Research: Large "R" or Small?

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The purpose of this essay is to clarify the distinction between research and experimentation. Working with experiments is an integral part of research but there are many experiments, which have no research component. An experiment is an attempt to try out something new, to test a theory, an idea, a product, an approach. Research is what happens when that test is subjected to certain clearly defined boundaries and restraints: limits as to time, place, experimenter, scope, range, and variables. If a group of parents decide to start a school without teachers, for instance, that is an experiment. If they decided to start a school without teachers and they agree to study the school and its effect upon the children for a given period of time; if they set out clear objectives and get some measure of where the children are in regard to those objectives before they start; if they measure the change in the children at, say, a year later; if they have multiple measures and some check on their own probable bias; if other people not involved with the experiment see the same results; if they share the findings from their experiment with others in some formal fashion - that would be research.

To give a sense of how an experiment or a series of experiments might be limited or framed I like to use field glasses - binoculars - as a metaphor. If I hold a pair of binoculars to my eyes I can focus on one object: bird, beast or butterfly, and temporarily shut out everything else. The binoculars magnify enough to allow me to see more than I can with the naked eye, but my focus is also helped by the fact that I have isolated the creature I am looking at and, for the moment, removed the distractions of its environment from my field of vision. The same thing is true with research. When we conduct research into the effect of a particular experiment we try to isolate the experiment and the variables: that which is different from the ordinary.

A scientist sets out two Petri dishes in the lab with exactly the same liquid in each one. The first dish he keeps as it is, to the other he adds one new ingredient. If there is a change in the second Petri dish he can attribute that to the effect of the added ingredient. If a psychologist wants to study the effect of light stimulus on rats he can put them in a dark box and flash lights at them at recorded intervals. If a teacher wishes to research the effect of a new approach in her classroom she must try to isolate the change from all other possible influences. This, of course, is much easier with Petri dishes, or rats.

Human beings can not be subjected to the controls we allow ourselves with rats, and are, in any case, such a complex mix of variables we can never be certain about their motivations or the meaning they make of their actions and ours. The best the teacher can do to turn her experiment into research is to make it into a study "project", with all the deliberation and intention that word implies. When an experiment becomes a research project it is usually for the purpose of replication and/or better understanding. The teacher may want to "research" her change in approach to determine whether she wants to do it again and to determine whether the results should be shared with other teachers to encourage replication. She may want to do a number of experiments within the boundaries of the research project, and in this case what she is doing is an exemplification of the scientific process: experiment, evaluate, modify, experiment again, evaluate, modify....

But, you say, teachers are doing that all the time. They try something new, notice what happens, make a slight change, try it again, test it out on a different day or a different group, notice what happens... This a process Donald Schon calls reflection-in-action and thinking persons do it all the time: it is learning from experience while in the experience; it is what is happening when we say thoughtfully, "Next time, I will try..."

However, a research project is more than the reflective process, or the scientific method applied to daily life, though research is impossible without reflection. Research, as opposed to an experiment, is cribbed, confined, controlled and focused within the uncompromising and rounded frame of whatever form of field glasses we choose to use.

I had the good fortune while I was in Auroville this winter to work with a small group of people interested

in qualitative research. We began by working on a definition of research, and came to the conclusion that there are two kinds of research. One we described as Research with a big "R" - by which we meant a Research Project, a deliberate study, framed by field glasses; the other, research with a small "r" by which we meant what I described above, what happens all the time when we make conscious attempts to try something different in order to observe what will happen; something as small as changing the baby's schedule or as large as planting a different kind of forest. Reflective practitioners, people who are often reflecting on what they are doing; who are trying to be deliberately aware and conscious; people who are engaged in careful observation, and are practicing what we might call a research frame of mind, are not doing Research in the way it is understood in common parlance.

The guidelines for Research with a big "R" may best be understood if I lay them out as questions. When you want to Research an innovation you ask yourself:

1) What is the question I wish to answer, or the problem I hope to understand better? (The clearer and more precise the question the more likely the Research will be successful.)

2) Why is this question important to me? (Now you have a chance to lay out your assumptions and give your rationale for the research.)

3) How will I look for answers to my question? Who will work on this research? What are their qualifications? What do "distant friends" (i.e. other writers and Researchers) have to say about this issue?

4) What methods will I use to collect my data? (With qualitative research this means you need to identify your sample, and the methods you will use to collect the data: survey, interview, observation, record searches, etc. You will also need to indicate the time frame you are working in.)

5) How will I analyze my data? (Analysis is often the most difficult and the most time consuming part of a Research Project. This is when you sort all your data, looking for themes, trends, and patterns; looking for findings, and when you cook or crunch and summarize the data so that you can communicate the main conclusions to others.)

6) How will I present my findings? (Most Research Projects end up as a document like a report or a book, but a presentation, videotape, a collection of pictures; even a novel or some other media may be used if appropriate to the subject.)

There are two kinds of Research: quantitative and qualitative. Quantitative research is, as the name suggests, an activity which involves quantities, and quantities means counting. Quantitative research (hard research) is generally "scientific", carefully bounded and defined, with all the variables controlled and accounted for. Quantitative research is the operating mode for most scientists and is responsible for most of the advances made in technology and medicine in the last few centuries. Qualitative research, on the other hand, is a "soft" science, gradually winning acceptance as the most useful form of social science research, particularly when quantitative and qualitative methods can be combined in a single project. Since it is not possible to control for all variables in human beings (praise be!) it is necessary to find ways to study human situations and human relationships which do not have to rely on control groups and confinement. Human beings are not rats or pigeons. The purpose of qualitative research is not to prove something but to learn something.

Simply by learning more about a situation, by studying it from different angles, by observing it with an impartial eye, and from several different vantage points we may get new insights on causes, effects and on how to proceed with our human subjects and compatriots.

The most common methods of gathering data for qualitative research are with the interview, survey, study of related documents, and various forms of observation, both formal and informal, participatory or objective. Since there is so much more likelihood of misinterpretation and unwitting bias in qualitative research a rigorous process of triangulation is required for credibility. Triangulation means trying to both gather and analyze information by different methods and from different points of view: qualitative researchers talk about multi-trait and multi-method approaches. In lay terms this means collecting the same information from different people, in different ways, and perhaps by different people; it means subjecting the data collected to different ways of sorting and understanding it and checking it out with different audiences. Triangulating is a term taken from

navigation: the sailor identifies a fixed point on the horizon and then measures that against several other points to get an accurate reading of where she is. Qualitative Research relies heavily on "thick" description, and usually presents the findings embedded in descriptions so that the readers can "see" what the researchers see.

In my own research, based on the question, "How do teachers get better at teaching on the job?" I interviewed about twenty teachers individually, and then another fifty or more in groups; I conducted a 12 question survey with 200 other teachers from different parts of the country; I recycled my findings to the respondents and others to be sure they said what I said they said and to be sure my conclusions made sense to them, and I read extensively on what other people had to say about professional development. When I had done all that I thought I was able to say something which would make sense, stand up to criticism, and be of use to other teacher educators.

There are many educational experiments in Auroville today but not many Research Projects, and that is just as well. If every innovation had to be subjected to the rigors of Research there would be little time left for teaching - or learning - or doing. However, if Auroville wants to learn more about itself and to send examples out into a thirsty world there will need to be more Research projects which are credible in the world's terms, which can speak with authority and pass the test of replication, with or without adaptations. Think carefully before you select your Research question, define it clearly, and then give it your full attention!

The training of the logical reason must necessarily follow the training of the faculties which collect the material on which the logical reason must work. Not only so but the mind must have some development of the faculty of dealing with words before it can deal successfully with ideas. The question is, once this preliminary work is done, what is the best way of teaching the boy to think correctly from premises. For the logical reason cannot proceed without premises. It either infers from facts to a conclusion, or from previously formed conclusions to a fresh one, or from one fact to another. It either induces, deduces or simply infers. I see the sunrise day after day, I conclude or induce that it rises as a law daily after a varying interval of darkness. I have already ascertained that wherever there is smoke, there is fire. I have induced that general rule from an observation of facts. I deduce that in a particular case of smoke there is a fire behind. I infer that a man must have lit it from the improbability of any other cause under the particular circumstances. I cannot deduce it because fire is not always created by human kindling; it may be volcanic or caused by a stroke of lightning or the sparks from some kind of friction in the neighbourhood.

There are three elements necessary to correct reasoning: first, the correctness of the facts or conclusions I start from, secondly, the completeness as well as the accuracy of the data I start from, thirdly, the elimination of other possible or impossible conclusions from the same facts. The fallibility of the logical reason is due partly to avoidable negligence and looseness in securing these conditions, partly to the difficulty of getting all the facts correct, still more to the difficulty of getting all the facts complete, most of all, to the extreme difficulty of eliminating all possible conclusions except the one which happens to be right. No fact is supposed to be more perfectly established than the universality of the Law of Gravitation as an imperative rule, yet a single new fact inconsistent with it would upset this supposed universality. And such facts exist. Nevertheless by care and keenness the fallibility may be reduced to its minimum.

The usual practice is to train the logical reason by teaching the science of Logic. This is an instance of the prevalent error by which book-knowledge of a thing is made the object of the study instead of the thing itself. The experience of reasoning and its errors should be given to the mind and it should be taught to observe how these work for itself; it should proceed from the example to the rule and from the accumulating harmony of rules to the formal science of the subject, not from the formal science to the rule, and from the rule to the example.

The first step is to make the young mind interest itself in drawing inferences from the facts, tracing cause and effect. It should then be led on to notice its successes and its failures and the reasons of the success and of the failure: the incorrectness of the fact started from, the haste in drawing conclusions from insufficient facts, the carelessness in accepting a conclusion which is improbable, little supported by the data or open to doubt, the indolence or prejudice which does not wish to consider other possible explanations or conclusions. In this way the mind can be trained to reason as correctly as the fallibility of human logic will allow, minimising the chances of error. The study of formal logic should be postponed to a later time when it can easily be mastered in a very brief period, since it will be only the systematising of an art perfectly well known to the student.

Sri Aurobindo, 'The Training of the Logical Faculty'
On Education