practical problems of personnel training and organization development in industry and business. The "Whole-Part-Whole Learning Model" is one unique feature of Swanson's Training for Performance System. Other features include a front-end business analysis method and tools to analyze knowledge and systems work. *Mailing Address:* Training and Development Research Center, University of Minnesota, 1954 Buford Avenue, St. Paul, MN 55108.

BRYAN D. LAW is a University of Minnesota graduate student in Training and Development and a Documentation/Training Intern with 3M Company. *Mailing Address:* Training and Development Research Center, University of Minnesota, 1954 Buford Avenue, St. Paul, MN 55108.

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