Course Learning Outcomes for Unit III

Upon completion of this unit, students should be able to:

3. Compare and contrast the differences between qualitative and quantitative research methodologies.
   3.1 Explain why a quantitative study is superior to a qualitative study for the Sun Coast Consulting project.

4. Evaluate different types of research methods.
   4.1 Develop the research design for the Sun Coast Consulting project.
   4.2 Evaluate appropriate research methods to answer business problems.

Course/Unit Learning Outcomes	Learning Activity
3.1	Unit Lesson Chapter 8 Chapter 9 Article: “The Place of Quantitative Methods in a Management Curriculum” Article: “Quantitative Versus Qualitative Research Methods—Two Approaches to Organisation Studies” Unit III Scholarly Activity
4.1	Unit Lesson Video: *Research Design* Unit III Scholarly Activity
4.2	Unit Lesson Unit III Scholarly Activity

Required Unit Resources

Chapter 8: Quantitative Methods

Chapter 9: Qualitative Methods, pp. 179–188

In order to access the following resources, click the links below:

Bagchi, A. (2005). The place of quantitative methods in a management curriculum. *Decision, 32(*2), 107–111. https://libraryresources.columbiasouthern.edu/login?url=http://search.ebscohost.com/login.aspx?direct=true&db=bth&AN=19511433&site=ehost-live&scope=site

RanYwayZ. (2016, September 20). *Research design* [Video]. YouTube. https://www.youtube.com/watch?v=WY9j_t570LY

A transcript of this video is available.

Lee, J. S. K. (1992). Quantitative versus qualitative research methods: Two approaches to organisation studies. *Asia Pacific Journal of Management*, *9*(1), 87-94. https://libraryresources.columbiasouthern.edu/login?url=http://search.ebscohost.com/login.aspx?direct=true&db=bth&AN=16852430&site=ehost-live&scope=site

Unit Lesson

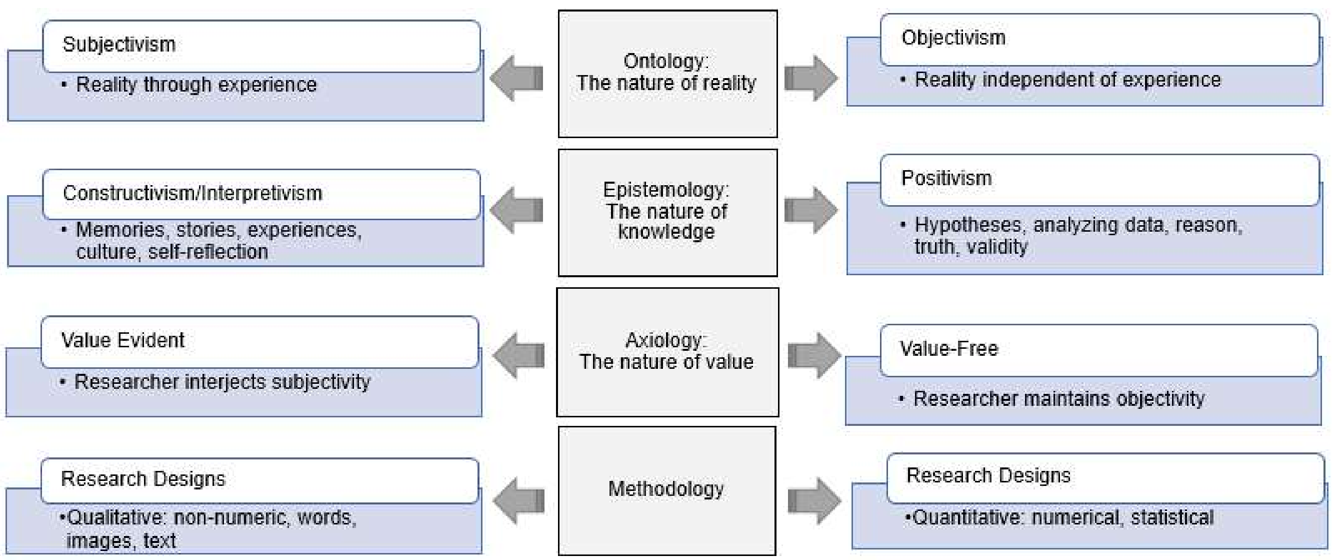
Research Methodology, Design, and Methods

A lot of ground has already been covered in the course, including understanding why business research is conducted. At its core, business research is conducted to improve performance and reduce risk by helping to make decisions when faced with management problems. The process begins with a management problem, which is clarified with a statement of the problems and the objectives of the research. Research questions and hypotheses are then formulated to form questions and testable predictions about the relationship between variables. Statistical tests are then used to determine if the null hypothesis should be accepted or rejected based on whether the test results are statistically significant or not. These results inform business decision-making.

The next several units will focus on the additional steps in the research process. This includes how to design research, which is the topic of Unit III. Research design is the blueprint of investigation to obtain answers to research questions. It is the framework of what the researcher will do (Cooper & Schindler, 2011).

Research Methodology

Research methodology refers to general categorical approaches to research (e.g., quantitative, qualitative, mixed methods). As discussed in Unit I, these categories, or approaches, are rooted in different philosophical traditions. For example, a quantitative methodology is rooted in a positivist tradition while a qualitative methodology is rooted in a constructivist tradition. Mixed methods, as its name suggests, is rooted in both positivist and constructivist research traditions. A researcher's approach to investigation is typically aligned with his or her philosophical worldview. This can be visualized as a top-down hierarchy where constructivists prefer a qualitative methodology to solve problems, while positivists prefer a quantitative methodology.



The choice of research methodology, qualitative or quantitative, flows down to a choice among various research designs, research methods, data collection methods, sampling designs, and data analysis designs. Many of the designs and methods are familiar to business students. The table below summarizes some of these design decisions for quantitative and qualitative research methodologies.

Methodological Approaches to Research (partial list)					
Methodology	**Research Design**	**Research Methods**	**Data Collection Methods**	**Sampling Design**	**Data Analysis Procedures**
Quantitative	Causal (experimental)	- True experimentation - Quasi-experimentation	- Laboratory experiment - Field experiment	- Target population - Sample size - Sample type (random, stratified, quota, convenience)	- Pearson's *r* -Simple regression -Multiple regression - Independent samples *t* test - Paired samples *t* test - One-way ANOVA - Factorial ANOVA - MANOVA
Quantitative	Descriptive (non-experimental)	- Descriptive stats - Correlational - Causal-comparative	- Survey (telephone, mail, electronic) - Observation (participant, non-participant) - Document analysis	- Target population - Sample size - Sample type (random, stratified, quota, convenience)	- Pearson's *r* -Simple regression -Multiple regression - Independent samples *t* test - Paired samples *t* test - One-way ANOVA - Factorial ANOVA - MANOVA

Qualitative	Exploratory (non-experimental)	- Case study - Ethnography - Grounded Theory - Phenomenology - Heuristics	- Interview (structured, unstructured) - Document analysis - Focus group - Observation (participant, non-participant)	n/a	- Coding - Content analysis - Word count - Concepts and themes

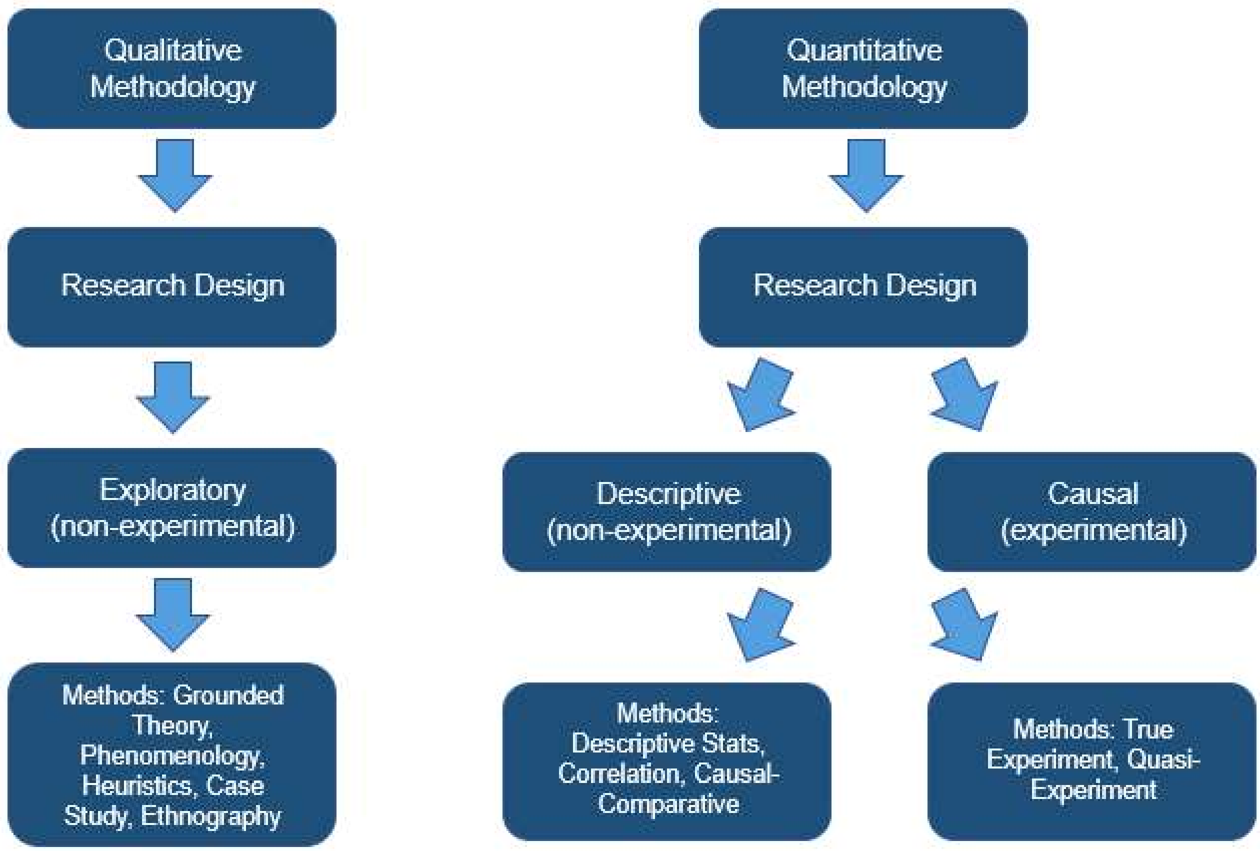
Research Design

Research design refers to the specific type of study that will be conducted. One's choice of research methodology, qualitative or quantitative, dictates the type of research design. Research design must be carefully planned before collecting any data. Planning is important so that time and money is not spent only to find out that the incorrect variables were analyzed.

There are three primary design types: *exploratory*, *descriptive,* and *causal*. Exploratory designs are customarily qualitative and subjective in nature versus causal and descriptive designs. Descriptive studies are representative of highly structured research designs intended to use statistical analysis to test formal hypotheses. As mentioned previously, these types of studies look at the relationships between variables. The final type of design, causal, attempts to understand if one variable causes an effect on another. These types of designs are extraordinarily controlled experiments and not typically conducted in general business research (Cooper & Schindler, 2011). It should also be noted that causal studies are the only type of research study for which a causation can be identified. Another way to think of research designs would be as either experimental or non-experimental. Qualitative research designs are always non-experimental. Quantitative research designs can be either experimental or non-experimental.

Research Methods

Research methods refer to specific procedures that will be used based on the chosen methodology and design. Quantitative causal design methods include true experiments and quasi-experiments. Descriptive quantitative design methods include causal-comparative, descriptive statistics, and correlation. Examples of exploratory design research methods include case study, ethnography, phenomenology, grounded theory, and heuristics. Mixed method designs use a combination of quantitative and qualitative methods. An example would be a design that is first exploratory using qualitative methods (e.g., case studies) to uncover issues that would then be explained using quantitative methods (e.g., correlation).



This course focuses primarily on quantitative research designs and methods to facilitate business decision-making for the remainder of the term. As was mentioned in Unit I, quantitative research uses the scientific method. Researchers use empiricism to attempt to describe, explain, and make predictions by collecting factual information about hypothesized relationships that can be used to decide if a particular understanding of a problem and its possible solution are correct. The strength of quantitative research is the ability to measure phenomena.

Design and Method Challenges

For quantitative research designs, methods are quite detailed and require that attention be paid to participant recruitment, sampling, sampling frame, sample size, survey instrument construction, pilot tests, data collection, data analysis, statistical procedures, data interpretation, coding, validity, reliability, generalizability, reporting, etc. *The Journal of Management Studies* rejects 70% of article submissions because of research method errors as most quantitative rejections were because of sampling errors ("Research Methods," 2006). This excerpt highlights the fact that there are many interrelated parts to a quantitative research project, with each part integral to validity, reliability, and generalizability of results.

Business phenomena are often far more complex than they appear on the surface. Even the independent variables under study may be influenced by the dependent variables the study is trying to predict. Lee (1992) also pointed out a quantitative limitation in measuring variables excludes the gestalt of human behavior. While quantitative results may be statistically reliable and valid, they likely will not encapsulate the entire phenomena of behavioral influences.

Further complicating the challenge of inter-correlated variables is what Bulmer (2001) lamented was an absence of consensus among social scientists on standards of measurement and operationalization of variables. Business research, which is closely related to social science in many respects, often has no standard measurements, such as height, length, mass, monetary value, etc. Social scientists, as do market researchers and human research professionals, often measure preferences, attitudes, beliefs, perceptions, and feelings based on constructs and concepts. This is a reminder that a necessary starting point for any research project is a review of the literature to see how others have defined the concepts and constructs under consideration. If an existing instrument that measures the construct is available, it is important to confirm its validity. If designing a new survey, or altering an existing one, pre-testing and field testing are required to confirm validity and reliability. This helps prevent Type I and Type II errors related to one's hypotheses. Incorrectly measuring just one independent variable may bias other coefficients (Echambadi et al., 2006).

Design Choice

Quantitative research design methods can be broadly placed into two main categories of experimental or non-experimental. The challenge is to select the most appropriate methods (e.g., experimental, correlational, causal-comparative, descriptive stats) for the research problem.

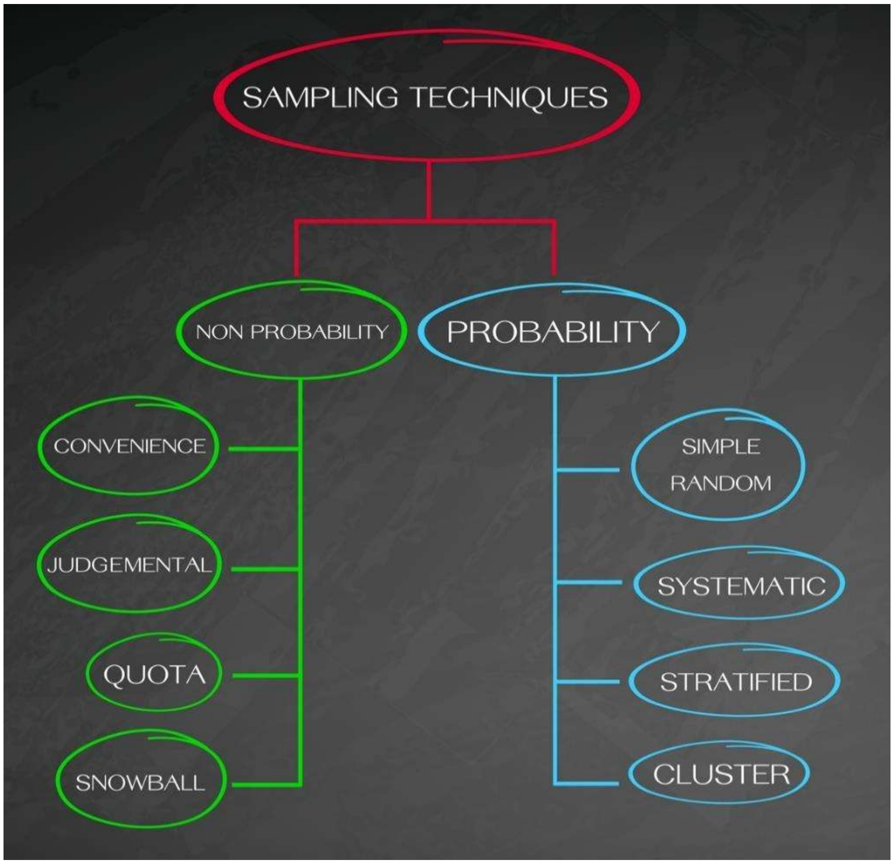
The purest form of scientific research is the experimental design. This is the only design option in which causation may be determined. However, experimental design is especially challenging in quantitative research. Particularly in business research, it is difficult to replicate in a controlled experiment many of the variables in the process. For example, while certain aspects of selling (e.g., volume of telephone cold calls) could be controlled in a laboratory experiment, other sales processes (e.g., face-to-face prospect meetings) make controlling variables impossible. To highlight this point, consider a laboratory experiment to measure a salesperson's adaptive selling ability to different prospect personality types. In this example, adaptive selling ability is the dependent variable and personality type is the independent variable. Researchers can control the independent variable by using scripted *prospect actors* to measure the salesperson's adaptability to each script. In live selling situations, salesperson adaptability still can be measured, but researchers cannot control the prospect personality type. For research that cannot be conducted in a controlled experiment, non-experimental designs are appropriate.

Unlike experimental designs, non-experimental designs are challenged, or limited, in that they cannot establish causality. These design methods include correlational, causal-comparative, and descriptive statistics. Correlational methods, perhaps the most widely recognized design among practitioners, attempt to reveal the existence and intensity of shared variation between independent and dependent variables (Rumrill, 2004). Causal-comparative studies attempt to determine the existence of statistically significant differences between groups. While the name implies testing for causality, it is a bit misleading. It is not possible to establish causality in comparative studies since the independent variables cannot be controlled (Rumrill, 2004). An example was provided in the sales scenario above where it was not possible to control for sales prospects' personality types (independent variable) that are encountered in live selling situations. Therefore, it is not possible to determine if a salesperson's adaptability to personality causes a successful or unsuccessful sales call. However, with a causal-comparative design, it would be possible to determine if significant differences exist between annual sales revenue between groups of high-adaptability salespeople and low-adaptability salespeople.

An additional challenge in non-experimental designs is in selecting the correct types of variables. Correlational designs typically require continuous independent and dependent variables. Causal-comparative designs usually have a nominal independent grouping variable and theoretical dependent variable (Rumrill, 2004).

Sampling and Data Collection

Sampling is basically selecting individuals from a population and then conclusions can be created for the population as a whole (Cooper & Schindler, 2011). This is referred to as generalizing to the population. Random samples are required to make generalizations about the population. In business research, one of the main reasons to use a sample is because it simply would not be feasible from a financial or time perspective to question or survey every single person in the population (Cooper & Schindler, 2011). If we could reach each person in the population, this would be a census. Good sampling is critical to business research and can make or break the outcome of the project. Sampling methods are either probability or nonprobability, and different types of samples include random, systematic, stratified random, proportionate versus disproportionate, cluster, double, sequential, multiphase, convenience, judgment, quoted, snowball, etc. (Cooper & Schindler, 2011). Researchers will also find that there is no standard sample size that is used in all business research. Some sample size requirements are large, and some sample requirements are small. There is no general rule of thumb when it comes to sample size. The best advice when the time comes to conduct business research and statistical analysis is to consult research and statistics textbooks and reputable websites to seek agreement on the preferred sample size for the statistical procedure.



Sampling techniques
(lamnee, n.d.)

There are many common data collection challenges that may be mitigated by using best practices in survey research methods. Depending on the research design and statistical procedure to be used, sampling error and sample size must be considered.

Sampling error, including random variability and bias, is a primary area of concern. Sampling error is the difference between the sample average and the population average (Renckly, 2002). This error occurs purely by chance since the sample will not exactly represent the population of interest. For example, if the population contains an equal number of men and women, it is unlikely that a sample would be comprised of exactly 50% women and 50% men. The degree of error will be determined by the amount of variance between the sample and population of interest (Fowler, 2009). This is relevant to research designs requiring random samples intended to make predictions about the population. Random variability occurs when the sample is non-representative of the population through purely random reasons (Fowler, 2009).

The sample itself is drawn from the sampling frame, which is the pool of participants who have a chance of selection. Another challenge is in determining how the sample will be drawn from the sampling frame. For some but not all statistical procedures, it is necessary to draw a purely random sample. The simple random sample is the prototype for a purely random sample where each participant has a known non-zero chance of being selected for participation. Random sampling produces the smallest sampling error because the random sample most closely represents the population of interest and, therefore, has the smallest variance than would be observed with other sampling methods (Fowler, 2009; Renckly, 2002).

Common Types of Sampling

Random sample: A random sample is a probability sample. Samples are drawn from the population of interest, and each participant has an equal chance of being selected for the sample. For example, a city planner in a large metropolitan area with a population of 500,000 adult residents would like to survey a sample of this population to determine attitudes about adding a city park. It would be cost prohibitive to survey all 500,000 adult residents, so she decides to use a sample size of 250 participants. She has a database containing the names of all 500,000 adult residents and uses a program to randomly select 250 participants, who will each receive a survey. All adult city residents had an equal chance of being randomly selected, so this would be the purest form of sampling.

Stratified sample: A stratified sample is a probability sample. The population of interest is first divided into discrete groups, or strata. These groups are often determined demographically by age, education, income, geography, and other characteristics. A random sample is then drawn from each discrete group. For example, the city planner first divides the resident database by annual income ranges of less than $25,000 per resident, $25,000 to $50,000, $50,001 to $75,000, $75,001 to $100,000, greater than $100,000. She then uses a program to select a random sample from each income range based upon its representation in the population. If the greater than $100,000 population comprises 20% of the residents, she would randomly select 50 residents from this stratum to contribute to the total sample size, which will eventually be 250 participants.

Quota sample: A quota sample is a non-probability sample where the researcher sets an arbitrary percentage, such as 20%, for each stratum. For example, the city planner may stand on a street corner and survey people until she has 50 surveys (20% of 250) from each of the five income groups. These 250 people will very likely not accurately represent the population of interest, all adult residents in the community, since it is very unlikely each income group is exactly 20% of the population, which is the reason this is a non-probability sample.

Convenience sample: A convenience sample is a non-probability sample. It uses any participant or data that is conveniently available. For example, the city planner may stand on the street corner and survey the first 250 adults she meets to collect data about their attitudes for the newly proposed park. These 250 people will very likely not accurately represent the population of interest (all adult residents in the community).

Either a table of random numbers or a computer program, like Excel, can be used to randomly select numbered participants (Fowler, 2009). While the simple random sample is pure and straightforward in concept, it is difficult to apply in many research scenarios. Complicating the process of drawing samples may include a large number of participants in the sampling frame, unnumbered lists, patterned lists, or no lists at all. Depending on the uniqueness of the sampling frame, alternatives to a simple random sampling design are available. They include systematic sampling, stratified sampling, probabilities of selection, and multistage sampling, such as cluster sampling and area probability sampling (Fowler, 2009). It is important to remember that if the sample was not randomly drawn, it is not possible to generalize results to the population (Renckly, 2002). To confirm that the sample is random rather than non-random, two conditions are necessary. Each participant must have an equal non-zero chance of being selected for the sample and participant selections must be independent of one another (Renckly, 2002).

Bias is a second type of sampling error that may occur in a number of ways. Bias, unlike random variability, is not random, but systematic (Fowler, 2009). For example, the sample participants answer systematically to a survey that differs from how the population would respond (Fowler, 2009). The challenge of bias can be reduced by selecting a sampling frame that is inclusive and representative of all participants in the population, using a random process for selecting sample participants and reducing non-response or incomplete responses from participants (Fowler, 2009). If bias occurs when sample participants are systematically included or excluded in the sample, the sample would not be a fair representation of the population of interest. Bias is especially concerning in research designs that require random sampling and may arise within the study if answers are not obtained from all participants selected for the study (Fowler, 2009). Non-responses can affect the study in two ways. It can bias results if a certain common segment of participants fail to respond, and their information is excluded. Results may be biased if the survey is not distributed evenly across the sample population (Renckly, 2002). For example, an electronically delivered survey could introduce bias if there were some participants who were not computer literate. The bias would be compounded if the non-respondents have similar characteristics that are different from those participants who answered the questions (Fowler, 2009).

Sample size is the final challenge to discuss related to data collection. Like many decisions relating to research design, there is often disagreement about how large a sample should be for a study (Fowler, 2009). Bartlett et al. (2001) add that lack of consensus and understanding of appropriate sample size affects the quality and accuracy of research results. Fowler (2009) warns readers to avoid conventional thinking regarding sample size since it is mostly inaccurate.

Data Analysis Design

The hypotheses will dictate the data analysis design. As mentioned in Unit II, quantitative hypotheses generally predict relationships between variables or differences between variables or groups. There are many statistical procedures that can be used to test hypotheses. This course will consider four commonly used procedures.

Correlation: Correlation is used to test a null hypothesis stating no relationship exists between variables. The correlation may show no relationship, a positive relationship, or a negative relationship. This concept makes sense intuitively as there are associations between variables all around in daily life. These associations and relationships can be positive or negative. Please note that, in correlation, the terms positive or negative are not used in the context of making a value judgment. A positive or negative relationship in statistical terms means the direction of the relationship. An example of a positive relationship between variables is when the consumer confidence index increases, there is an increase in the stock market indices. This is a positive relationship being that both variables move in the same direction. An example of a negative relationship between variables is when the temperature decreases, our energy consumption (and monthly expenditure) for heating increases. This is a negative relationship because the variables move in opposite directions. As one variable decreases, the other increases (Field, 2005).

An important distinction needs to be made between correlation and causation. Even if a statistical test (e.g., Pearson's *r*) indicates a relationship between variables, it must never be stated that one variable causes the change in the other variable. For example, there is a positive correlation between ice cream consumption and sunburn. It would be absurd to say that ice cream consumption causes sunburn, but the relationship between variables does exist due to extraneous variables like hot and sunny weather. This extreme example makes the point that correlation does not mean causation. Causation can only be statistically shown via experimental research designs, which have tight controls to manipulate independent variables.

Regression: Although correlation can detect relationships between variables, it lacks predictive power. Relationships between variables are more useful if they can be used to make predictions. Another statistical procedure that has predictive power is regression analysis. Regression analysis is used to test a null hypothesis stating there is no statistically significant prediction of *Y* by *X*. If we know the relationship, or association, between the variables *X* and *Y*, through simple regression analysis, we can make a prediction of how a change in *X* will relate to a change in *Y*. For example, if job satisfaction is related to productivity, a manufacturer could use regression analysis make a prediction about what the firm could expect in increased production if they can improve job satisfaction. Remember, this is not to state how a change in *X causes* a change in *Y*. Regression only predicts a change based on the relationship between variables. Regression can be very powerful, especially when multiple *X* variables are included in the analysis to make a prediction about a change in a single *Y* variable. This is called multiple regression (Field, 2005).

The *t* test: The *t* test is used to test a null hypothesis stating there is no statistically significant difference between two means. Means can be compared from two different groups. For example, a researcher may want to know if Group A (restoration technicians) did better on the annual safety test than Group B (remediation specialists). Means can also be compared for the same group over time. For example, did Group C's average safety test scores increase after safety training?

ANOVA: Analysis of variance (ANOVA) is similar to the *t* test but is used to test a null hypothesis that no statistically significant differences exist among means for three or more groups. For example, a researcher may want to determine if there are statistically significant differences in average annual safety scores among

Group A (restoration technicians), Group B (remediation specialists), Group C (mid-level engineers), and Group D (environmental scientists).

In Closing

Although there are many things to consider when conducting research, there are an overwhelming number of great resources that will help guide researchers as they formulate their research designs. No one commits everything to memory, and that is why it is important to refer to sources when assembling a research study. The next three units will cover the data analysis.

References

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Suggested Unit Resources

The video below provides further insight about qualitative and quantitative research methodologies. By watching this video you will see the moderator explain the differences between qualitative and quantitative research designs using practical and entertaining examples to elucidate dissimilarity in various research methods.

ChrisFlipp. (2014, January 15). *Qualitative vs. quantitative* [Video]. YouTube. https://www.youtube.com/watch?v=2X-QSU6-hPU

A transcript of this video is available.