How to Get Little or No Effect and Make No Significant Difference

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Recently, I completed a survey of the research and evaluation on the Information Mapping method of structured analysis and writing of training and reference documents. (Horn, 1990). It describes and compares major evaluations in business and university doctoral dissertations. Most of these experiments were well designed and showed significant improvements in learning (on the order of 10 to 30 percent) or much better retrieval of information (up to 50 percent better) than the documents used by the control groups. Significant increases in on-the-job productivity were shown in implementation studies.

Several studies, however, failed to show better scores than the documents used by control groups. "How could that be?" I asked myself.

I looked at these studies harder than most and I began to understand. They were guaranteed from the design of the experiment to produce no effect!

So, for the benefit of novice evaluators and researchers, I propose in this article some ways to design experiments such that results of "little of nor effect" are virtually assured. You can make no significant difference in your examination of instructional and reference materials by following the easy guidelines given below.

Why would a researcher want to get little or no effect? You'd think that nobody would want to. Do novice researchers get confused by the obtuse way of writing null hypotheses? Maybe. The obfuscatory way of writing dissertations is by now famous.

Whatever the intentions, the fact is that several researchers, including myself, have designed experiments that, upon reflection, one could almost certainly forecast getting no effect. Yet all of the experiments I will be discussing in this article asked good questions and had research designs which were quite competently done from the standpoint of technical requirements, statistics, controls, group size, etc.

What appears to have happened is that the researchers included a "fatal flaw" which for the most part had to do with one factor overwhelming the outcome to be measured. So I will look first at retrieval experiments and then at learning experiments to illustrate how this could happen. Finally, I will make some remarks about evaluation from simple observation of the materials themselves.

I want to make some other remark before starting. The following may strike some people as somewhat ironic or comic. As G.K. Chesterton once said, "You don't have to be somber in order to be serious." I hope readers will take my "laws" in that spirit.

Getting Sure-Fire No Effect from Information Retrieval Experiments

I have frequently made the claim that retrieval research is as important as learning research, since we all forget most of what we learn within a month or two. This has led some researchers to do experiments on documents prepared according to Information Mapping's method to show that these documents improve the speed and accuracy of retrieval.

To do these experiments, researchers prepared the documents in two different ways, one according to the Information Mapping method an the other according to some "conventional" approach. Users were asked to find the answers to questions or to perform some tasks. Users were given them a fixed limit. In these retrieval experiments, researchers generally compare the average errors (or correct answers) of the two groups.

How could a researcher get no significant effect in such circumstances? Easy! Allow retrievers an unlimited amount of time.

There is a second possible kind of error in retrieval experiments. If the size of the document used for retrieval is very small—say one sheet or a few sheets of paper—and the time you allow is long enough, then you can expect that both the experimental and control groups will get approximately the same scores.

So the **Law of Getting No Effect (Information Retrieval Department)** is:
Anybody can retrieve anything from a small enough document, given unlimited amount of time.

No one consciously sets out to prove this law, yet the outcome of the efforts might make one think otherwise. Because I have the papers and dissertations, I can assure you they have. I will not give citations out of courtesy to the researchers whose good intentions are clear from the amount of work they put into their experiments, but whose exact thinking about why they thought they would get effects is unclear from their reports.

Getting No Effect from Learning Experiments

Another common kind of research asks: "Did the subjects learn better from one set of documents rather than another?" In these experiments you generally compare two groups using two different sets of documents (or other material, e.g. audio-visual). In some experiments you give everybody the same amount of time and count the errors (or correct answers). In other experiments, you give learners as much time as they want to learn from the materials, and count time and errors (or correct answers).

If students are given unlimited amounts of time to learn the material, you can generally get no effect outcomes, similar to retrieval experiments.

This gives us our second **Law of Getting No Effect (Learning Department)**:
Anybody can learn anything in an unlimited amount of time—especially if they are highly motivated.

In learning experiments you can wipe out your ability to detect many differences in scores by increasing the amount of high quality practice you require the subjects to do. This derives in Thorndike's law of practice. Increase the amount and quality of practice and you will have to increase the amount of learning material in order to show any differences.

This gives us our third **Law of Getting No Effect (Learning Department)**:
Anybody can learn almost anything if they practice enough.

Another way of producing no effect is to organize the learning in an almost identical fashion and present the two groups with only minor differences in format. Why? Because the amount of practice overwhelms the ability of the experimental design to detect differences. Why? Because the materials are more similar in critical ways than they are different.

One of our own early experiments suffered from this defect. We had enough material—almost ten hours of classroom use of the materials. We had good controlled experimental circumstances. We had motivated students. They all had the same amount of time. But the only difference in the material is that we placed the map titles and marginal labels, hallmarks of Information Mapping's most frequently used format, into the text itself. So essentially the experiment was a test between two different formats. The analysis, organization, and sequencing was identical. All the words were the same, in the same order. And the practice constituted half or more of the time the learners spent with the materials.

This gives us our fourth **Law of Getting No Effect (Learning Department)**:
If you give two groups essentially the same materials, the will learn the same amounts from them—or your randomization is faulty.

One of the major mistakes in initial contact with Information Mapping's method is to think that it is only a format. Such a mistake leads researchers to design experiments based on formats. Note here that differences in organization are different from differences in format. So how do you find out if differences in format make a difference? You almost certainly have to do retrieval type experiments—if the organization of the material is very similar. The effect of practice is so great that you might have to make the learning experiment impracticably long to test formats.

This gives us our fifth **Law of Getting No Effect (Formats Department)**:
Differences in format are difficult to detect in learning experiments.

Wiping Out Effects in Naturalistic Settings

One of the important kinds of evaluation is to see if a particular set of learning or reference materials works in an on-the-job or an in-the-classroom-with-real-students situation. This is normally called the "field test."

Besides yielding "operating characteristics of the documents, field tests also provide sometimes unexpected valuable results. For example, on-the-job research has shown certain formatting and readability requirements that writers at their word processors had not anticipated.

But such "naturalistic setting" as jobs, classrooms and laboratories may be the wrong place to attempt to measure for certain effects. For example, if the task involves only a few stages of procedural steps to describe, but doing the steps takes on the average a few hours, then task length may wipe out any measurable differences between two treatments of a few pages of written instructions. This is exactly why scientists from Galileo onwards have attempted to isolate the variables by the design of controls in the experiment.

This leads to my next **Law of Getting No Effect (Bustling, Distracting World Department):**
You can't see the measurement if the world is standing in front of the ruler.

Getting No Effect by Not Seeing the Invisible

Another way of evaluating different documents is to ask users or experts to evaluate them by examining the documents themselves. The presumed point of such evaluations is to find out the opinion of the subject as to which document is "better." But this method of doing research requires more controls and better thinking than most research designs.

By just looking at some documents superficially, all you can really see are their superficial aspects. *You can not easily see the kind of analysis that went into the document.* Therefore, for example, you can *not* see the kind of completeness and appropriateness of the document generated by appropriate application of Information Mapping's method. You can not see the organization and sequencing of the document well without comparing it to another version of the document generated by some other methodological (or non-methodological) approach.

If the subjects can not compare carefully the full differences between differences in the methods, it is unlikely that they will be able to give a meaningful comparison. But surely people wouldn't do that, you might say.

I have recently run into a circumstance where a group of writers in a company were given a small sample of Information Mapping's method and asked to compare it to what they did. They, predictably, looked at the format, without examining the underlying analysis, organization and sequencing of the material. Predictably they suggested there was no significant difference.

This gives us our next **Law of Getting No Effect (Learning Department)**:
If the evidence is almost invisible, then you won't be able to see it.

Information Mapping's method has from the very inception been a method that included guidelines and rules for
• analysis
• organization
• sequencing, and
• presentation

of documents. But those who have taken only a superficial look at it have thought that they could establish its benefits only from the presentation formats because they were the most visible.

Conclusions
One of the startling things about the experiments, as I noted at the beginning of this article, is that the research designs were quite competently done from the standpoint of technical requirements, statistics, controls, group size, etc. and the right questions were asked. Yet each of the experimental designs included a fatal flaw.

The laws summarized above add up to my final law:
It is easy to get no effect and make no significant difference.

References

Horn, R.E. (1990) How High Can It Fly? The Lexington Institute

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Summary of the Laws of Getting No Effect

Retrieval

1. Anybody can retrieve anything from a small enough document, given unlimited amount of time.

Learning

2. Anybody can learn anything in an unlimited amount of time.
3. Anybody can learn anything in an unlimited amount of time—especially if they are highly motivated.
4. If you give two groups essentially the same materials, the will learn the same amounts from them—or your randomization is faulty.
5. Anybody can learn almost anything if they practice enough.

Formats

6. Differences in format are difficult to detect in learning experiments.

Bustling, Distracting World

7. You can't see the measurement if the world is standing in front of the ruler.
8. If the evidence is almost invisible, then you won't be able to see it.