Research: The Inquiry for Truth[1]

Ted Ward

The responsible scholar approaches research as an honorable and exacting task: *The inquiry for truth*

The Christian Researcher's Ordinal value: Truth. Newly discovered truth is the researcher's greatest joy. It is relatively rare, even for the competent and experienced researcher, to truly discover something that is not already understood or at least suggested by others. If an experimental study has a flaw in the design, a mishandled procedure, or a careless overstatement of an outcome, the researcher's reputation can be blighted beyond repair. Careful researchers are cautious, but when the evidences are "air-tight" and the analyses are carefully disciplined, solid contributions to theory can be the threshold to respectable honor.

Carelessness, ill-advised exaggeration, or deliberately biased handling of data has the effect of "lying to scholarship." Even innocent accidents can lead to errors; such errors and errors, when published, become a source of falsehood. Thus to publish an outcome or conclusion hitherto only suspected is especially hazardous. Not only does it discredit the author, but any subsequent use of the flawed research can pollute the flow of scientific inquiry.

The most important quality of any research is its fidelity to truth. Speculation and amateurish guesswork are abhorrent. The disciplined researcher labors under profound constraints. The urgency of truth is more clearly visible in experimental (quantitative) studies because the data are more definitive and the procedures are easier to replicate and validate. Within descriptive (qualitative) research, there is often a greater tolerance of sloppy procedure and inexact management of data. This is one reason for the current disdain for qualitative research. The burden of honesty is no less, but the looseness of reasoning and the apparent need to use inexact descriptors tend to draw the researcher into a more fuzzy realm of reasoning. The only defense for the thoroughgoing researcher in the qualitative mode is to be very circumspect about the particulars of description: precision of nomenclature, standardization of verbal analysis, resistance to emotional involvement and to the temptations of bias in handling interview data, and complete avoidance of "putting words in a subject's mouth."

The Rudiments Of Science: Curiosity, Inquiry, Discovery

The researcher's God-given motivation: Curiosity. In the normal human curiosity is a driving force. It is a built-in feature of the way our Creator made us. We want to know *what is.* Humans are by no means the only creatures that exhibit curiosity. For some creatures, life itself is highly dependent on curiosity—the quest for food, for avoidance of danger, for habitat, and for suitable mating. In the human, curiosity takes on a particularly creative role. It is not enough to determine *what something is;* we ponder over *what it is for a*nd how it works. We invest brain-time in considering what else it could be and do. Humans invent things by seeing beyond the present. We see the possibilities. A rock is not simply something to be stumbled upon. If thrown it becomes a weapon and if grasped firmly it becomes a primitive hammer. Few animals give so much attention to finding or making tools to creatively extend their ordinary capabilities. But for humans, this extension of

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curiosity is raised to a fever pitch! People who tend to be creative rarely accept the first possibilities that come to mind. We invent. God invested in us the combination of curiosity and flexibility that allows us to be motivated by and to take action upon our high levels of creativity.

The motive of research: Inquiry. Curiosity, when played out systematically and productively, is properly called inquiry. In the learner who is showing the gifts of research, one of the earliest characteristics is watching "to see what happens." Our first son as a two-year old loved to watch trains pass by. After many weeks of indulging this fascination, on one afternoon his parents will never forget, he exclaimed, "No boose!" Glancing across the lake at the last of the passing train, we realized that he had noticed there was no caboose on the otherwise familiar afternoon freight train. He had discerned that this train was unusual in that it did not end with his favorite car. If he had been older and a regular newspaper reader he might have known that federal regulations had very recently been changed, allowing railroads to operate freight trains without the traditional "farewell" car. But as a careful observer of trains, he had noticed the change. He had reacted, expressing a hunch that something was different about this particular observation. This *hunch* started him off into a scientific path. *Inquiry* could next draw him into these investigations: How frequently will this be true? Why? What's the reason for this exception? Is this actually something new? Will I see it again? Will it always be this way? It is human to be led into inquiry by the unusual, the unexpected, and the dissonance between the expected and the discovered.

The reward for curious inquiry: Discovery. Discovery is the third component of this scientific cycle. It is the conclusion that will almost surely not be the *end* but rather the point at which yet another cycle of science starts. Discovery depends upon more volition, foresight, and activity than does curiosity and inquiry. Those who deliberately search into the unknown territories, histories, diseases, mysteries, and puzzles of all sorts are far more likely to be the discoverers. In terms of our nation's history, reflect on Christopher Columbus, Giovanni da Verrazano, the brave souls on the *Mayflower,* the Corps of Discovery, the astronauts—those who put themselves into difficult situations, taking risks in order to discover. Their curious inquiry deliberately turned segments of the unknown into the known.

The cycle of three initial operations constitutes the *rudiments of science:* curiosity, inquiry, and discovery. Science is concerned with what can be known of the universe. Since expansion of science is motivated by curiosity that leads to inquiry, these components stimulate the frameworks and disciplines for discovery. Following in this paper is a view of science as the disciplined framework in which knowledge is wrestled loose from mystery, myth, and wishful thinking. Science is concerned with truth in terms of both validity and reliability. *Building knowledge* is the motive of science.

Often, a research inquiry begins with a hunch. *Hunch,* especially in a disciplined mind, emerges from experiences, reflections, reading, deliberate or casual observation, and creative reasoning in which multiple ideas coincide as "*aha* moments" in one's imagination. This sort of hunch will usually require refinement through a process of sharpening and focusing. If the hunch can be adequately disciplined, what will follow is its formalization of the grounded information and ideas into something that can be put to the test in order to determine its claims. This process is called "hypothesis testing." It is at the very heart of theory-building, the great building-block of science. To accomplish this, the researcher must identify the pertinent variables, propose a procedure in which they can be made functional or operational (under carefully controlled and thoroughly documented conditions), and assure that changes or observable differences will be greater than chance occurrences.

A precisely stated and well-grounded hypothesis is the beginning point for hypothesis- testing. Though it may have arisen as a hunch in the researcher's mind, the hypothesis must have matured to a researchable state, based on substantial descriptive (qualitative) studies. (These grounding studies may have been carried out by the experimental researcher or by others.)

The hypothesis must be stated in a testable form; thus it will be possible to confirm or disconfirm it by data from an appropriate experiment. Some form of data-gathering, usually before and after the experimental treatment, must be planned and executed. The results are then ready for sharing and further judgment. What survives this process is then published for the field as a *conclusion.*

The paragraphs above are a sort of vernacular review of the steps a beginner takes to move toward a research proposal. Taking these hastily stated procedures in more precise terms, it is possible to suggest what should take place in the development of a research plan.

Discipline is at the foundation of science: orderly procedures, precise measures, orderly nomenclature, and standardization rather than idiosyncrasy. From beginning to end, from planning to final reporting, everything is carefully described in thorough documentation. The discipline of science also suggests a cycle. The procedural steps of orderly scientific inquiry generally form a sequence somewhat like the following:

1. <u>EXPLORING whatever is known about a situation, problem, place or behavior</u>. Libraries and archives of documents are commonly the first major repositories from which the researcher seeks to identify and review the history of previously developed knowledge about the phenomenon or process.

2. <u>GAINING EXPERIENCE with the variables of the study</u>. This step is often intertwined with the EXPLORING step, especially if one's study is grounded in operations and experiences with which the researcher has first-hand knowledge or career experience. Nothing is more appropriate than spending a substantial block of time "living with" the phenomenon or context in which the research is needed.

3. <u>DISCOVERING CLUES to grounded hypotheses</u>. This step can be accomplished most readily if the phenomenon has been given thorough examination and documentation in a competent qualitative research. Otherwise the previous research, experience, or historical writing on the phenomenon may require more descriptive work before engaging in any sort of hypothesis-testing.

4. <u>ORGANIZING AN EXPERIMENT to test the selected hypothesis (or hypotheses</u>). Assuming that human subjects will be needed, the issues that must be considered include what characteristics are the proper descriptors of the human subjects affected by or experiencing the circumstances, inputs, or activities indicated by the independent variables of the experiment? The research plan must also deal with the issues of consent, sampling procedure, and assignment to experimental or control groups.

5. <u>PRE-TESTING the experimental group and the control group</u>. Using an appropriate instrument or observable indicator that is known to be sensitive to the effects being tested, any changes or differences that indicate the consequences of the experimental treatment must be assessed. This pre-testing is primarily for the purpose of providing a base-line for assessment of differences detected in the post test, but it also serves the purpose of assuring that the experimental group and control group are equitably balanced ("matched").

6. <u>Performing the EXPERIMENTAL TREATMENT</u>. The "treatment" might be a relatively long or a very short experience, according to the requirements of the experiment. In other words, whether the issue is reacting to a sudden or surprising event or experiencing a period of contrasting diet, the need is for a thorough and complete encounter with the experience being tested. Of course, a longer treatment generally exposes the subjects to more numerous and more varied extraneous influences that may confound the outcomes.

7. POST-TESTING the experimental group and the control group. Comparing the sets of scores will discern the effect of the treatment. This second careful measurement should be made very soon after the experimental treatment. (Usually the same instrument or its equivalent is used *pre* and *post.*) Making this comparison will test the validity of the hypothesis (subject to the statistical analysis of the data).

8. STATISTICAL ANALYSIS of the data. Statistical tests of the data will be needed in order to assess the degree of confidence in the outcomes; the statistical tests will enable the final judgments about the worth of the hypothesis. The selection of the statistical tests and the means of undertaking the analysis must conform to accepted scientific standards and practices.

9. DOCUMENTING THE OUTCOMES, their meaning, and probable applications. This documentation will provide the full story of the experiment. It represents the experiment, its background, and the relationship to other relevant data. The researcher is obligated to report to the professional scientific world in appropriate language and level of detail. These documents should reflect minimal personal opinion and bias.

10. SEQUEL. If the report of this research is accepted and is granted the high honor of general agreement about its validity, within the accretions and flow of science, it will add in some identifiable way to the body of theory underlying the particular scientific knowledge to which it is a useful contribution, an accretion, or a modification.

Special note to learners: This document is an effort to describe the procedures involved in carrying out an exercise in research—*from hunch to conclusion, without skipping a step!* You may be delighted to know that doctoral dissertations usually focus on either the *descriptive* part (steps 1-3) or the *experimental* part (steps 4-9) of the research sequence. Choosing which of these two parts will depend on how much is already in the literature on the problem. If the problem is not already commonly studied, it would be wiser to begin with a thorough literature review and treat it in the *descriptive* mode.