# Creating Handouts That Facilitate Learning

Noel E. Wilkin

**SUMMARY.** The academic movements of active learning and abilities-based education have caused many instructors to evaluate their activities in the classroom. One activity that receives inadequate attention is the creation and use of handouts for the purpose of facilitating learning. The psychological processes of encoding and elaboration are helpful in understanding how information is stored and recalled from memory and how the processes of note-taking and review can facilitate storage and recall. Once the overall purpose of the learning experience is determined and the structure selected, layout guidelines can be used to maximize the appeal of the handout. This review of these issues creates a concise guide that is useful in constructing handouts that will maximize the instructor's opportunity to facilitate students' acquisition of information presented. *[Article copies available for a fee from The Haworth Document Delivery Service: 1-800-342-9678. E-mail address: getinfo@haworthpressinc.com <Website: http://www.haworthpressinc.com>]*

**KEYWORDS.** Handout, note-taking, encoding, elaboration, learning, instruction

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## *INTRODUCTION*

Once an instructor has spent considerable time preparing the content for a given topic that will be presented in class, he or she is left with one seemingly simple question: "Should I provide a handout?" Handouts are beneficial accessories to well-prepared presentations, yet they are not likely to receive the same amount of attention that the lecture content receives.[1] They are often an afterthought of the instructor. However, handouts have the potential to facilitate or debilitate retention of the information presented. Handout materials can take the form of copies of slides or overheads, reproductions of manuscripts, summaries of the instructor's notes, or outlines developed from the instructor's notes. The easiest materials to create are printouts of the notes or slides created for the topic being discussed. Many software programs available today will print slides with considerable ease. This raises the question of whether one format will be better than others, as optimal benefits can only be achieved if these materials are used appropriately. If the handouts are to benefit the student, they must contain the appropriate content, have the appropriate format, and be distributed at the appropriate time. While the content is largely dependent upon the subject area, findings in cognitive psychology and educational research can be used to determine the *amount* of information and *how* the information should be presented.

There is a paucity of information on the creation and optimal use of handouts, and without conducting a study within the instructor's class, it is difficult to determine the handout materials that will be *most* effective for that instructor and for those students. These issues do not eliminate the desire or the need to disseminate materials that will complement the topics that are covered within a course or the desire to facilitate learning. This leaves instructors with the need for guidelines to help them create effective handouts that will meet their objectives. This paper synthesizes relevant findings from human information processing and note-taking research and combines this knowledge with style recommendations to provide guidelines for instructors who wish to use handouts as a tool to improve student learning outcomes. This review will help instructors to reflect on how they intend to use the materials that they develop and will help guide them in the development of these materials.

## *DETERMINING THE PURPOSE OF THE HANDOUT*

Many instructors are likely to spend considerable time preparing the content of the topics to be presented during class time but are not likely to spend adequate time considering the portion of the content and the structure of the materials to be handed to the students. This process necessarily begins with answering the question:

*What is the purpose of the handout?*

In answering this question, it may be helpful to consider:

- Why is it necessary to give the students a handout?
- Is the intention to use the handout as a tool to help students structure and retain the information being presented?
- Is the intention to use the handout as a reference source only, from which the students can study at their convenience?

Based on the answers to these questions, the instructor can categorize the handout that she wishes to create as either a student guide or a reference source. The **student guide** can serve as an educational tool to be used during the lecture, and it can be structured so that it maximizes the student's exposure to the material. The purpose of the student guide is to facilitate acquisition of knowledge, skills, or attitudes while the material is being presented. The structure of the handout can affect how the students use the materials and, as a result, can affect whether the handout achieves the intended purpose. It is assumed that most instructors provide their students with handouts with the intention that the handouts will facilitate storage and recall of the information presented and facilitate note-taking during class. While they can assist in facilitating the acquisition of skills and attitudes, handouts are most likely to be used to facilitate the acquisition and recall of information or knowledge. Based on existing theories of how people store information and the benefits of note-taking and review on this storage process, recommendations can be made as to which presentation format will promote these activities and what handout designs will maximize the benefits from these activities.

The **reference source** handout is primarily used after (or in place of) material covered during the presentation. It serves as a concise resource that supplements the information covered in class. Also,

students can use the reference handout to ensure the validity of the notes that they took during the class. The purpose of the reference handout is to supplement or clarify information that is presented rather than to serve as a medium designed to facilitate learning during the presentation. If the goal is to provide complete information to students without concern for how the student uses the handout while the information is being presented, then complete handouts should be created using appropriate type style, layout, text, and graphics (covered in the General Layout section of this paper). Even in these cases, there is the potential for the student to use the materials for review. Both the student guide and reference source handouts can be used to facilitate student retention and recall of information. To understand how handouts can be used in these ways, a review of various human information processing abilities is warranted.

## *INFORMATION RETENTION ISSUES*

By providing information to students in a handout, an instructor has deemed the information to be of some importance and is suggesting to the students that the information should be remembered. To explore how this can be facilitated by the handout content and structure, a discussion of the research findings in the area of human information storage and retrieval is warranted. Theories of human information processing have been developed from research in the area of cognitive psychology. The subsections that follow describe the most important findings from cognitive psychology as they relate to the use of handouts in classroom instruction.

### *Types of Memory*

Much of the research on memory has postulated that memory contains two entities (see Ref. 1 for a review of these theories). These two entities are generally referred to as working memory (short-term memory) and long-term memory. Working memory holds information that is being used to conduct the task at hand, while long-term memory is more appropriately thought of as a library of information that can be borrowed when needed for a given task.

Considerable research has been performed to evaluate the abilities

and limitations of working memory (for reviews, see Refs. 2 and 3). This research indicates that working memory:

- Is limited in its ability to store information
- Is more a process of manipulating information than a holding place for information
- Is easily accessed and fragile, as new information will replace information that is currently being "worked on" in working memory
- Has many ways of being accessed, including perceptions from the environment, information retrieved from long-term memory, and thoughts generated during the processing of information (2).

These findings, combined with the fact that the only way for information to reach long-term memory is through the working memory, have considerable implications for the process of learning. Most relevant here is the implication that information must be rehearsed or repeated so that it stays in working memory long enough to have the chance to be stored in long-term memory.

### *Rehearsal*

Given the transient nature of working memory, it has been proposed that to maintain information in working memory people must be able to rehearse it (4). Rehearsal can take two forms. Maintenance rehearsal is the type in which people simply focus on the information to be remembered, without regard for its meaning. For example, repeating something over and over is considered maintenance rehearsal. Elaborative rehearsal entails thinking about what the information means, how it is related to the task at hand, how it is related to other items in the environment, and how it relates to information already stored (2). This form of rehearsal requires more cognitive processing. As one would expect, maintenance rehearsal is inferior to elaborative rehearsal as a preparation method for many memory tests. This is mainly because of the way that elaboration affects the storage of information in long-term memory.

It is believed that information is stored in memory through a process of encoding that uses a series of judgments, inferences, and generalizations to make sense of the information and connect it to data already stored in long-term memory (5). Retrieval of one piece of

information improves the chance that a person will recall those pieces of information connected to it. For example, a person may not be able to remember the name of one of his grade school teachers. However, one day he sees one of his grade school classmates and is suddenly able to remember his teacher's name. This is most likely due to the fact that the information about the classmate was connected to information about the grade school environment, which included the teacher's name. This process of connection is facilitated by rehearsal. It has been proposed that elaborative rehearsal can lead to improved memory in at least two ways (3). First, it provides redundant routes for retrieving information. The more connections made between new information and information currently stored in memory, the more ''routes'' there are for retrieving the new information. Returning to the example, the teacher's name may have been connected to the name of the school, the name of the town in which the school was located, etc. These redundant routes provide multiple paths to the information which cannot be readily recalled, hence, the more routes, the higher the probability of recall. Second, it helps people to infer what they can no longer remember. For example, assume that it was the name of the grade school that the person could not remember instead of the teacher's name. Suppose he could remember that it was named after the town and he could remember the name of the town, so he could infer the name of the school. These findings imply that a handout that allows the student to elaborate on information and process the meaning of information will improve the likelihood that the student can recall such information when it is needed.

Elaboration opportunities can be facilitated by handouts, and they can be instructor-generated or student-generated. First, elaborations provided by the instructor can be placed on the handout. For example, the instructor might list the new information to be learned and then provide other information that is related to the new information. In essence, this strategy requires that the instructor explicitly build the connections for the students; i.e., she must relate the new information to information that is already stored in a student's memory. Examples would include explicitly linking new information to information that was already covered in class. Or, the instructor can use analogies that will help the student relate the concept to more familiar concepts. This strategy will help students elaborate on the information presented and will help them organize the information. Because people store infor-

mation categorically, information meant to help students understand its meaning can assist them by simplifying the process of placing information in the appropriate categories. Further, if the instructor organizes the information on the handout according to the way that the instructor understands and assigns meaning to it, then there is an increased likelihood that the student's meaning for the information will resemble the instructor's. This may be advantageous if the instructor's organization of the information is likely to be masterful. Second, a handout can provide students with opportunities to elaborate on the information themselves. For example, a handout can encourage students to think of how this new information is relevant to a previous experience they have had. Any question that will encourage students to consider the meaning of the information is likely to facilitate recall. The instructor has a choice: he can provide the elaborations or he can encourage student elaboration. It seems reasonable that student elaborations will be effective as they will ensure that the information can be connected to the information that is stored in each student's unique memory. In fact, there is evidence to suggest that student elaborations might be better than those provided by the instructor (6). However, if the instructor chooses the elaborations carefully (using those that convey meaning for the student and that constrain the information to be stored), then the source of the elaborations will not be as important (3). In fact, it has been argued that a person's intention to learn does not matter as much as how the person processes the information during its presentation (7, 8).

In summary, it seems that providing opportunities to encode and elaborate on the information presented in class will result in improved recall. It is therefore useful to examine student behaviors that will increase the likelihood of successful encoding of information and subsequent recall.

## *NOTE-TAKING ISSUES*

Note-taking and the review of notes are student behaviors that seemingly hold the potential to encourage elaboration and information storage. The behavior of note-taking is likely to provide the opportunity to process information being covered in class while it is being presented. The subsequent review of the notes will be affected by the quality of the notes that were taken and the process used to review the

notes. Herein lies the implication for handout development. The handout has the potential to influence the way in which the students take notes during the presentation (the process of note-taking) and the manner in which the students use the notes to review (a product of note-taking). The process of note-taking includes the act of documenting the critical points of a presentation. This process, which is ingrained in norms of classroom activity, has the potential to offer students several benefits, including encouraging attention and encoding the material presented. The product of note-taking is likely to influence the review of the notes taken. This review is essentially a rehearsal process that facilitates storage and recall of information. Both the process and the product are likely to influence academic performance, and both provide an opportunity to encode information (9, 10).

### *Note-Taking Process*

The benefits of note-taking have been evaluated experimentally by comparing the recall performance of those who take notes while listening to a presentation to the recall performance of those who do not take notes during the presentation. In these comparisons, the groups are not given the opportunity to study or review the content of the presentation (10, 11). In an evaluation of the research on the note-taking process, Kiewra concluded that taking notes will aid–but not ensure–recall (10). A majority of the studies (33 out of 56) found that taking notes was more beneficial than simply listening. Twenty-two studies found no difference, and two found that note-taking was dysfunctional.

Instructors also hope that during the process of taking notes, students are taking accurate notes. It has been known for some time that there is a correlation between correct information in the notes and correct information on tests (12). Other research indicates that even when notes are not reviewed, the number of critical lecture ideas recorded during note-taking is correlated with test performance (11). This is particularly disturbing when one considers the incompleteness of student notes. Even good students may not take down all of the critical points presented during class, and many students take fewer notes as the class period progresses (13).

These findings emphasize the importance of taking accurate and complete notes during a presentation. It seems reasonable to assume that the act of accurately transcribing what is heard facilitates the

storage of information for later recall. While encoding obviously takes place, the actual quality of processing that occurs during note-taking has not been established (10, 14). However, it is likely that as long as the processing that takes place during note-taking is consistent with how the student will be tested and the student is aware of these expectations, the act of note-taking will be beneficial to students' performance on tests (15, 16).

### *Review of Notes*

Like the process of note-taking, a majority of the research (17 out of 22 studies) investigating the benefits of review found that students who review their notes will outperform those who do not (10). Kiewra found only five studies that indicated no significant differences (10). This behavior is investigated by comparing those who review their notes to those who do not. As one would expect, the impact of the review on performance is dependent on the materials available for review (10, 14, 17). Review of a complete set of notes is beneficial. Both students who listen and review the instructor's notes and students who skip class and review the instructor's notes are likely to outperform those who attend class and take and review their own notes (18, 19). However, this effect is likely to be tempered in higher order processes (application, analysis, synthesis, and problem solving). The differences found on factual exams have been attributed to incomplete notes taken by the students. One implication of this finding is to inform students of the instructor's expectations prior to note-taking. If the instructor tells students how they will be assessed, e.g., factual recall or higher order processes, it is likely to influence their note-taking and recall (15, 16).

### *Implications for Handout Creation*

Given the evidence relating effective note-taking to positive outcomes, this section lists a number of suggestions designed to improve the handouts used in classroom instruction.

*Provide students with a handout that encourages them to take notes*. In addition to providing handouts, instructors should verbally encourage students to take notes and provide them with a handout that allows room for taking notes. Incomplete outlines can accomplish this. For

example, a handout that has bullet points indicating that there are critical points supporting the general concepts that need to be transcribed from the lecture could be effective. The question, "How much space is needed to encourage note-taking?" is a reasonable one. It seems that the more space instructors give students, the more notes they will take (20). But the quantity of notes is not as important as the quality of notes; i.e., it is more important for the students to have more of the key points than to have simply more notes. Also, instructors should tell students how they will be held accountable for recalling the information for an exam. This is likely to influence the notes that they take.

*The handout should maximize the opportunity to note the critical points of the presentation*. While there could be alternative explanations for the correlation found between key points in the notes and performance on tests, this does not eliminate the fact that students cannot review information they do not have. Given the incomplete nature in which students take notes, a handout that facilitates the transcription of a complete set of critical points will be beneficial. The handout should promote complete note-taking by indicating key points, e.g., uncompleted or skeleton outlines. The outline must be explicit as to what critical points the student needs to note while still allowing for the opportunity to take personally meaningful notes that facilitate understanding.

*The handout should clearly organize the information being presented*. Providing students with a handout that clearly organizes the information presented will facilitate their storage and recall of the information. Given that the goal is to process the information during the presentation in a manner that assigns meaning to that information, two objectives can be established. First, the instructors should develop the content of the handout in a way that allows students to understand the information being presented. This will facilitate students' ability to take accurate notes. While this will be determined by the specific content of the material being presented, there are a few general ways in which this can be accomplished. For example, the instructor can use analogies, can build on previously covered information, can ask questions that force students to think about the meaning of the information, and can organize the information according to its meaning. However, elaboration activities facilitated by the instructor should not interfere with the process of taking complete notes. Therefore, a second objec-

tive is to incorporate elaboration exercises into handouts that can be used by students during review.

*The handout should encourage structured review of the notes*. Reviewing the notes maximizes the opportunity to encode and elaborate on the information that was presented and increases the students' chances of performing well on tests that assess the retention of that information. Reorganization and outlining of the information taken in the notes is effective in improving performance (10). This can be accomplished by providing blank outlines that can be used during review. Further, if the information can be organized conceptually in a way different from how it was presented, a matrix that encourages reorganization would be appropriate.

The research in this area does not suggest a specific way that students should take notes or review notes. Also, it does not give instructors empirically tested ways to facilitate storage and recall of the information they want students to learn. Hence, these suggestions, which are based on the findings from the note-taking research, are intended to help until more specific recommendations can be made.

These recommendations are a tall order for a document that, to date, is created probably as an afterthought to the content of the presentation. Moreover, these suggestions are quite specific when, in fact, there is little evidence suggesting the most effective means for structuring handouts. However, some assurance that the outline format will be beneficial is available from research conducted on the types of note-taking formats that result in the best learning outcomes.

### *Formats That Facilitate Note-Taking*

Research on note-taking formats has centered around three formats-conventional notes, outlines, and matrices. Conventional notes are notes students take on their own from the materials being presented. An outline is a more structured note-taking format that provides a portion of the presented material. The matrix is a two-dimensional table that represents the conceptual relationships between the pieces of information presented. The main topics are placed in the columns across the top of the page, and the subtopics are placed in the rows down the side of the page (21). Both the outline and matrix notes are more likely to result in a more complete set of notes (containing more of the key ideas) than conventional notes, and this translates into better performance on tests (21, 22). Of the two, the outline format seems to

be slightly more beneficial to students when considering the number of ideas transcribed for each format and performance on a recall test that was based on the material presented (23). However, while the outline format will promote accurate and complete note-taking, it does not assure or prescribe a systematic review of the notes taken.

### *Note-Taking and Review System*

One system of note-taking prescribes behaviors that are intended to influence the process of note-taking, the product of note-taking, and the process of review. The Cornell Note Taking System, developed in 1962 by William Pauk and published in a text entitled *How to Study in College,* calls for the student to engage in the "Five R's" (24). These five steps, which include record, reduce, recite, reflect, and review, are facilitated by the layout of the page. The page is divided into two columns. The left column is two inches wide and the right is six inches. Using the right column, the student records the lecture, taking down as many of the meaningful concepts as possible. The next step is to reduce. Soon after the lecture, the student uses the left column to write a summarization of the meanings and relationships of the concepts covered. This summarization affords the opportunity for elaboration. The third step is called "recite." Here the student is encouraged to cover the right (larger) column with a piece of paper, and using the words jotted in the recall (left) column, repeat the facts and concepts in his own words. Ideally, the student will repeat these concepts in three or four different ways using different words, but in ways that convey the same meaning. This activity further connects the information to that stored in memory. The system calls for the student to reflect after reciting the material. The essence of this activity is to enable the student to form a holistic understanding. Through reflection the student should be able to categorize the essential components of the notes and understand how the information fits together. The final step is review. In this stage, the student is encouraged to conduct a quick review (20 minutes each day) of the notes. Review involves an explicit repetition activity that is likely to improve information retention.

Based on the way in which people process information, this system is likely to encourage information storage and recall. This system calls for a specific page layout, but the benefits are conveyed primarily by the manner in which the student uses and processes the information, i.e., the layout facilitates student activities found to improve perfor-

mance (e.g., note-taking, reorganization, and structured review of the material). This format could be expanded to include a skeleton outline in the right column that will organize the material to be covered.

On the other hand, an instructor may not feel that it is her place to force a student to engage in these activities outside of class. Indeed, this system is prescribed in a book for students on how to study, and nothing prevents them from using this system on their own to study the material covered during class. However, if a handout can facilitate student learning–inside and outside of class–with little additional effort from the instructor, creating such a handout is worthwhile. After all, note-taking and review are both beneficial learning behaviors (10).

## *GENERAL LAYOUT ISSUES*

To facilitate note-taking and review, handouts should have a well-organized flow of information that makes it easy for the student to find and read the information presented, both during the presentation and afterward. Whether the handout is meant to serve as a student guide while the material is being presented or as a reference source for use after the presentation, general layout issues need to be considered. These include the type style, layout, text, graphics, and appearance (25, 26).

### *Type Style*

The type style includes elements of font and size. To make a handout easy to read, a simple, neat font should be chosen. The font can be varied to provide emphasis for important information. However, this can be overdone; one should limit the number of fonts to two or three types, and all should be easy to read. This will allow for emphasis but decrease distraction. Proportional type should be used because it is easier to read. Color can be used effectively to emphasize particularly important information. However, the cost and time involved in producing large numbers of color handouts must be considered.

### *Layout*

A creative, attractive, and functional layout should be used. In general, pages with consistent margins that contain headers and page

numbers will be appealing and provide a functional layout. Of course, attractiveness of handouts is in the eyes of the beholder. Instructors should strive for an uncluttered look. Creativity can be used to incorporate information into a functional layout. For example, instead of simply having bullet-pointed items divided into sections, the instructor might place them in boxes or balloons that represent relationships between the items. A rule of thumb that is commonly applied to business presentations, which are created to be appealing, is to leave 50% white space on each page. This is used to decrease the clutter and amount of information so that it can be processed easily. Also, the layout should provide ample space for the student to jot down the key points from the lecture. This rule should be applied if the instructor would like students to find and use the information on the handout easily, for example, using bold, italics, and fonts to emphasize important information or headings.

### *Text*

The text of a resource handout should contain the essential information. If this handout is to be used as a reference, it should contain only that information that is essential to the topic at hand. The manner in which the handout is to be used should serve as a guide. If it is to be a simplified representation of other information, then jargon and technical terms should be defined or avoided; i.e., the instructor should cater the terms to the audience and the purpose of the presentation.

### *Graphics*

Graphics are an appealing way to represent information. There is some evidence that mental imagery plays an important role in cognition and memory (27). As a result, the use of graphics may improve the likelihood that students will store the graphically represented information and improve the likelihood that they can recall it when it is needed. At a minimum, graphics that are constructed so that they capture the meaning of the information will improve the likelihood of recall because the information could have been stored propositionally or graphically by the students.

Overall, these guidelines will help the instructor to create an appealing handout that can be used easily by students. He is likely to want

the student to refer to the handout as a reference source but would also like the handout to help facilitate learning, memory, and retention of the information. The instructor must evaluate the intended outcome of the handout and use these guidelines to maximize the benefit of the handout materials.

## *CONCLUSION AND IMPLICATIONS*

The creation of handouts begins with a seemingly simple question, "Should I provide a handout?" Ultimately, the answer depends on what the instructor intends to accomplish by providing the handout. The process of storing and recalling information in memory can be facilitated through the use of a handout that is structured to promote the encoding and elaboration of the information presented. Note-taking and review are activities that are likely to play critical roles in the process of storing and recalling information. Given the prevalence of the note-taking behavior in classrooms across the country, there is considerable opportunity for instructors to use handouts to improve the outcome of this behavior for the purpose of improving learning.

In summary, students should be encouraged to take notes and review them. Because of the benefit afforded by taking notes, the handout should be given out at the beginning of class. This capitalizes on the encoding opportunity afforded by taking notes on the key concepts in the lecture. A handout in the form of an outline seems to be the best format to ensure that the students get a complete set of notes to review. The benefit offered by the review process seems to work through the cognitive process of elaboration. The handout should contain space in which students can take notes of their own, but not so much space that students become distracted from the key points and concepts by trying to transcribe too much of what is being said. This distraction can be further minimized by creating a handout that is appealing and neat and uses fonts, text, and graphics appropriately.

The recommendations made here are based upon the theoretical findings in cognitive and educational psychology. This is not to say that each instructor is going to reap benefits from creating and using handouts in this fashion. Rather, these guidelines are meant to provide direction to an activity that receives precious little attention and forethought. Following the guidelines for creating handouts discussed in

this paper can lead to improved student note-taking and subsequent improved learning outcomes.

## NOTE

1. The term *presentation* is used to describe the conveyance of information during a scheduled class period. This information could be conveyed using lecture, discussion, or other active learning method, such as those discussed by Peter Hurd elsewhere in this issue.

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