

Alignment, Directionality and Synchronization in Scientific Research

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Abstract

The problem of research in Latin America is circumscribed to the polemic between those who defend a quantitative position versus others of qualitative location, when both are part of a single process: the scientific one. There are no discrepancies, since one precedes the other in order to develop quantification, which is subsequent to qualification. In addition, there is another type of research called mixed, which means that qualitative and quantitative studies can be carried out simultaneously. How to quantify if a construct is not fully defined; and if it is partially defined, will it at least have dimensions that can be measured? In this way, it is necessary to carry out an analysis, whatever the type of research that is carried out, qualitative or quantitative or mixed, so that the problems, objectives, theoretical or statistical assumptions and designs are addressed, aligned and synchronized in order to understand the purpose and the time-space in which the study is going to be developed. These constructs are the basis for the internal consistency that the research work must have from the methodological point of view.

Keywords: Alignment, directionality, synchronization.

Resumen

La problemática de la investigación en América Latina se encuentra circunscrita a la polémica entre los que defienden una posición cuantitativa frente a otros de ubicación cualitativa, cuando ambos son parte de un solo proceso: el científico. No existe discrepancias, ya que uno precede al otro para poder desarrollar la cuantificación que es posterior a la cualificación. A esto se suma, que aparece otro tipo de investigación denominada

mixta, es decir que se pueden realizar los estudios cualitativos y cuantitativos simultáneamente. ¿Cómo cuantificar si un constructo no se encuentra plenamente definido?; y si está parcialmente definido, ¿al menos tendrá dimensiones que se podrían mensurar? En ese orden de pensamiento, se hace necesario que se realice un análisis, cualquiera que sea la clase de investigación que se realice,

cualitativo o cuantitativo o mixto, con la finalidad de que, tanto los problemas como los objetivos, los supuestos teóricos o estadísticos y los diseños deben estar direccionalizados, alineados y sincronizados para que se pueda entender el propósito y el espacio-temporal en el cual se va a desarrollar el estudio. Estos constructos son el sustento para la consistencia interna que debe tener el quehacer investigativo desde la óptica metodológica.

Palabras clave: Alineamiento, direccionalidad, sincronización

I. Introduction

When looking for information regarding the approach to a problem or research objectives, it is evident that one only finds a lot of theoretical information entangled with philosophical approaches and distant appreciation, sometimes humanistic, sometimes technological, and that in the end becomes a deep doubt of the researcher.

It is necessary to differentiate research problems and objectives from teaching-learning problems and objectives. One thing is a research problem and another is a teaching-learning (T-L) problem; one issue is the research objective and another the T-L objective. Here lies the first methodological problem in posing these two central pillars of scientific inquiry in the social scientific domain.

If one begins by formulating a problem with the interrogative adverb How, the researcher is oriented to look for the mechanisms of that adverb, not taking into consideration that, if his study carries hypotheses that are constructed by

veritable propositions, they must necessarily answer whether they are true or false; the adverb does not lead him to that answer, but to what processes he should use so that the how becomes visible.

Added to this is the idea that the researcher can use any verb to set out the research objectives. In this sense, the researcher, having a problem that asks how, poses an objective that usually begins with determine and will always do so, that is, whatever the type of study, will always use "determine" regardless of the level, the problem, the objective, the hypothesis, the design and the research method.

Likewise, both the theoretical framework and the so-called methodology are disconnected from the problems and objectives, since they are not used to elaborate the research discourse. They forget that the research background should be of the same research level as the study that is being developed. In the same way, the theoretical bases are not used in the research process because they are not connected with the problems and objectives of the study. This is observed when the problem is inductive and the student incorporates a deductive antecedent. They also point out that they are going to develop the hypothetical deductive method when the formulated problem and objective are of an inductive nature.

This is observed in greater detail when the research presents hypotheses, which should be in alignment and synchrony with the problems and objectives presented. If the problem is inductive, the objective should be inductive and the hypothesis to be contrasted should also be inductive. Similarly, if the hypothesis is deductive,

the problem and the objective should correspond to that hypothesis.

Now, the hypothesis must correspond to a research design, in which the method, techniques and measuring instruments are found. No one doubts that in all studies observation and description are used and not for this reason they are observational or descriptive studies; all researchers carry out analysis, use logic and dialectics, make deductions and not for this reason they are analytical or experimental studies. It is necessary to differentiate the levels of research from the thought processes that are consubstantial in the investigative inquiry.

II. Alignment

Research alignment implies that the stated problem, the formulated objective, the assumptions to be tested, the design to be used and the method to be applied must be at the same research level, with the same purpose (Mauch & Park, 2003) . If the purpose of the study is exploration, it is evident that the inductive method must be used, but this does not mean that deduction must not be used as a process. If the purpose is explanatory, then the method must be deductive, but this does not imply that induction must not be used as a process.

It is at this point where there is the biggest Giordano knot in the methodological field. If a problem is inductive, is the research inductive? if an objective is deductive, will the problem be inductive? This comes from philosophy and it is good to understand it in the sense that the great investigative confusion comes from the disorder coming from the conflict between induction and deduction and how the isms that disorder it are

produced, which represent problems within the philosophical criterion and another is the methodological treatment when the researcher decides to develop a problem and give it an inductive or deductive treatment and that within this treatment one uses inductive and/deductive processes.

It turns out that everything begins with the statement of the research topic, which must have 4 dimensions: a) Line of research; b) Purpose of study; c) Population; d) Space-Temporal (Supo & Zacarías, 2020) . With these four factors, the statement of the study can be constructed where the line of research is the topic to be studied, made up of the variables (one or more variables) and the thesis writer must have knowledge of it. The purpose of the study is the level of research; the population are the units to be studied; and the spatiotemporal includes the place where the study is carried out and in what period of time. The study statement is important because it refers to the title of the research.

In this order of ideas, the research statement or title is structured with the lines of research (variables), purpose of the study (level of research), study population (units of analysis) and space-time. With these elements, the research problems are constructed, so it is understood that the thesis student knows his line of research, is passionate about his topic of study, and seeks to contribute to the body of knowledge he has chosen to investigate.

The research question is very different from the question that is formulated in the area of learning. Both questions are distinct, they are different, because while research seeks to discover, structure, improve a certain knowledge;

the learning question is aimed at the student being able to apprehend knowledge, skills and dispositions in order to be taught. Equating research problems with learning problems generates many uncertainties among researchers, because they consider that they should be treated in the same way, which is far from reality. If one has a problem that seeks the relationship between two variables, its formulation would be: *would there be a relationship between variable A and variable B?* Regarding the question: *what is the relationship between variable A and variable B?* or how is the relationship between variable A and variable B? the question is directed in another sense, since it takes for granted that there is a relationship between both variables, since the question is oriented to "how" and "which", not if there is a link between both variables.

The question about *What is the relationship?* addresses whether the link is direct or indirect; while the question *How is the relationship?* is oriented to whether the link is strong, moderate or weak. This implies that in order to answer the questions which and how, the nexus must first be established. In this sense, the questions *which* and *how* are in the field of the punctual estimation and for this the respective correlation coefficient must be read according to the nature of the variables being studied.

As for the objectives, the same thing happens. If a research objective is established, it must be aligned to the research problem (Miles, 2017) . Therefore, Bloom's taxonomy is not relevant. Many researchers take the above taxonomy as a reference; however, the first level of research is exploratory and

therefore the researcher must explore. On the other hand, the first level of Bloom's taxonomy is to know, which is not a research objective. Making a comparison between the levels of inquiry and the categories of Bloom's taxonomy (Supo & Zacarías, 2020) and the categories of the taxonomy of Bloom taxonomy (1956) , the following is observed:

Table 1: Comparison between Bloom's Categories and Levels of Inquiry

BLOOM'S TAXONOMY	RESEARCH LEVELS
Evaluation	Application
Synthesis	Predictive
Analysis	Explanatory
Application	Relational
Understanding	Descriptive
Knowledge	Exploratory

It is evident that the nouns raised by Bloom (1956) have no link with the levels of inquiry as their nature and purposes are different. Bloom's nouns were elaborated for the teaching-learning process (Adams, 2015) . Bloom's nouns were developed for the teaching-learning process to enable students to learn, while the research levels are for the purpose of discovering knowledge and solving problems within society. In Bloom's taxonomy, the *Application* category is used for the learner to apply knowledge that has been remembered and understood; while the applied level of inquiry refers to the application of a process that has gone through exploration, description, relationship, explanation, and prediction.

There is a Bloom's Taxonomy modified by Anderson & Krathwohl (2001) which mainly modified nouns into verbs and changed synthesis to create (placing it at the top of the categories), as

well as changed evaluation to assess, when again comparing Bloom's modified Taxonomy with the levels of inquiry.

Table 2: Comparison of Modified Bloom's Taxonomy and Levels of Investigation

MODIFIED BLOOM TAXONOMY	RESEARCH LEVELS
Create	Application
Evaluate	Predictive
Analyze	Explanatory
Apply	Relational
Understand	Descriptive
Remember	Exploratory

Source: Anderson & Krathwohl (2001).

When analyzing the *Apply* category in Bloom's Taxonomy as modified by Anderson & Krathwohl (2001), it does not relate to the relational level of inquiry and while application in Bloom's categories is at the third level, application in the levels of inquiry is at the top of the hierarchy. This is evidence that Bloom's categories should only be used in the teaching-learning process and not in research, even if they have been modified (Chandio et al., 2017).

The alignment of the title of the research with the general problem allows to establish what type of research is being developed, what level of research is going to be carried out and allows to identify the variable or variables that are going to be studied. The research objectives should be added to this, which have other purposes with respect to the categories used by Bloom in his taxonomy. Table 3 shows the comparison of both research and learning objectives.

Table 3: Comparison of Research and Teaching-Learning Objectives

BLOOM TAXONOMY		RESEARCH LEVELS	
OBJECTIVES	CATEGORIES	LEVELS	OBJECTIVES
Create	Creation	Application	Apply
Evaluate	Evaluation	Prediction	Predict
Analyze	Analysis	Explanation	Explain
Apply	Application	Relation	Relate
Understand	Understanding	Description	Describe
Remember	I remember	Exploration	Explore

It is evident that the objectives of the teaching-learning process are different from those of research. The *recall* category is not linked to the exploratory level and for this reason, Bloom's taxonomy is very distant from research with respect to its objectives. It is one thing to recall, which is an objective of teaching-learning that has the purpose of memorizing and then evoking information, and another thing to carry out research that leads to exploring the phenomena that are being investigated (Krathwohl, 2002). It should be understood that problems and research objectives are intimately linked to each other (Tafur & Izaguirre, 2015).

In this order of ideas, having the title, the problems and the objectives aligned, that is to say that they have the same purpose in the inquiries that are going to be carried out, the research hypotheses are raised. If the research purpose is exploratory or qualitative, the hypotheses are set out (Flick, 2015). If the research purpose is exploratory or qualitative, what is proposed are the categorical assumptions that must be aligned with the identification, interpretation, construction or diagnosis, which represent the four sub-levels of this process. Identification studies are linked to

phenomenology; interpretation studies to hermeneutics; construction studies to constructivism; and diagnostic research is associated with heuristics.

If the title, the problem and the research objective are framed within the descriptive level (Cubo et al. 2019), which is the first step of quantitative studies, the sub-levels will be description, estimation and verification. The descriptive sublevel is linked to the objectives describe, characterize if only descriptive statistics with the corresponding statistics are going to be used; the estimative sublevel is attached to the objectives estimate and can be of prevalence or incidence for which a confidence interval and minimum and maximum values have to be considered; to finish with the descriptive study, the verifying sublevel, is associated with the objective verify for which the contracting of a hypothesis that carries a single analytical variable is carried out.

The relational level (Arbaiza, 2014) links two analytic variables, both of which have the same rank and position, but one is called an associated variable and one is called a supervisor. This distinction is made because many people give the variables in relational studies names that correspond to explanatory studies. In a relational study, three factors are sought: whether there is a relationship between the two variables; whether the relationship is direct or indirect; and how strong the relationship is. The first factor is read in the p-value; the second factor is read in the sign of the correlation coefficient found; and the third factor is read in the value of the correlation coefficient. At the relational level there are also three sub-levels: comparative, relational and measurement. The comparative level allows to compare

two groups or two communities or two samples or two individuals by applying specific statistics according to the nature of the study variables.

In the explanatory level (Cubo et al.2019; Supo, 2017) the independent and dependent variables appear as it is the step of causality, it also presents three sublevels: evidence, demonstration and verification. The first sublevel is observational, non-experimental and of little use due to the fact that most research tends to be relational, there being a gap in this sublevel of the explanatory level. The transition from the relational level to the explanatory level there is a gap because in the area of social knowledge few explanatory studies are designed and within them almost nothing of quasi-experimental and/or experimental studies because they are longitudinal studies, with intervention and require more time and a considerable investment of time and money.

The sub-levels of explanatory study are accompanied by three verbs that follow these gradations within causal research: *evidencing* (observational), *demonstrating* and *proving*. Each one has a specific treatment, which requires the use of specific tests depending on the nature of the variables and the behavior of the data. It must be taken into consideration that explanatory studies seek causality and may have at least two or more analytical variables, so it is essential to have a vast understanding of the subject since the method used is deductive. For the evidence that is an observational study, randomized designs are used; for the demonstration that is experimental, block designs are used; and for the test that are also experimental, factorial designs are used.

At the predictive level (Supo, 2017) , the predictive level includes the predictor variables and the variables to be predicted. There are also three sub-levels, which are the predictive level itself, the prognostic level and the prevention level. The verb that accompanies the predictive studies is to predict which provides the computation of the probability that an event will occur being able to use the tools of linear regression. For the second sub-level, the verb forecast is used, which works in function of time this means that it can be established when the phenomenon can occur and the tool survival analysis can be used; and the verb for the third sub-level is to foresee or prevent which is used to prevent any risk situation and the tool that can be applied is the Cox regression.

For the application level (Supo, 2017) , there are also three sub-levels: supervision, control and calibration, which use tools to be able to test a hypothesis or carry out a punctual estimation. The variables used are exogenous variables and endogenous variables. The verb that accompanies the supervision is to supervise and allows to establish the limits of the control in the intervention (punctual estimation) as a reason for the tool that is used is the monitoring with averages and graphs. The verb that is used for the control is that it allows to evaluate the efficiency and effectiveness of a certain process (test of hypothesis) for which the tool of study of capacity of the process is handled; finally, for the sub-level calibration the verb calibrate is used with the purpose of modifying the intensity of the intervention for which the tools of repeatability and reproducibility (punctual estimation) are used.

The hypotheses that are formulated must be aligned with the title of the research, the problem and the objective that was set. If this does not occur, there is a methodological flaw that will show a work without orientation and without a compass. If the study is descriptive, then its problem, objective and hypothesis should be univariate, a single analytical variable, and therefore the statistics used should correspond to this situation; if the study is relational, then the problem, objective and hypothesis should have two analytical variables and should use the elements corresponding to that level of research. Then, the alignment occurs in the following way:

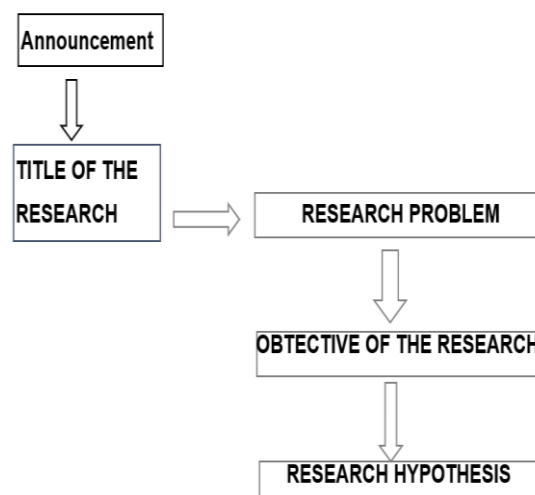


Figure 1. Linking statement, title, problem, objective and hypothesis

Then, the statement, the title of the research, the problem, the objective and the respective hypothesis must be aligned. Without alignment, there is no good research process because it will not be possible to understand what the scholar is looking for regarding the topic under study. Then, descriptive-correlational studies appear (Arbaiza, 2014; Hernández et al. 2014) or descriptive-correlational-explanatory research that only confuse the reader of the research.

III. Directionality

The alignment of the research must be framed within a research design, in a research strategy which implies that along with the problems, objectives and hypotheses it must fit a design that accurately explains how the research wheel is going to move. Being a term used in statistics (MacNeil, 1997) , it is considered that in the design of investigation the methods, procedures and tools are located, being denominated directionality.

Frequently, the researcher works with the title of the research (statement), the general problem, the general objective and the general hypothesis isolated from the research design. Even the dimensionalities of the variables are done separately from the specific problems or the specific objectives. This is due to the fact that the research strategies that are left out of the field of research problems, objectives and hypotheses are unknown.

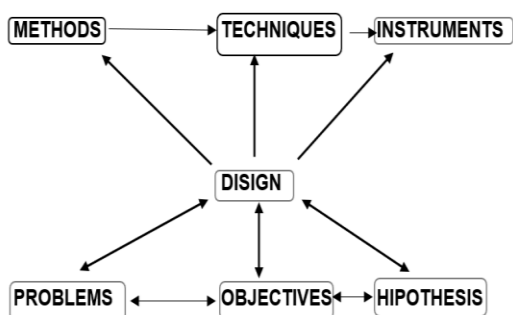


Figure 2. *Links of the Design with research elements*

The directionality allows to establish the design that is going to be used according to the level of research, type of problem, objective and hypothesis. If it is an exploratory, descriptive or relational study, the study will have to use an observational, non-experimental,

transversal design where the inductive method is applied. If the level of study is explanatory, predictive or applicative, the design will have the characteristics of observational (specific case of the explanatory level of evidence), quasi-experimental or experimental, longitudinal, analytical where the deductive method is applied. Undoubtedly these singularities are not absolute, but they are a guide for the researcher.

Directing a research allows the researcher to establish that there is no component that is ancillary to a research plan, report or paper. If the scholar has a defined line of inquiry and a consistent theoretical framework it will allow him/her to develop his/her research work. Everyone is familiar with the theoretical environment that is organized by the preceding studies, theoretical foundations and the definition of concepts. Therefore, the theoretical framework allows developing the research problem, objectives and hypotheses; together with the respective justification and limitations.

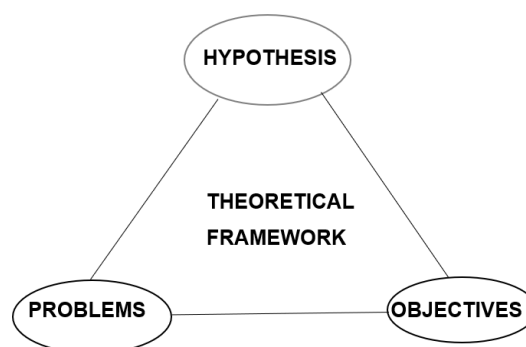


Figure 3. *Theoretical Framework and Research Problems, Objectives and Hypotheses*

This is connected to the research design, which is shaped by the method, stages and devices of the research. Therefore, the triad problem, objective and hypothesis have to be directed towards a particular design, depending on what the researcher is looking for. If the first triad is found in qualitative, descriptive and relational studies, then the research design must use the inductive method, since these studies start from the facts and then give them an explanation based on a certain theory. In that sense, the designs can be, by their origin, communitarian, experimental, epidemiological and of validation of the instruments. The components of the research strategy make up the second triad, and should follow the same line of development of the first triad, as indicated in Figure 4.

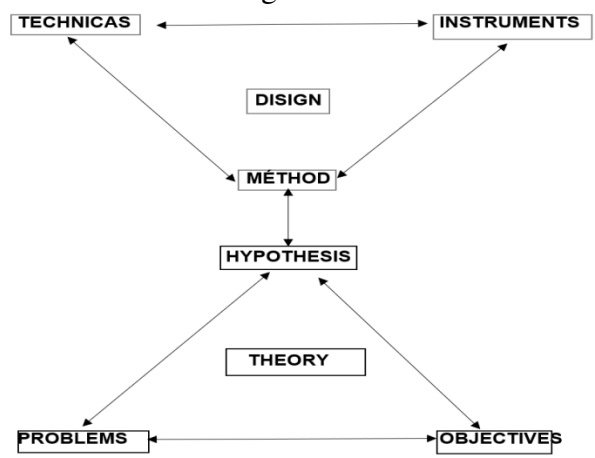


Figure 4. *Link between Theoretical Framework and Design*

In this order of ideas, the link between the theoretical framework and the design is substantive to carry out a good research; without a theoretical framework that must be oriented by an expert in the subject and the design that must be guided by an expert in methodology, they will allow the elaboration, first of the project and then of

the final report of the thesis. Alignment and directionality are two aspects that must be taken into consideration for the elaboration, development and presentation of a thesis, whatever the level of the research. These aspects converge in synchronization.

IV. Synchronization

Synchronization consists of the entire research plan or final report being aligned and addressed. It is the final assembly that needs to be reviewed, whether in a research project or a thesis. It refers to the cut-off point between alignment and synchronization so that it can be established that the study is well oriented and developed (Jenkins & Holcomb, September, 2014).

The problems, objectives and hypotheses are likely to be aligned in the study; the researcher may correctly use a research method, technique and instrument, but they are not addressed and therefore not synchronized. For example, if the study is exploratory in nature and the deductive method is used, this does not correspond to the level of research. Deductions are confused with the deductive method, but it should be understood that in an exploratory study the inductive method is used, even when deductions and inductions are used in the reasoning process. This implies that it starts from the phenomenon to be studied and then give it support in a theory.

Once the problems, objectives and hypotheses are aligned (predictive study), this indicates that the direction the researcher will follow is framed in a design whose method to be used is deductive and for this reason the analysis starts from a consistent and robust theory

to reach the studied phenomenon. Within the study, the researcher can carry out inductions and deductions; analysis and synthesis; thesis, antithesis and synthesis, but this does not make the analytical study inductive or deductive. What prevails is the general method that is being used and that within that method mental processes of analysis and synthesis, induction and deduction, dialectics, among others, are carried out.

If the level of research is explanatory and the inductive method is used, there will be a non-directionality; the explanatory level having aligned the problems, objectives and hypotheses, the design must be directed in the method, the technique and the instruments. If the alignment does not correspond to the direction of the design, then the research question cannot be answered. The explanatory study must use the deductive method to be synchronized.

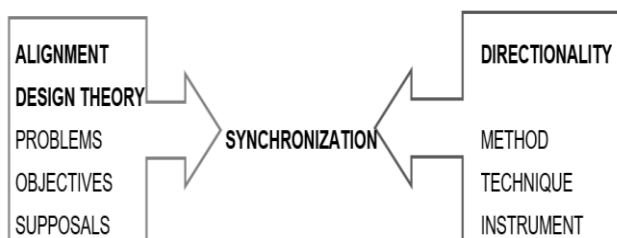


Figure 5. *Synchronization: Alignment and Directionality*

Synchronization allows to evaluate whether a research problem is correctly stated and that the correct method, technique and instrument are used. If a descriptive level study is conducted, apart from having aligned the problems, objectives and hypotheses (if the study has them), then the direction to take is taking into account a design that employs the inductive method, using statistics that

process an analytical variable allowing to compare two groups, one of them is within the other.

Also, if the study is aligned within the relational studies (two analytical variables), the problems, objectives and hypotheses (if any) are within the relational level, the direction to take is that of a design where the method is inductive, the techniques are observational, documentary and survey. The survey is the central one since it is the technique that is most applied and that most of the advisors guide the novice researchers for the realization of scientific studies. The instruments are questionnaires, scales or inventories. Few researchers use inventories and questionnaires are confused with scales, one being different from the other because the questionnaire is used for nominal categorical variables and the scale is used for ordinal categorical variables.

When one aligns and directs the components of a research work, all of them are synchronized since an inductive study must use the inductive method and a deductive research must apply the deductive method, then the study has internal consistency, reflected in the consistency matrix, presented in a table that allows to verify the alignment, directionality and synchronization. There is logic in the research, so that the consistency matrix has enough structure and functionality to reflect the rigor of the scientific inquiry. If the research is aligned and directional, the result is synchronization; but if the study is neither aligned nor directional, it is not synchronized (Figure 6).

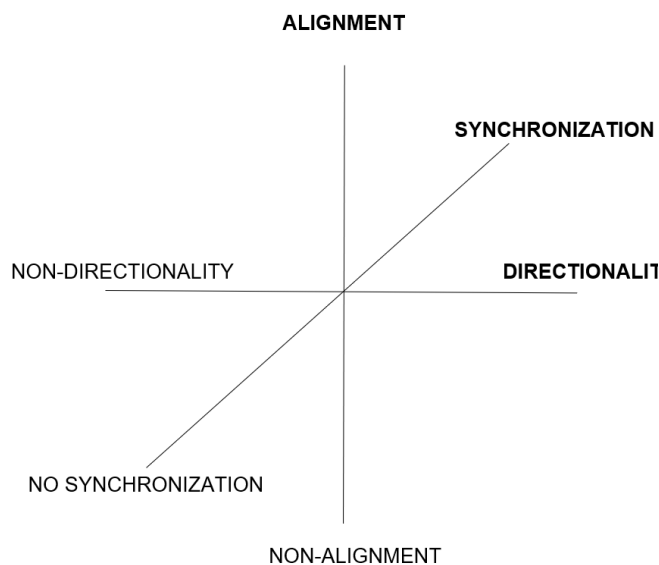


Figure 6. Alignment, Directionality, and Synchronization of a Scientific Paper

Source: Adapted from Exploring Education (2019)

Conclusions

First: The alignment of all the components of a research project allows the subject matter and methodology to fulfil their function correctly.

Second: The directionality that the theoretical framework and the research design are intimately linked giving consistency to the research.

Third: Synchronization indicates that the study is aligned and directional.

Fourth: If a research paper is synchronized, i.e., aligned and directional, then it will have internal consistency.

References

Adams, N. (2015). Bloom's taxonomy of cognitive learning objectives. *J*

Med Libr Assoc, 103(3), 152-153. doi:10.3163/1536-5050.103.3.010

Anderson, L. W., & Krathwohl, D. R. (2001). *A taxonomy for learning, teaching, and assessing: A revision of Bloom's Taxonomy of Educational Objectives (Complete edition)*. Logman.

Arbaiza, L. (2014). *Cómo elaborar una tesis de grado*. Esan ediciones.

Bloom, B. S., Engelhart, M. D., Furst, E. J., Hill, W. H., & Krathwohl, D. R. (1956). *Taxonomy of Educational Objectives: The Classification of Educational Goals, by a committee of college and university examiners*. Longman Green.

Chandio, M., Pandhiani, S., & Iqbal, R. (2017). Bloom's Taxonomy: Improving Assessment and Teaching-Learning Process. *Journal of Education and Educational Development*, 3(2), 203-221.

doi:10.22555/joeed.v3i2.1034

Cubo, S., Martín, B., & Ramos, J. (2019). *Métodos de investigación y análisis de datos en ciencias sociales y de la salud*. Ediciones Pirámide.

Explorando la Educación. (15 de agosto de 2019). Evaluación Auténtica [video]. Youtube. Obtenido de <https://www.youtube.com/watch?v=54jUPscj2jM>

Flick, U. (2015). *El diseño de investigación cualitativa*. Ediciones Morata.

Hernández, R., Fernández, C., & Baptista, M. (2014). *Metodología de la Investigación*. McGraw-Hill.

Jenkins, M., & Holcomb, M. (september, 2014). Toward a Definition of Synchronization. *Paper presented*

- at the CSCMP Conference at the University of Tennessee. Tennessee.
- Krathwohl, D. (2002). A Revision of Bloom's Taxonomy: An Overview. *Theory into Practice*, 41(4), 212-218.
<https://www.depauw.edu/files/resources/krathwohl.pdf>
- MacNeil, K. (1997). Directional and Non-directional Hypothesis Testing: A Survey of SIG Members, Journals, and Textbooks. *Presented at the Annual Meeting of the American Educational Research Association*. Chicago. Obtenido de <https://files.eric.ed.gov/fulltext/ED409374.pdf>
- Mauch, j., & Park, N. (2003). *Guide to the Successful Thesis and Dissertation A Handbook for Student and Faculty* (5 ed., Vol. 23). Marcel Dekker.
doi:https://hadinur1969.files.wordpress.com/2017/10/guide_thesis.pdf
- Miles, D. A. (2017). Workshop: Confessions of a Dissertation Chair Part 1: The Six Mistakes Doctoral Students Make With the Dissertation. *Presented at the 5th Annual 2017 Black Doctoral Network Conference*. Atlanta. Obtenido de https://www.researchgate.net/publication/333772680_UPDATED_ARTICLE_Research_Methods_and_Strategies_Achieving_Alignment_How_to_Develop_Research_Alignment_In_A_Dissertation_Study
- Supo, J. (2017). *Portafolio de Aprendizaje para la Docencia en Investigación Científica*. Bioestadístico.
- Supo, J., & Zacarías, H. (2020). *Metodología de la Investigación Científica: Para las ciencias de la salud y las ciencias sociales* (3ra. ed.). Sociedad Hispana de Investigadores Científicos.
- Tafur, R., & Izaguirre, M. (2015). *Cómo hacer un proyecto de investigación*. Alfaomega.