# RESEARCH MATTERS –Research designs

**What is research design** (source: <https://www.researchgate.net/publication/308915548_Research_Design>)

A research design is the framework within which research activity will be conducted. Identifying a research design for a study is guided by the type of information required to answer the research question suitably. The research design indicates the ways to go about collection, measurement, and analysis of data.

Some more common research designs are outlined in the following Table 1.

**Table 1 – Common research designs** (Adapted from: <https://libguides.usc.edu/writingguide/researchdesigns>*)*

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| **Action Research** | Action research is iterative or cyclical in nature and is intended to foster deeper understanding of a given situation, starting with conceptualizing and particularizing the problem and moving through several interventions and evaluations. The action research cycle can be regarded as a learning cycle.  **What do these studies tell you?**   1. This is a collaborative and adaptive research design that lends itself to use in work or community situations. 2. Design focuses on pragmatic and solution-driven research outcomes rather than testing theories. 3. When practitioners use action research, it has the potential to increase the amount they learn consciously from their experience. 4. Action research studies often have direct and obvious relevance to improving practice and advocating for change. 5. There are no hidden controls or pre-emption of direction by the researcher.   **What these studies don't tell you?**   1. It is harder to do than conducting conventional research because the researcher takes on responsibilities of advocating for change as well as for researching the topic. 2. Personal over-involvement of the researcher may bias research results. 3. The cyclic nature of action research to achieve its twin outcomes of action [e.g. change] and research [e.g. understanding] is time-consuming and complex to conduct. 4. Advocating for change usually requires buy-in from study participants. |
| **Case Study design** | Case study research is an in-depth study of a specific research problem. It is often used to narrow down a very broad field of research into one or a few easily researchable examples. It is also useful for testing whether a specific theory and model applies to occurrences in the real world. It is a useful design when not much is known about an issue.  **What do these studies tell you?**   1. Approach excels at bringing us to an understanding of a complex issue through detailed contextual analysis of a limited number of events or conditions and their relationships. 2. A researcher using a case study design can apply a variety of methodologies and rely on a variety of sources to investigate a research problem. 3. Design can extend experience or add strength to what is already known through previous research. 4. Social scientists, in particular, make wide use of this research design to examine contemporary real-life situations and provide the basis for the application of concepts and theories and the extension of methodologies. 5. The design can provide detailed descriptions of specific and rare cases.   **What these studies don't tell you?**   1. A single or small number of cases offers little basis for establishing reliability or to generalize the findings to a wider population of people, places, or things. 2. Intense exposure to the study of a case may bias a researcher's interpretation of the findings. 3. Design does not facilitate assessment of cause and effect relationships. 4. Vital information may be missing, making the case hard to interpret. 5. The case may not be representative or typical of the larger problem being investigated. 6. If the criteria for selecting a case is because it represents a very unusual or unique phenomenon or problem for study, then your intepretation of the findings can only apply to that particular case. |
| **Cohort studies** | A cohort study generally refers to a study conducted over a period of time involving members of a population which the subject or representative member comes from, and who are united by some commonality or similarity. Using a quantitative framework, a cohort study makes note of statistical occurrence within a specialized subgroup, united by same or similar characteristics that are relevant to the research problem being investigated, rather than studying statistical occurrence within the general population. Using a qualitative framework, cohort studies generally gather data using methods of observation. Cohorts can be either "open" or "closed."   * Open Cohort Studies [dynamic populations, such as the population of Los Angeles] involve a population that is defined just by the state of being a part of the study in question (and being monitored for the outcome). Date of entry and exit from the study is individually defined, therefore, the size of the study population is not constant. In open cohort studies, researchers can only calculate rate based data, such as, incidence rates and variants thereof. * Closed Cohort Studies [static populations, such as patients entered into a clinical trial] involve participants who enter into the study at one defining point in time and where it is presumed that no new participants can enter the cohort. Given this, the number of study participants remains constant (or can only decrease).   **What do these studies tell you?**   1. The use of cohorts is often mandatory because a randomized control study may be unethical. For example, you cannot deliberately expose people to asbestos, you can only study its effects on those who have already been exposed. Research that measures risk factors often relies upon cohort designs. 2. Because cohort studies measure potential causes before the outcome has occurred, they can demonstrate that these “causes” preceded the outcome, thereby avoiding the debate as to which is the cause and which is the effect. 3. Cohort analysis is highly flexible and can provide insight into effects over time and related to a variety of different types of changes [e.g., social, cultural, political, economic, etc.]. 4. Either original data or secondary data can be used in this design.   **What these studies don't tell you?**   1. In cases where a comparative analysis of two cohorts is made [e.g., studying the effects of one group exposed to asbestos and one that has not], a researcher cannot control for all other factors that might differ between the two groups. These factors are known as confounding variables. 2. Cohort studies can end up taking a long time to complete if the researcher must wait for the conditions of interest to develop within the group. This also increases the chance that key variables change during the course of the study, potentially impacting the validity of the findings. 3. Due to the lack of randominization in the cohort design, its external validity is lower than that of study designs where the researcher randomly assigns participants. |
| **Descriptive design** | Descriptive research helps provide answers to the questions of who, what, when, where, and how associated with a particular research problem; a descriptive study cannot conclusively ascertain answers to why. Descriptive research is used to obtain information concerning the current status of the phenomena and to describe "what exists" with respect to variables or conditions in a situation.  **What do these studies tell you?**   1. The subject is being observed in a completely natural and unchanged natural environment. True experiments, whilst giving analyzable data, often adversely influence the normal behavior of the subject [a.k.a., the Heisenberg effect whereby measurements of certain systems cannot be made without affecting the systems]. 2. Descriptive research is often used as a pre-cursor to more quantitative research designs with the general overview giving some valuable pointers as to what variables are worth testing quantitatively. 3. If the limitations are understood, they can be a useful tool in developing a more focused study. 4. Descriptive studies can yield rich data that lead to important recommendations in practice. 5. Appoach collects a large amount of data for detailed analysis.   **What these studies don't tell you?**   1. The results from a descriptive research cannot be used to discover a definitive answer or to disprove a hypothesis. 2. Because descriptive designs often utilize observational methods [as opposed to quantitative methods], the results cannot be replicated. 3. The descriptive function of research is heavily dependent on instrumentation for measurement and observation. |
| **Experimental design** | An experimental design enables the researcher to maintain control over all factors that may affect the result of an experiment. In doing this, the researcher attempts to determine or predict what may occur. The classic experimental design specifies an experimental group and a control group. The independent variable (intervention) is administered to the experimental group and not to the control group, and both groups are measured on the same dependent variable. Subsequent experimental designs have used more groups and more measurements over longer periods. True experiments must have control, randomization, and manipulation.  **What do these studies tell you?**   1. Experimental research allows the researcher to control the situation. In so doing, it allows researchers to answer the question, “What causes something to occur?” 2. Permits the researcher to identify cause and effect relationships between variables and to distinguish placebo effects from treatment effects. 3. Experimental research designs support the ability to limit alternative explanations and to infer direct causal relationships in the study. 4. Approach provides the highest level of evidence for single studies.   **What these studies don't tell you?**   1. The design is artificial, and results may not generalize well to the real world. 2. The artificial settings of experiments may alter the behaviors or responses of participants. 3. Experimental designs can be costly if special equipment or facilities are needed. 4. Some research problems cannot be studied using an experiment because of ethical or technical reasons. 5. Difficult to apply ethnographic and other qualitative methods to experimentally designed studies. |
| **Exploratory design** | An exploratory study is conducted about a research problem when there are few or no earlier studies to refer to or rely upon to predict an outcome. The focus is on gaining insights and familiarity for later investigation or undertaken when research problems are in a preliminary stage of investigation. Exploratory designs are often used to establish an understanding of how best to proceed in studying an issue or what methodology would effectively apply to gathering information about the issue.  **The goals of exploratory research are intended to produce the following possible insights:**   * Familiarity with basic details, settings, and concerns. * Well-grounded picture of the situation being developed. * Generation of new ideas and assumptions. * Development of tentative theories or hypotheses. * Determination about whether a study is feasible in the future. * Issues get refined for more systematic investigation and formulation of new research questions. * Direction for future research and techniques get developed.   **What do these studies tell you?**   1. Design is a useful approach for gaining background information on a particular topic. 2. Exploratory research is flexible and can address research questions of all types (what, why, how). 3. Provides an opportunity to define new terms and clarify existing concepts. 4. Exploratory research is often used to generate formal hypotheses and develop more precise research problems. 5. In the policy arena or applied to practice, exploratory studies help establish research priorities and where resources should be allocated.   **What these studies don't tell you?**   1. Exploratory research generally utilizes small sample sizes and, thus, findings are typically not generalizable to the population at large. 2. The exploratory nature of the research inhibits an ability to make definitive conclusions about the findings. They provide insight but not definitive conclusions. 3. The research process underpinning exploratory studies is flexible but often unstructured, leading to only tentative results that have limited value to decision-makers. 4. Design lacks rigorous standards applied to methods of data gathering and analysis because one of the areas for exploration could be to determine what method or methodologies could best fit the research problem. |
| **Longitudinal design** | A longitudinal study follows the same sample (group of participants) over time and makes repeated observations. For example, with longitudinal surveys, the same group of people is interviewed at regular intervals, enabling researchers to track changes over time and to relate them to variables that might explain why the changes occur. Longitudinal research designs describe patterns of change and help establish the direction and magnitude of causal relationships. Measurements are taken on each variable over two or more distinct time periods. This allows the researcher to measure change in variables over time. It is a type of observational study sometimes referred to as a panel study.  **What do these studies tell you?**   1. Longitudinal data facilitate the analysis of the duration of a particular phenomenon. 2. Enables survey researchers to get close to the kinds of causal explanations usually attainable only with experiments. 3. The design permits the measurement of differences or change in a variable from one period to another [i.e., the description of patterns of change over time]. 4. Longitudinal studies facilitate the prediction of future outcomes based upon earlier factors.   **What these studies don't tell you?**   1. The data collection method may change over time. 2. Maintaining the integrity of the original sample can be difficult over an extended period of time. 3. It can be difficult to show more than one variable at a time. 4. This design often needs qualitative research data to explain fluctuations in the results. 5. A longitudinal research design assumes present trends will continue unchanged. 6. It can take a long period of time to gather results. 7. There is a need to have a large sample size and accurate sampling to reach representativeness. |
| **Meta-Analysis design** | Meta-analysis is an analytical methodology designed to systematically evaluate and summarize the results from a number of individual studies, thereby, increasing the overall sample size and the ability of the researcher to study effects of interest. The purpose is to not simply summarize existing knowledge, but to develop a new understanding of a research problem using synoptic reasoning. The main objectives of meta-analysis include analyzing differences in the results among studies and increasing the precision by which effects are estimated. A well-designed meta-analysis depends upon strict adherence to the criteria used for selecting studies and the availability of information in each study to properly analyse their findings.  **What do these studies tell you?**   1. Can be an effective strategy for determining gaps in the literature. 2. Provides a means of reviewing research published about a particular topic over an extended period of time and from a variety of sources. 3. Is useful in clarifying what policy or programmatic actions can be justified on the basis of analysing research results from multiple studies. 4. Provides a method for overcoming small sample sizes in individual studies that previously may have had little relationship to each other. 5. Can be used to generate new hypotheses or highlight research problems for future studies.   **What these studies don't tell you?**   1. Small violations in defining the criteria used for content analysis can lead to difficult to interpret and/or meaningless findings. 2. A large sample size can yield reliable, but not necessarily valid, results. 3. A lack of uniformity regarding, for example, the type of literature reviewed, how methods are applied, and how findings are measured within the sample of studies you are analysing, can make the process of synthesis difficult to perform. 4. Depending on the sample size, the process of reviewing and synthesizing multiple studies can be very time consuming. |
| **Observational design** | This type of research design draws a conclusion by comparing subjects against a control group, in cases where the researcher has no control over the experiment. There are two general types of observational designs. In direct observations, people know that the researchers are watching them. Unobtrusive measures involve any method for studying behaviour where individuals do not know they are being observed. An observational study allows a useful insight into a phenomenon and avoids the ethical and practical difficulties of setting up a large and cumbersome research project.  **What do these studies tell you?**   1. Observational studies are usually flexible and do not necessarily need to be structured around a hypothesis about what you expect to observe [data is emergent rather than pre-existing]. 2. The researcher is able to collect in-depth information about a particular behaviour. 3. Can reveal interrelationships among multifaceted dimensions of group interactions. 4. You can generalize your results to real life situations. 5. Observational research is useful for discovering what variables may be important before applying other methods like experiments. 6. Observation research designs account for the complexity of group behaviours.   **What these studies don't tell you?**   1. Reliability of data is low because seeing behaviours occur over and over again may be a time consuming task and are difficult to replicate. 2. In observational research, findings may only reflect a unique sample population and, thus, cannot be generalized to other groups. 3. There can be problems with bias as the researcher may only "see what they want to see." 4. There is no possibility to determine "cause and effect" relationships since nothing is manipulated. 5. Sources or subjects may not all be equally credible. 6. Any group that is knowingly studied is altered to some degree by the presence of the researcher, therefore, potentially skewing any data collected. |
| **Systematic review** | A systematic review is a specific methodology that identifies existing research about a well-defined topic of investigation, usually derived from a public policy or clinical, practice-based problem. The design involves selecting and critically evaluating the contributions of each identified study, analyzing and carefully synthesizing the data, and reporting the evidence in a way that facilitates clear conclusions about what is and is not known. A systematic review is not a traditional literature review, but a self-contained research project that explores a clearly defined research problem using existing studies. The design of a systematic review differs from other review methods because distinct and exacting principles are applied to the evaluative process of analyzing existing literature.    **NOTE**: A thorough and well-designed systematic review requires extensive and on-going consultation with a librarian to ensure that all published and unpublished studies concerning the research problem have been located and evaluated as to whether they should be included in your analysis. Due to the required time commitment and workload, these types of reviews are often conducted as a group project.    **What do these studies tell you?**   1. A systematic review synthesizes the findings of multiple studies related to each other by incorporating strategies of analysis and interpretation intended to reduce biases and random errors. 2. The application of critical exploration, evaluation, and synthesis methods separates insignificant, unsound, or redundant research from the most salient and relevant studies worthy of reflection. 3. They can be use to identify, justify, and refine hypotheses, recognize and avoid hidden problems in prior studies, and explain data inconsistencies and conflicts in data. 4. Systematic reviews can be used to help policy makers formulate evidence-based guidelines and regulations. 5. The use of strict, explicit, and pre-determined methods of synthesis, when applied appropriately, provide reliable estimates about the effects of interventions, evaluations, and effects related to the overarching research problem investigated by each study under review. 6. Systematic reviews illuminate where knowledge or thorough understanding of a research problem is lacking and, therefore, can then be used to guide future research. 7. The accepted inclusion of unpublished studies [i.e., grey literature] ensures the broadest possible way to analyze and interpret research on a topic. 8. Results of the synthesis can be generalized, and the findings extrapolated into the general population with more validity than most other types of studies.   **What these studies don't tell you?**   1. Systematic reviews do not create new knowledge per se; they are a method for synthesizing existing studies about a research problem in order to gain new insights and determine gaps in the literature. 2. The way researchers have carried out their investigations [e.g., the period of time covered, number of participants, sources of data analyzed, etc.] can make it difficult to effectively synthesize studies. 3. The inclusion of unpublished studies can introduce bias into the review because they may not have undergone a rigorous peer-review process prior to publication. Examples may include conference presentations or proceedings, publications from government agencies, white papers, working papers, and internal documents from organizations, and doctoral dissertations and Master's theses. |