

EDITORIAL REY DAVID

GENERALITIES ABOUT DEGREE PROJECTS AND SCIENTIFIC RESEARCH

KELLY PEÑA M. / JUSSEN FACUY D. / MINONI CHIRIBOGA P. / BAYARDO CAICEDO G.

Generalities About Degree Project and Scientific Research

Eng. Kelly Peña Moreno. MSc.
Eng. Jussen Facuy Delgado. MSc
Eng. Minoni Chiriboga Peña
Esq. Bayardo Caicedo González
Coordinators

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Dedication

To all our students and colleagues, whose passion and dedication inspire us every day. This book is dedicated to you, who, with your commitment and effort, transform learning into an enriching and meaningful experience. I deeply appreciate your constant support and collaboration on the path to academic excellence. Your enthusiasm and desire to advance knowledge are the driving force behind every page of this work.

With gratitude and admiration,

Eng. Kelly Peña Moreno. MSc.
Eng. Jussen Facuy Delgado. MSc
Eng. Minoni Chiriboga Peña
Esq. Bayardo Caicedo González

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Introduction

In the book "Generalities About Degree Projects and Scientific Research" two fundamental aspects of higher academic education are explored: the Curricular Integration Project and Scientific Research.

The first chapter, "Degree Project: Curricular Integration Work," addresses the culmination of higher education through the integration project, which signifies the consolidation of knowledge acquired during the academic program. In this context, it considers the formats permitted by the Organic Law of Higher Education (LOES) and the Academic Regime Regulations (RRA) in Ecuador, such as thesis, tesinas (comprehensive exams), and scientific articles. The LOES promotes high-quality higher education by establishing standards for the digital presentation of degree projects, while the RRA provides

guidelines on program duration, credits, and graduation requirements. Students can choose from various formats, each with its requirements and structures, ranging from comprehensive research to the publication of scientific articles, thereby ensuring a rigorous and complete integration of knowledge.

The second chapter, “Scientific Research”, focuses on the evolution and characteristics of research as a fundamental pillar of the advancement of knowledge. Scientific research, unlike traditional philosophy, is based on systematization, empiricity, rationality and originality, and does not seek definitive answers, but rather focuses on discovering new problems and generating rigorous and verifiable knowledge. This chapter also highlights the importance of ethics in research, which ensures the validity and integrity of results, and the crucial role that research plays in solving contemporary problems and satisfying new human aspirations.

Together, these chapters offer a comprehensive view of the degree processes and scientific research, providing valuable guidance for students and professionals in academia.

Biography of the authors

Editorial Coordinators

Kelly Peña Moreno She is a forestry engineer with a degree in English. She has a master's degree in Environmental Management and a master's degree in Applied Statistics from ESPOL. She also holds a diploma in Biostatistics from CATIE-Costa Rica. She has obtained specializations in Dendroclimatology in Chile, the United States and Germany. She is a peer reviewer for the Scopus-indexed journal "Climatic Change"; a journal focused on aspects of climate change and variability. She is a researcher and co-author of important scientific research projects published in important journals such as Tree-Ring Research and Frontiers in Plant Science. She leads the project called "Literacy in Dendrochronology in Ecuador"; she also stands out for being the moderator of important international conferences given in English in the field of Dendrochronology. She is currently Research Director and Professor at the Rey David Higher Technological Institute.

Jussen Facuy Delgado He is a distinguished professional in computing and information technology, with extensive experience in teaching, research and management. He is a Computer and Information Technology Engineer, and has two master's degrees: one in Corporate Projects and Finance, and another in Environmental Management. Currently, he is researching for his doctorates in Computer Science and Education. Registered with SENESCYT as a researcher, he specializes in predictive models, artificial intelligence and environmental intelligence, with valuable contributions in scientific publications. He has taught at universities such as Guayaquil and Agraria del Ecuador, and has led technological and educational projects at MIDUVI, MINEDU and the Public Water Company. In addition, he has held strategic roles in academic institutions, standing out as Research Coordinator and Director of Quality Assurance at the Rey David Technological Institute.

Minoni Chiriboga Peña She is a Commercial Engineer and holds a Master's degree in Educational Management with a major in Organization, Management and Innovation of Educational Centers. With a solid academic background and extensive experience in the educational field, she has dedicated her career to the continuous improvement of the management and direction of educational institutions. Currently, she serves as Academic Vice-Rector of the Rey David Technological Institute (ISTRED), where she promotes initiatives to strengthen educational quality and promote innovation in teaching. Her focus on the organization and direction of educational centers has been key to the implementation of strategies that improve learning and institutional management.

Bayardo Caicedo González He is an outstanding graduate in political and social sciences, a lawyer from the courts and tribunals of the Republic of Ecuador, a graduate of the Vicente Rocafuerte secular university in Guayaquil, and holds a higher diploma in quality assessment and accreditation of higher education. He is an Ecuadorian educator, known

for his commitment to higher technical and technological education in Ecuador. With more than 29 years of service in the educational field, he has dedicated his life to the training of young professionals, promoting the academic and personal development of thousands of students, being the founding rector of the Rey David Technological Higher Institute. His educational vision and commitment to social progress have left an indelible mark on the academic community and on all those who have had the privilege of learning under his guidance. Bayardo David Caicedo González continues to be an example of leadership, dedication and excellence in the educational and legal field of Ecuador.

Compilers

CHAPTER I

Kelly Peña Moreno

CHAPTER II

Kelly Peña Moreno

CHAPTER 1
DEGREE PROJECT: CURRICULAR INTEGRATION WORK

Kelly Yohanna Peña Moreno

Abstract

Curricular Integration Work represents a crucial stage in academic training, marking the completion of higher studies and the consolidation of knowledge acquired throughout the program. Within the framework of the Organic Law of Higher Education (LOES) and the Academic Regime Regulation (RRA) in Ecuador, various formats are established for degree works, which include thesis, dissertation (complex exam) and scientific articles.

The LOES promotes access to high-quality higher education and defines the principles and standards that govern the Higher Education System. According to Article 144 of this law, degree works must be presented in digital format, thus guaranteeing their accessibility and public dissemination. The Academic Regime Regulations (RRA), detailed in Article 123, regulate essential aspects such as the duration of the programs, credits, and requirements for the degree, providing clear guidance for institutions and students.

In this context, students have the option to choose between different integration work formats. The thesis, as a comprehensive research work, is a traditional and comprehensive way to demonstrate research ability and contribute to knowledge in a specific field. Alternatively, students can opt for a complex exam, which is presented as a dissertation. This format offers a less extensive but equally rigorous option for knowledge integration. Furthermore, the preparation of a scientific article is

another valid option, allowing students to publish their research in academic journals, thus contributing to the dissemination of knowledge in their area of study..

Each of these degree formats presents specific requirements and its own structures, from the original research to the presentation and defense of the work. Qualitative and quantitative research play a key role in the choice of format, as both methodologies offer complementary perspectives for data analysis and interpretation.

Finally, adhering to presentation regulations, such as those established by the APA Seventh Edition, guarantees quality and consistency in academic works. This introduction to integration work provides an essential framework for the development of degree projects, highlighting the available options and the regulatory context that guides their development.

1.1. Introduction to Curriculum Integration Work

Theoretical and Legal Foundations of IC

The Organic Law of Higher Education (LOES) ensures access to high-quality higher education, promoting excellence, continuity and student mobility without discrimination. This law defines the principles and operations of the institutions within the Higher Education System, as well as the organizations in charge of its

regulation. This raises several questions (Ley Orgánica de Educación Superior [LOES], 2010). According to Liang (2020) suggests that universities should be governed by laws and regulations that ensure educational quality, equity in access, and compliance with academic standards. These laws range from the management of resources and the protection of student rights to the implementation of academic programs and the evaluation of educational effectiveness.

What Are the Principles and Rights of Higher Education?

In the view of Akbar et al. (2022) explains that legal education in academic programs is of utmost importance to encourage law-abiding behavior among students at the end of their degree, highlighting the importance of improving educational strategies and programs in this area. As previously indicated, the regulations define all the parameters for Higher Education, including fundamental principles such as humanism, culture, and science. In addition, it promotes the right of people to contribute to the public and social good. (LOES, 2010). One of the highlighted rights is equal opportunity, which seeks to ensure that all students can access a high-quality academic education. Likewise, the right of all citizens, including communities and peoples, to be part and participate in the higher educational process is recognized, in accordance with the mechanisms established by the Organic Law of Higher Education (LOES, 2010).

What Rights Do Students Have Under This Law?

Rights act as a set of rules that guide the conduct and behavior of people, with the aim of regulating social coexistence and organizing society at different times (Liang, 2020).

In the context of Higher Education, these rights have been established to ensure the adequate development of the educational system, as stipulated by the Organic Law of Higher Education. Student rights include:

Students in higher education have the right to graduate without discrimination, with access to quality education and necessary resources. They also participate in the evaluation of their programs and enjoy freedom of expression and association. Education is secular, intercultural, and promotes equity, while providing economic support based on merit (LOES, 2010).

Regarding the degree, the LOES establishes:

Art. 144.- Degree Works in digital format: Higher education institutions must present undergraduate and postgraduate degree works in digital format for inclusion in the National Higher Education Information System of Ecuador, ensuring their public dissemination and respecting the rights of author.

Art. 123.- Regulations on the Academic Regime: The Higher Education Council will approve the Academic Regime Regulations (RRA), which will regulate aspects such as titles, degrees, duration of programs and credits, promoting the mobility of students, professors and

researchers. This regulation details and complements the LOES in academic topics, such as study programs and requirements for the degree, establishing quality standards in higher education institutions in Ecuador (LOES, 2010).

What Does the Academic Regime Regulation Regulate?

Regulates the main functions of Higher Education Institutions (HEI) and their management, in accordance with the regulations of the Higher Education System (Consejo de Educación Superior [CES], 2022).

Which HEI Should Apply the RRA?

All higher education institutions, whether public or private, must apply the Academic Regime Regulations (RRA). This includes universities, polytechnic schools, technical and technological institutes, and higher conservatories. These entities must follow RRA guidelines to ensure consistency and quality in academic management, program evaluation, and the granting of titles and degrees (CES, 2022)

The articles that make up the Academic Regime Regulations in which the degree is treated as a central topic are:

Art 26.- Each Higher Education Institution (HEI) must design and approve its degree unit for undergraduate and postgraduate degrees, establishing its structure, contents and evaluation criteria according to article 22 of the Regulation. Students must complete the required credits

and choose between a degree project or a thesis, depending on the professional or research path of the program. The HEI must guarantee the appointment of a director or tutor for the evaluation, and the issuance of the degree only occurs once all established academic and administrative requirements are met (CES, 2022).

Art 85.- After the student has complied with all the credits and requirements of the study plan, as well as the academic and administrative regulations of the HEI, the institution will issue the consolidated certificate of completion of studies and the corresponding degree. This consolidated record will include the student's information, transcript, and details about community service hours completed through pre-professional internships or internships (CES, 2022).

Degree Elements

Thesis

The thesis, according to the Oxford Dictionary, is "a long essay or dissertation involving personal research, written by the candidate for a university degree." In higher education institutions, the thesis is crucial to demonstrate the student's ability to conduct independent research and contribute to knowledge in their field; in such a way that students, by carrying out these research projects, increase their skills and scientific capacity (Valencia, Macias, & Valencia, 2015).

This work evaluates skills in critical thinking and research methodology, and allows students to delve deeper into topics of interest, thus demonstrating their academic and professional preparation (Cuschieri, Grech, & Savona-Ventura, 2018).

Below are some key aspects of the thesis concept in higher education:

Original Research: A thesis involves conducting original research that addresses a specific research question or problem (Cooper, 2015). Students must conduct extensive research and generate new knowledge, theories or perspectives in their field of study (Valencia et al., 2015).

Contribution to knowledge: The thesis must contribute to existing knowledge in the field. This may mean presenting new data, developing innovative theories or approaches, solving practical problems, or critically reviewing existing literature. (Cuschieri et al., 2018).

Length and depth: A thesis is typically an extensive and detailed work that requires a thorough review of relevant literature, research methodology, data collection and analysis, and presentation of results in an organized and coherent manner (Bukhari, 2020).

Academic supervision: Most theses are completed under the supervision of an academic advisor or a thesis committee (Mushoriwa & Nyakutse, 2014). These supervisors guide the student through the research process and provide guidance and feedback.

Defense: The presentation and defense of the thesis are usually final requirements to complete the academic program; the same one that with a good guide helps students to successfully defend their degree work (Mushoriwa & Nyakutse, 2014). In a thesis defense, the student presents his or her findings and responds to questions and criticism from professors and experts in the field.

Format and style: Theses must follow a specific format and style, which varies by institution and field of study. This includes the structure of the document, citations and references, and other formal aspects.

Ipanaqué-Zapata et al. (2023) emphasizes that a thesis in higher education is an original and in-depth piece of research that students undertake as part of an advanced academic program; in which students, upon reaching their academic degree, have better scientific research skills.

Its objective is to contribute to knowledge in a specific academic field and demonstrate the student's ability to carry out independent research. The thesis is an essential component of many master and doctoral programs (Rhodes, 2012).

Complex Examination

The concept of "complex examination" in higher education refers to a modality of academic assessment used in some countries and educational systems to evaluate the knowledge and skills of students at the end of their university study program. This type of exam usually has

distinctive characteristics compared to traditional exams. In this sense, from the student perspective, an exam will show the level of mastery of their curricular framework. (Singh, 2022).

Below are some key concepts associated with complex exams:

Comprehensive evaluation: Complex exams seek to evaluate the comprehensive training of students, which means that they are not limited to evaluating theoretical knowledge, but also consider practical skills, competencies, analysis, synthesis and critical reflection capacities.

Content Integration: These exams often require students to integrate and apply knowledge acquired throughout their program of study in different academic areas. Instead of individual subject tests, complex exams may include questions or tasks that involve multiple disciplines. As noted by Di Pietro (2013) suggests that end-of-course exams improve student performance because they are able to properly digest and understand academic material.

In-depth evaluation: Complex exams are usually longer and more challenging than traditional exams. They may include open questions, essays, research projects, oral presentations, debates, or any other task that requires deep reflection and a demonstration of knowledge and skills. On the other hand, the scores obtained when taking the exams

Critical reflection: These exams often seek to evaluate students' ability to analyze problems, propose solutions, and argue their points of view critically. Reflection and sound argumentation are key components of evaluation. Indrašienė et al. (2023) emphasizes that critical reflection in students is when the experiences of daily life merge with the knowledge they have acquired throughout their academic career: which generates a new understanding and meaning of things.

Final assessment: Complex exams are generally taken at the end of the study programme, often in the last academic year or at the conclusion of required courses. This allows students to demonstrate their preparation for graduation and the application of their knowledge in the real world: which helps evaluate the level of understanding and competence in a specific area (Zahra, Mahmood Alvi, & Muazzam, 2022).

Oral and written evaluation: Complex exams may include oral and written components. Students can be evaluated through oral presentations, thesis defenses, extensive essays, project reports, interviews, among others. This type of evaluation is carried out under the context of the regulations of each institution (Stray, 2001).

Comprehensive grading: The grading of a comprehensive exam is based on a global evaluation of all the areas evaluated. The results are usually decisive for obtaining a university degree.

Long-term preparation: Students often prepare for a long period of time for these exams as they require a deep and solid understanding of the contents of the syllabus. Preparation may include subject review, research, development of academic and practical skills, and faculty advising (Zahra et al., 2022).

In summary, a complex exam in higher education is a comprehensive and in-depth evaluation that seeks to measure the academic training and skills of students at the end of their university career (Singh, 2022). These exams are an important component of higher education in several countries and help ensure that graduates are prepared to meet academic and professional challenges in their respective disciplines.

Scientific Article

Un artículo científico es un tipo de documento académico que comunica los resultados de investigaciones originales o experimentos realizados por científicos, académicos o investigadores en una determinada área del conocimiento (Hoogenboom, Manske, & Hoogenboom, 2012). Articles are published in scientific journals and play a fundamental role in the dissemination of new knowledge and advances in the academic and scientific community. According to Ölçücü, Aydın, and Özgök (2018) state that writing and publishing an article is one of the most reliable ways of scientific communication between scientists.

Here are some key aspects of the concept of a scientific article:

Original research: Scientific articles present original research and experiments carried out by the authors. Researchers collect data, perform analyses, tests, and experiments with the goal of answering specific research questions or contributing to knowledge in their field. On the other hand, the ideas presented in the article must be well organized in such a way that readers naturally understand the relevance of the scientific article (Faber, 2012).

Formal structure: Scientific articles follow a formal structure that includes sections such as the abstract, introduction, methodology, results, discussion, conclusions and references. This structure is designed to allow readers to understand and evaluate the research in a systematic way.

Peer review: Before publication, scientific articles usually undergo a peer review process, as stated Zaman (2023) The scrutiny of other experts against the investigative ideas of the author of the scientific article helps the editor make an informed decision and the manuscript is of better quality. In this process, other experts in the field review the article to evaluate its quality, methodological rigor, relevance, and originality. This review helps ensure the quality of the research and its contribution to the scientific literature.

Technical language: Scientific articles often use technical and specialized language that is designed to be

precise and clear in the communication of research, as stated (Faber, 2012) that there is coherence and that it does not deviate from the topic being talked about. The use of technical terms and a specific structure allows experts in the field to understand the article easily.

Citations and references: Authors of scientific articles must properly cite the sources of information and references used in their research. This helps establish the existing knowledge base and provides credit to previous authors.

Contribution to knowledge: Scientific articles have the main objective of contributing to existing knowledge in a particular field. This may mean presenting new discoveries, validating existing theories, solving problems, or introducing novel methods. As noted by Zaman (2023) suggests that high-quality manuscripts contribute to the system of education, research and culture.

Specialized audience: Scientific articles are aimed at a specialized audience made up of other researchers, scientists, academics and professionals in the same field. These readers have technical knowledge and a deep understanding of the subject.

Publication in scientific journals: Scientific articles are published in scientific journals that cover specific areas of research. Each journal has its own editorial process and requirements for submitting articles. Nisa, Ramadhan, and Thahar (2023) argues that each journal has its own criteria for writing scientific articles.

In summary, a scientific article is an academic document that presents original research carried out by scientists and researchers, following a formal structure and using technical language. (Faber, 2012).

These articles play a fundamental role in the communication and dissemination of scientific knowledge in the academic and scientific community. Furthermore, writing a scientific article is a skill in the rewarding world of publishing (Amobonye et al., 2024).

This article must have the correct information about the student and the institute where they are being trained, in our case Instituto Superior Técnico Rey David. Remember that to make your article valid, it must be published on the date of the degree process, with clear information about the student and the institute, an indexed journal, and that the topic be related to your career.

1.2. Research Approaches

Qualitative

What is qualitative research?

Qualitative research is a set of research techniques used to obtain an overview of people's behavior and perception on a particular topic.

Generates ideas and assumptions that can help understand how a problem is perceived by the target population, as well as define or identify options related to that problem.

Aspers y Corte (2021) emphasizes that qualitative research is very useful in the early phases of research projects, and it also allows you to analyze the data used in the social sciences and acquire in-depth knowledge through the analysis of texts (and words, rather than numbers).

Characteristics of qualitative research

Qualitative research focuses on understanding or explaining the behavior of a group, a phenomenon, an event or a topic (Aspers & Corte, 2019). These are some characteristics of qualitative research

- Qualitative research aims to describe and analyze the culture and behavior of human beings and their groups from the perspective of the researcher.
- Qualitative research is based on a flexible and interactive research strategy.
- It is a more descriptive research method that focuses on interpretations, experiences and their meaning (Agius, 2013).
- The data derived from this type of research is not statistically measurable, it must be interpreted subjectively.
- This type of research uses methods such as observation, interviews and discussions in focus groups or an insight community. On the other hand, qualitative research is not experimental (Agius, 2013).

Qualitative Research Approaches

An important aspect when carrying out qualitative research is the approach, since each one represents different methods, techniques and types of results that can be obtained. Grossoehme (2014) suggests the most important ones:

- Grounded theory: Researchers collect extensive data on a topic of interest and develop theories through an inductive research method.
- Ethnography: In ethnographic studies, researchers immerse themselves in groups or organizations to understand their cultures (Oranga & Matere 2023).
- Action research: In participatory action research, researchers and participants collaboratively link theory with practice to drive social change.
- Phenomenological research: According to explain that, in phenomenology, researchers approach a phenomenon or event based on the descriptions and interpretations of the experiences lived by the participants.
- Narrative inquiry: Researchers examine how stories are told to understand how participants perceive and make sense of their experiences (Grossoehme, 2014).

Qualitative researchers are often considered "instruments" in research because all observations, interpretations, and analyzes are filtered through their own perception (Mantula et al., 2024).

For this reason, when writing your methodology for qualitative research, it is important to reflect on your approach and thoroughly explain the decisions you made when collecting and analyzing the data; This approach is very valuable in higher education because it broadly analyzes and understands the phenomena and experiences (Mantula et al., 2024).

Instruments and Methods

The instruments of the qualitative approach are the tools used to collect qualitative data. These instruments may be diverse in nature, but they all share the goal of capturing the meaning and experience of the participants (Grossoehme, 2014).

Some of the most common qualitative research instruments include:

Interview: The interview is a structured conversation that is carried out with the participants of a study to collect information. Interviews can be individual or group, and can be semi-structured, structured or unstructured (Aspers & Corte 2021).

Observation: Observation is the process of collecting data by observing the behavior of study participants. Observation can be participant or non-participant (Oranga & Matere, 2023).

Document Analysis: Document analysis is the process of collecting data by analyzing documents, such as records, files, letters, diaries, and works of art. Content analysis: Content analysis is the process of collecting data by analyzing the content of texts, such as news articles, books, speeches, and emails (Agius, 2013).

Choosing the appropriate qualitative research instrument depends on a number of factors, including the objectives of the study, the nature of the population being studied, and the available budget (Oranga & Matere 2023). It is important to select an instrument that is appropriate for the type of data that needs to be collected and that provides the information necessary to answer the research questions.

Qualitative Approach Methods

Qualitative approach methods are the procedures used to collect and analyze qualitative data. These methods are based on constructivist assumptions, which maintain that reality is constructed by individuals and that it can be studied through interpretation.

The methods of the qualitative approach can be classified into two main categories: Data collection methods, Data analysis methods.

Qualitative data collection method

Qualitative data collection methods are used to collect data that cannot be measured numerically (Grossoehme, 2014). This data may be diverse in nature, but all share the goal of capturing the meaning and experience of participants. Some of the most common qualitative data collection methods include:

- The interview is a structured conversation that is carried out with the participants of a study to collect information. Interviews can be individual

or group, and can be semi-structured, structured or unstructured. (Dzogovic & Bajrami, 2023).

- Observation is the process of collecting data by observing the behavior of study participants. Observation can be participant or non-participant (Dzogovic & Bajrami, 2023).
- Document analysis is the process of collecting data by analyzing documents, such as records, files, letters, diaries, and works of art.
- Content analysis is the process of collecting data by analyzing the content of texts, such as news articles, books, speeches, and emails (Grossoehme, 2014).

Choosing the appropriate qualitative data collection method depends on a number of factors, including the objectives of the study, the nature of the population being studied, and the available budget (Agius, 2013). It is important to select a method that is appropriate for the type of data that needs to be collected and that provides the information necessary to answer the research questions.

Qualitative Data Analysis Methods

Qualitative data analysis methods are used to analyze qualitative data. These methods allow you to identify patterns and themes in the data, as well as interpret the meaning of the data, and are used to analyze data that is not quantitative.

Some of the most common qualitative data analysis methods include:

- Content Analysis: Content analysis is a qualitative data analysis method used to identify patterns and themes in the content of texts (Shava et al., 2021).
- Discourse Analysis: Discourse analysis is a qualitative data analysis method used to interpret the meaning of discourse.
- Narrative Analysis: Narrative analysis is a qualitative data analysis method used to interpret the meaning of stories.

Choosing the appropriate qualitative data analysis method depends on a number of factors, including the objectives of the study, the nature of the data being analyzed (Aspers & Corte, 2019; Belotto, 2018).

Types of Qualitative Research Approach Studies

Qualitative research approach studies can be classified based on a number of criteria, including depth, objective, context, and participants.

Clasificación Según La Profundidad

Depth studies focus on describing a phenomenon objectively. These studies typically use data collection methods such as observation, interviews, and document analysis (Ugwu & Val, 2023). Some examples of qualitative descriptive studies include:

- A study describing college students' experiences with online learning.
- A study describing the coping strategies used by

people with chronic illnesses.

- A study describing cultural beliefs about health and illness.

Interpretive studies focus on interpreting the meaning of a phenomenon. These studies usually use data collection methods such as interviews, participant observation, and text analysis. (Liamputtg, 2009). Some examples of qualitative interpretive studies include:

- A study that interprets the religious beliefs of a group of people.
- A study that interprets the experiences of immigrants in a new country.
- A study that interprets the meaning of a work of art.

Classification According to Objective

Objective studies focus on representing reality impartially. These studies typically use data collection methods that are systematic and reproducible. Some examples of objective qualitative studies include:

- A study that uses participant observation to describe student behavior in the classroom (Levi & Forward, 2021).
- A study that uses content analysis to analyze voters' opinions about a political candidate.
- A study that uses document analysis to study the history of an organization (Liamputtg, 2009).

Subjective studies focus on interpreting reality from the perspective of the participants. These studies typically

use data collection methods that are flexible and allow for researcher participation. Some examples of qualitative subjective studies include:

- A study using in-depth interviewing to explore the experiences of people with mental illness (Levin & Forward, 2021).
- A study that uses participant observation to understand the meaning of a religious ritual.
- A study that uses discourse analysis to interpret the meaning of a literary text.

Classification According to Context

Field studies are carried out in the natural context of the participants. These studies allow the researcher to understand the phenomenon under study in its real context. (Aspers & Corte, 2019). Some examples of qualitative field studies include:

- A study that observes the behavior of children on a playground.
- A study that interviews people living in a rural community.
- A study that analyzes an organization's documents.

Laboratory studies are carried out in a controlled environment. As noted by Alkan (2021) suggests that these studies allow the researcher to manipulate the study variables and control external factors that may affect the results; focusing on the qualitative characteristics of a study and not the quantitative ones. Some examples of

qualitative laboratory studies include:

- A study using in-depth interviewing to explore the experiences of people with mental illness (Levin & Forward, 2021).
- A study that uses participant observation to understand the meaning of a religious ritual (Shava et al., 2021).
- A study that uses discourse analysis to interpret the meaning of a literary text.
-

Classification According to Participants

Studies with voluntary participants are carried out with people who participate voluntarily (Shava et al., 2021). These studies tend to be more realistic and better represent reality than studies with non-volunteer participants. Some examples of studies with qualitative volunteer participants include:

- A study that interviews people who live in a rural community
- A study that observes the behavior of children on a playground
- A study that analyzes the documents of an organization.

Studies with non-volunteer participants are carried out with people who participate through a selection process. These studies may be more realistic than studies with volunteer participants.

Steps to Analyze Data in Qualitative Research

Steps to Analyze Data in Qualitative Research

In qualitative research, various types of data can be collected, whether texts, recorded audios, or even videos and photographs. Therefore, this step may mean transcribing interviews, field notes or survey responses, among others (Levin & Forward 2021).

Review and Explore Data

This step involves examining the data for patterns or repeated ideas that emerge throughout the data collected (Oranga & Matere 2023).

Develop a Data Coding System

Starting from your initial ideas, it is time to establish a set of codes that can be applied comprehensively to categorize all the data (Belotto, 2018).

This includes reviewing all responses obtained throughout the study and labeling them with various codes, either manually or through a computer program. As data is reviewed, new codes can be created to add to the system if necessary.

Asignar Los Códigos A Los Datos

Data analysis in qualitative research also involves identifying recurring themes and linking the codes into cohesive, overarching themes (Belotto, 2018).

Present the Results

The presentation of the results of the analysis of qualitative research must be carried out in an effective, understandable and suitable way for decision-making (Uprety, 2007).

The information can be presented through tables and matrices, since it allows the findings obtained during the process to be connected.

Advantages of qualitative research

These are some of the advantages of qualitative research that will help you define if it is the type of research you need to conduct in your next research Project

- Qualitative research does not require a strict design plan. This gives the researcher the freedom to let the study take place in a more natural way: which is more in-depth and detailed (Mwita, 2022).
- Researchers obtain more detailed data. This type of research focuses on social context and meaning and how it affects individuals, which is particularly beneficial in the social sciences (Mantula et al., 2024).
- Allows greater freedom of expression: The respondent feels freer to give an authentic answer, since they are not influenced by a group. For example, this type of study is ideal for dealing with sensitive topics or simply to preserve anonymity (Agius, 2013).

- The administrator can manage when respondents can intervene. You can start a discussion with participants using elements such as photos, videos or audios (Aspers & Corte, 2019).
- You can get the point of view of geographically dispersed people (Oranga & Matere, 2023). Through online qualitative research, for example using an online community, you can obtain feedback from people anywhere in the world, or a sample that is difficult to find or cannot attend a product testing session (Grossoehme, 2014).
- Online research reduces the cost of submitting and implementing a qualitative study. Plus, tracking and collecting responses is faster, as is data processing (Dzogovic & Bajrami, 2023).

Disadvantages of Qualitative Research

Researchers must take into account the practical and theoretical limitations of qualitative research, which typically include:

- Lack of reliability. The real-world environment often makes qualitative research unreliable due to uncontrolled factors affecting the data (Uprety, 2007).
- Subjectivity Due to the main role of the researcher in the analysis and interpretation of data, qualitative research cannot be reproduced in other areas and contexts, in addition to the fact that it depends largely on what the researcher

manages to observe, record and analyze (Mwita, 2022).

- Limited generalization. This type of research is usually carried out in small groups to obtain rich data, but very specific to a context. Despite rigorous analysis procedures, it is difficult to draw generalizable conclusions because the data may be biased and not representative of the general population (Shava, et al. 2021).
- It requires a lot of work. Analysis of qualitative data often has to be verified or performed manually, which is time-consuming (Mwita, 2022). However, various platforms can also be used to record and manage data from this type of research.

Quantitative Approach

Quantitative research is a method of collecting data in a context of mainly scientific studies. Based on the data collected, predefined hypotheses can be tested (Pandey, Madhusudhan, & Singh, 2023).

The different research methods are used, for example, in the university environment for bachelor's or master's theses, but can also be applied in any other research context, such as in market research institutes.

This method is widely used in natural and social sciences: biology, chemistry, psychology, economics, sociology, marketing, etc (Apuke, 2017).

What is Quantitative Research?

Quantitative research is a structured method of collecting and analyzing information obtained from various sources. This process is carried out with the use of statistical and mathematical tools with the purpose of quantifying the research problem (Barella et al., 2024).

Regarding its use in companies, quantitative research can help improve products and services or make accurate and informed decisions that help achieve established objectives. In general, it is about asking people to give their opinion in a structured way so that you can produce concrete data and statistics that guide you and in this way, obtain reliable statistical results.

To carry this out, it is important that you find a large number of people and make sure that they are a representative sample of your target market.

Characteristics of Quantitative Research

Quantitative research seeks to measure a phenomenon, quantify, express in figures, the parameters studied in a population; in such a way that it quantifies the data and thus can generalize the findings (Ghanad, 2023).

These figures can be descriptive or comparative results, or they can be the subject of statistical analysis to establish whether there are significant links between certain parameters studied (Nassaji, 2015)

The main characteristics of quantitative research:

- It seeks to interpret the information, it is based on the use of numbers and figures
- The key questions of this method are: How many?, Who?, How much?, or To what extent? (Ghanad, 2023)
- It is a descriptive research method
- Its objective is to analyze the behavior of the population
- Results can be used in general situations
- Study the behavior of your sample
- Works on the stimulus and response system

Instruments To Use In Quantitative Research

Quantitative research instruments are the tools used to collect quantitative data; with a traditional or empiricist research approach (Abdulai & Owusu-Ansah, 2014). These instruments may be diverse in nature, but they all share the goal of capturing reality objectively and systematically.

Some of the most common quantitative research instruments include:

- Surveys: Surveys are a type of questionnaire administered to a sample of people to collect information about their opinions, attitudes, or behaviors. Surveys can be self-administered or administered by an interviewer (Sharma, 2022).
- Questionnaires: Questionnaires are a series of questions used to collect information from respondents. Questionnaires can be self-administered or administered by an interviewer

(Sharma, 2022).

- Interviews: Interviews are structured conversations conducted with study participants to gather information. Interviews can be individual or group (Sharma, 2022).
- Observation: Observation is the process of collecting data by observing the behavior of study participants. Observation can be participant or non-participant (Sharma, 2022).
- Secondary Data Analysis: Secondary data analysis is the process of collecting data that has already been collected by others and not by the author (Martins, Da Cunha, & Serra, 2018). Secondary data can come from a variety of sources, such as surveys, censuses, government records, and commercial databases.

Quantitative Research Methods

Quantitative research can be carried out by carrying out the following research methods. Here are the types of quantitative research so you can choose the one that best suits your project:

Descriptive research: It is carried out prior to data analysis with the objective of finding important factors and characteristics of the study phenomenon; emphasizing analyzing the data systematically and thus finding key factors for the investigation (Barella et al., 2024).

Quantitative research provides a description,

explanation, prediction and exploration of phenomena in real-life situations and characteristics (Syahfira Purba, 2021). The correlation of particular individuals, situations or groups is described.

Descriptive research seeks to describe the current state of an identified variable. Therefore, the projects are designed to provide systematic information about a specific phenomenon and thus be able to describe it and its characteristics (Nassaji, 2015)

In this type of research you do not usually start with a hypothesis, but it is likely that one will be developed after the data is collected. Data analysis and subsequent synthesis provide proof of the hypothesis (Grimes & Schulz, 2002).

Systematic data collection requires careful selection of the units studied and careful measurement of each variable.

Correlational research: As the name suggests, researchers use this type of quantitative research to relate two or more variables using mathematical analysis methods (Barkha et al., 2022).

Some of the variables that are usually analyzed are patterns, relationships and trends. The impact of one of these variables is observed when the relationship between them changes. In fact, it is common for researchers to tend to manipulate one of the variables to achieve the desired results (Fitria, 2019).

Comparative Causal Research: Among the types of quantitative research, this stands out because it depends mainly on the comparison factor. This method is used by researchers to draw conclusions about the cause-effect equation between two or more variables (where one variable depends on the other independent variable) (Okoye, Egunjobi, & Kouassi, 2023).

The independent variable is established, but it is not manipulated and what is commonly done is to observe its impact on the dependent variable. As dependent and independent variables will always exist in a group, it is advised that conclusions be drawn carefully taking into account all factors. Causal comparative research is not limited to the statistical analysis of two variables, but extends to the analysis of how various variables or groups change under the influence of the same changes (Okoye et al., 2023).

Experimental research: Another type of quantitative research is experimental research, which basically depends on a theory. There can be multiple theories in an experimental investigation. It is worth mentioning that a theory is a statement that can be verified or refuted (Nassaji, 2015).

After stating the statement, other tasks are performed to understand whether the theory is valid or not. This type of method is mainly used in natural or social sciences, as there are several statements that need to be proven correct or incorrect.

1.3. Style of Organization and Presentation of Information

Apa Standards Seventh Edition

The APA Regulations Seventh Edition is a set of standards and guidelines for the presentation of academic works, research, reports, and other scientific documents (Jin & Chung, 2018). These standards were published by the American Psychological Association (APA) in 2020, and are designed to ensure the clarity, consistency, and accuracy of the information presented (Smith & Eggleston, 2001). According to, Landrum (2013) suggests that the researcher when writing his manuscript avoid plagiarism with good paraphrasing strategies and giving credit to the original sources.

The APA Guidelines, Seventh Edition, cover a wide range of aspects of the presentation of academic documents.

Structure

The structure of the APA Seventh Edition standards is divided into four main sections: definition, format, citations and references.

Definition: This section provides a brief description of the regulations and their objectives. Where the researcher considers a particular research strategy (Appelbaum et al., 2018).

Page Layout: This section establishes guidelines for page size, margins, font, font size, spacing, and page numbering (Bradley, Noble, & Hendricks, 2020).

Page size: The size used in APA standards is letter size paper

Margins: Margins should be 1 inch on all sides. This means there is 1 inch of space between the edge of the page and the content.

Font: Must be Times New Roman or Arial.

Font size: Must be 12 points.

Spacing: Spacing should be 2.0. This means that there are two lines of space between each line of text.

Page Numbering: Pages should be numbered in the upper right corner, starting on the title page.

Interlineado: APA Standards, double spacing must be applied on all pages of the document, except in specific cases such as tables, figures or appendices (Bradley et al., 2020).

Indentation in APA standards: When we use indentation, it will be 5 spaces (½ inch (1.27 cm) from the left margin) at each beginning of the paragraph; remember that you can use the tab key or apply the settings in WORD (Bradley et al., 2020).

Paragraph Alignment: Left alignment should be applied throughout the project. The right margin must be set to "Irregular", and using justification in the text is discouraged, unless the request comes directly from the corresponding professor or institution (Landrum, 2013).

Quotes

It is the direct or indirect reproduction of the text or ideas of other authors in our work. The citation must be accompanied by some basic data that allows us Citations and references Adaptation of APA 7; the same ones that will give credits to the authors and the original sources from which the information was obtained (Yatin et al., 2018)

The citations and references section of the APA Seventh Edition standards establishes the guidelines for citing the sources used in a document, and for preparing the list of references.

This section explains that citations should be brief and concise, and should provide enough information so that the reader can identify the source consulted (Levitt et al., 2018). The list of references must be ordered alphabetically by the author's last name, and must include all the information necessary so that the reader can find the source consulted (Landrum, 2013).

Bibliographic References

It is the list that contains the works that have been used and cited specifically in our text, support our discourse and give it validity and credibility (Landrum, 2013). In each of the references all the data that allows us to identify the mentioned work will be included so that we can consult it if necessary (Bradley et al., 2020).

User Interaction

Interaction with the user: This section refers to the procedure of conceiving, creating and analyzing computer systems that are intuitive and accessible to any user (Appelbaum et al., 2018). So researchers use these research standards when writing their manuscripts (Levitt et al., 2018).

APA standards establish a series of principles for user interaction, including:

Consider user needs: Computer systems should be designed taking into account the needs of users, including their skills, knowledge, and preferences (Jin & Chung, 2018).

Use clear and concise language: The language used in computer systems must be clear and concise, so that it is easy to understand for all users (Okoye et al., 2023).

Provide feedback: Computer systems must provide feedback to users about their actions, so they can know if they are performing tasks correctly (Bradley et al., 2020).

Use user aids: Computer systems should provide user aids, such as user manuals, tutorials, and help guides, so that users can learn how to use them (Landrum, 2013).

Evaluate user interaction: Computer systems should be evaluated to ensure they meet user needs (Yatin et al., 2018)

Five Tips to Better Understand APA Standards Seventh Edition.

Find Resources And Guides To APA Standards

There are numerous online resources related to APA Standards, ranging from the original manual in English, translations, summaries, presentations, tables, tutorials, adaptations from various universities, to citation and reference generators. In such a way that the use of APA standards not only influences the clarity and understanding of the manuscripts, but also makes them more inclusive (Serra et al., 2024).

When searching, you can choose those resources that you find easy to use. Some institutions offer quick guides that are particularly effective, as they cover the most relevant aspects. In this sense, Hunsley (2010) suggests the Citation and Referencing Guide based on APA Standards (7th edition), emphasizing the standards necessary to report scientific manuscripts following ethical and legal aspects of publication.

It is advisable to have easily accessible resources to consult in case of recurring questions.

1.4. Preparation of the Preliminary Project

The preparation of a thesis draft is based on the need to transform valuable research into publications for specialized journals, overcoming emotional and practical challenges. This process includes adapting the manuscript, planning the writing, and managing comments from editors and reviewers (Patterson & Gilkison, 2020).

Preliminary Project Structure

Study Background

The background of the study is a section of a research paper that describes the research that has been conducted on the topic of the study. The background of the study provides a framework for the current study and helps justify the need for the research. Writing the background section correctly is essential to place the research in the context of previous studies and highlight the relevance of the project (Nizma, Bangun, & Zuardi, 2024).

The background of the study usually includes the following elements:

- A literature review: Provides a description of previous studies that have been conducted on the topic of the study. According to Kubota et al. (2021) suggests that, when reviewing existing literature, it is essential to contextualize research in an increasingly competitive academic environment.
- A discussion of the findings from the literature: Analyze the findings of previous studies and explain their importance.
- A rationale for the current research: Explains why the current study is necessary or important. Based on Valencia et al. (2015) explains that in a degree thesis it is crucial, since it explains the relevance and impact of the proposed research in the academic and professional context.

Problem Under Research

The research problem is the question or set of questions that seeks to be answered to obtain information on a specific topic, and it must be formulated in a clear and relevant manner. In any professional career, research and publication are essential aspects of continuous learning (Rhodes, 2012).

Research Object

The object of research is the specific topic or phenomenon being studied, and must be concrete enough to allow for effective research. It must be relevant to the field of study and feasible with the available methods and resources (Cuschieri et al., 2018).

Relationship between research object and research problem

The research object defines the general scope of the study, while the research problem specifies the purpose and approach within that framework. Both are interrelated, with the object establishing the context and the problem guiding the specific direction of the investigation (Abdulai & Owusu-Ansah, 2014).

Research objective (General and specific)

General objectives: define the main purpose of the project and guide its planning, execution and evaluation. Although broad, they must be clear and understandable to ensure effective long-term guidance (Kubota et al. 2021).

Specific objectives: in a project they detail concrete and practical goals, facilitating planning and execution. Integrating Bloom's objectives into this planning is essential, as they provide a clear structure for developing cognitive skills from basic levels, such as remembering and understanding, to more complex levels, such as analyzing and creating. This integration ensures that the objectives are achievable and that the project encourages deep and progressive learning (Nurmatova & Altun, 2023). Bloom's Taxonomy and its role in academic writing highlight the importance of setting effective pedagogical objectives to improve students' writing skills (Korzh, 2017).

As stated by Nurmatova and Altun (2023) indicates that specific objectives aligned with Bloom's Taxonomy range from remembering basic information to evaluating and creating complex solutions. These objectives facilitate detailed and effective planning, promoting the progressive development of cognitive skills.

General and specific objectives are intrinsically connected, as the former establish the broad framework and general direction of the research, while the latter break down this framework into concrete, manageable goals. Specific objectives should be closely aligned with overall objectives to ensure that each detailed step effectively contributes to achieving the main objective.

Theoretical Framework

Definition: a theoretical framework is presented as the section that details the background, fundamental theories

and key concepts that support a project or research. In the view of (Salawu et al., 2023) provides a structure of theories and concepts that guides the study and bases the interpretation of the investigated phenomena. Furthermore, by establishing a clear and coherent basis, it facilitates the formulation of research questions and ensures the stability and generalization of the findings.

The theoretical framework is made up of the following components:

Research background: This component presents a review of the literature on the research topic. The literature review must be exhaustive and up-to-date.

Conceptual framework: this component presents the concepts, theories and models that will be used in the research.

Hypotheses: in this component the research hypotheses are presented. Hypotheses are propositions that can be proven or disproved by research. As per Kara-Junior (2014) the theoretical framework, the background, the conceptual framework and the hypothesis are fundamental elements in a scientific manuscript, since they establish the basis of existing knowledge, define the key concepts, and formulate questions and assumptions that will guide the research, allowing a critical evaluation and the reproducibility of the experiments.

Methodology

The methodology in a thesis is the systematic approach that guides the research, describing the logical steps

and procedures used to address the study problem (Dr. Swarooprani, 2022). This component is crucial because it not only defines the specific methods used, but also justifies their selection and application, ensuring that they are appropriate for the research problem and objective. Based on Belotto (2018) suggests that the methodology establishes the precise approach and techniques for collecting and analyzing data, ensuring the validity and reliability of the results.

Bibliography

Bibliographic references in scientific research are essential, since they guarantee the validation and reliability of the information presented (Ocaña-Fernández & Fuster-Guillén, 2021). By providing readers with access to relevant and up-to-date sources, it facilitates further exploration of the topic under investigation. In addition, it ensures that all publications are correctly cited according to established standards, which reinforces academic integrity and allows rigorous monitoring of scientific work.

Support and/or Presentation

Topic mastery

As stated by Thomas and Skinner (2012) indicates that mastery of the topic in a thesis is essential, since it implies a deep and up-to-date understanding of the relevant concepts and theories, allowing the researcher to communicate their findings clearly and effectively.

This knowledge ensures that the author can simplify complex concepts, confidently answer questions, and place their research in the proper context (Gohar, 2024).

The importance of the dissertation lies in its ability to develop critical research, analysis and communication skills in the student (Thomas & Skinner 2012). Furthermore, a well-crafted dissertation can be converted into a journal article, amplifying its academic and professional impact, and contributing significantly to the production of knowledge and the prestige of the educational institution.

On the other hand, (Gohar, 2024) preparing for your thesis dissertation will manage academic stress, develop research skills, and ensure a well-structured and reasoned presentation. Following tips such as maintaining good communication with supervisors, managing time effectively, and taking care of mental health can facilitate this process. (Dr. Swarooprani, 2022).

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CHAPTER 2
SCIENTIFIC RESEARCH

Kelly Yohanna Peña Moreno

Abstract

Scientific research, as a fundamental pillar of the advancement of knowledge, has evolved over time, becoming deeply rooted in both philosophy and history. This chapter explores the epistemological and methodological foundations that shape research activity, addressing how philosophy and history have shaped our current conceptions of science. From its initial conception as a process of searching for answers to humanity's fundamental questions, research has transcended to become a crucial tool in multiple fields of knowledge, from medicine and industry to education and politics.

Scientific research not only seeks to generate new data and theories, but also requires rigorous ethics to ensure the validity and integrity of its results. Systematization, empiricality, rationality and originality are distinctive characteristics that define modern scientific research, while adherence to ethical principles ensures transparency and appropriate use of resources.

Furthermore, in the contemporary context, research has acquired unprecedented relevance, reflected in its indispensable role in solving everyday problems and satisfying new human aspirations. This chapter also highlights the importance of critical reading in the research process, highlighting how access to and understanding of scientific literature fosters innovation and the advancement of knowledge.

2.1. Introduction to Research

Introduction to Research

Between philosophy and history of Research, the first thematic unit corresponding to this course is constituted, in which several articles have been grouped that address, from a historical-philosophical perspective, the activity of research, such as the search for answers to the big questions that humanity has posed since the beginning of time (Whitaker, 1984).

In accordance with (Khairunnisah, Salminawati, & Irmi, 2023) suggests that research is presented not only as the search for solutions to everyday problems, but also as an activity aimed at understanding and interpreting human and social facts based on reflection; as a research technique to find a conclusion or inference. To do this, it is located on the epistemological level, since the researcher adopts a philosophical or epistemic approach to generate new knowledge resulting from the research process (Waters, 2019). Based on Walton and Zhang (2013) considers that epistemology is skeptical which makes it difficult to conceive true knowledge; the same one that is achieved by guiding scientific research.

In contrast, will talk about the feasibility of constructing terms such as history of research, or philosophy of research, to conclude that these are two terms whose semantic underpinnings, because they are transdisciplinary, are fragile, with blurred borders, in constant evolution, and

that Rather, they are terms created for academic purposes (Bahri, 2024). So that history, philosophy, and research become notions that make up a synergistic system, which transcends the sum of its parts. According to Casadevall and Fang (2015), the invention of scientific writing has transcended time; the same thing that has allowed history to belong today.

A reflection is proposed on the influence of history and philosophy on research, originally conceived as a human activity with a tendency to seek solutions to the daily problems of humanity Bahri (2024), Levitt et al. (2018) for the satisfaction of their immediate material needs, with the passage of time in the development of the spiritual elements inherent to life itself and to the human being, worrying then about the interpretation and understanding of these individual and social human facts.

Research, as an activity and discipline for the systematization of information and its subsequent conversion into scientific knowledge, seeks to transmit universal signifiers for its global admission, define methods and processes to reach valid conclusions accepted by the scientific community (Levitt et al., 2018). The epistemological perspectives validated the quantitative methods and processes for the validation and testing of hypotheses and in response to the needs for interpretation and understanding of realities and phenomena, the open and flexible designs that characterize qualitative research approaches emerged (Walton & Zhang, 2013).

Research at the Current Moment

Research today has acquired unusual importance. There is almost no transcendent human activity that is not based on research (Ipanaqué-Zapata et al., 2023). The doctor investigates not only when he discovers the agent of a new disease, or the new medicine to better attack an illness, but in each patient. Part of your clinical history, that is, the analysis of your patient's problem. On this basis, he formulates his hypothesis (the gallbladder functions poorly), and to verify it he resorts to the laboratory: blood tests, urine tests and x-rays, and only when his hypothesis is proven, does he prescribe the respective treatment (Cooper, 2015).

The industrialist investigates, the lawyers, the farmers, the politicians, the sociologists, the teachers investigate or should investigate (Rhodes 2012). The simple construction of a small school in a village can no longer be done on hunches or under pressure from a social group: it will be necessary to investigate the existing school population, its projection into the future taking into account vegetative growth and migrations, aspirations of the population, sources of work, etc. etc., based on which its dimension and orientation will be given (Abdulai & Owusu-Ansah, 2014).

Researchers around the world are engaged in a systematic search for solutions to the problems that afflict humanity, an endless search, because if a solution is found to one problem, more and more problems will appear next, since the happiness of man above Land is not obtained by

satisfying one, two, three or four needs; As these have been satisfied, man will have new and new aspirations. This is the dynamic of humanity, otherwise it would stagnate and disappear (Ipanaqué-Zapata et al., 2023).

Thanks to this tenacious work by a plethora of researchers, man has achieved greater physical well-being and has raised his standard of living and security (Abdulai & Owusu-Ansah, 2014). Thanks to their work, man can have a richer diet, better quality clothing, reduce heavy work (washing machine, mixer, excavator, etc.), better means of communication and entertainment. But at the same time that these achievements have been achieved, new and greater numbers of problems have arisen, the solution of which can no longer be left only to those scientific men who dedicated their entire lives to discovering one or a part of the laws that govern nature.

2.2. La Evolución del Conocimiento Científico

From Traditional Philosophy to Current Scientific Method

Human beings have accumulated knowledge about the environment in which they live by increasing their theoretical and practical knowledge to transform the surrounding reality. This set of knowledge, as well as the human activity aimed at achieving it, is what is called science. However, the concept of science cannot be applied to any type of knowledge, but only to knowledge that

has been obtained through a methodology, the scientific method, and meets certain conditions (Ekanem, 2013).

Knowledge can be understood as the conscious and grounded knowledge that we are capable of communicating and discussing; and it is thus distinguished from vulgar knowledge that is simply remembered and that we cannot subject to criticism (Bahri, 2024).

Therefore, what characterizes current science is not the claim to achieve true knowledge but rather the achievement of rigorous and verifiable knowledge. Science as such cannot claim the illusory goal that its answers are definitive, or even probable; because its progress is directed towards an infinite purpose: that of constantly discovering new, deeper, more general problems, and justifying our responses to them (Ekanem, 2013).

It is worth noting that the importance of science is not only to group or master a set of knowledge that meets certain requirements, but also in the way in which these are obtained, that is, the scientific method, which consists of observing those facts that allow the observer to discover the general laws that govern them and describe the process of scientific research (Cooper, 2015).

The Fundamental Characteristics of Scientific Research: System, Empiricism, Rationality and Originality

Scientific research is a procedure of reflection, control and criticism that seeks to provide new data, facts,

relationships or laws in any area of scientific knowledge. Science uses research to discover new knowledge and to reformulate existing knowledge (Sharma, 2022).

People who carry out this type of research are called scientists (Khairunnisah et al., 2023). Because they must have the necessary resources to sustain research for the time it demands, many countries offer scholarships and incentives for scientific research.

Scientific ethics is the set of ethical principles that underlie all inquiry in science. It generally contemplates not causing avoidable suffering to experimental animals and respecting the confidentiality of individual data (Bahri, 2024).

Characteristics of Scientific Research

Just like any type of research, scientific research has its own particularities that make it its own. In this section we show you the 8 characteristics of scientific research:

It is systematic: its main requirement is the systematization of all its processes, which provides rigor to its results. This means that the observations and steps to follow are not random, but, on the contrary, have a foundation and concrete objectives (Kabir et al., 2023).

The standardization of all your procedures is the key so that actions are executed reliably in search of results. Furthermore, it is the only way to organize the research in time and space, taking into account external factors and the researcher's own work pace.

It is empirical: all the results produced by scientific

research must be able to be contrasted with reality. Furthermore, they must be able to be observed in any real and concrete area, giving rise to the measurement of results. (Olsson, Sentilles, & Papatheocharous, 2022). In this way it is possible to test the research hypothesis and thus be able to affirm, deny or complement, as the case may be.

It is rational: another of its characteristics emerges from its logic and rationality, where objective aspects must be highlighted over subjective ones. As it has the particularity of being empirical, it makes it necessary to base it on real and observable facts. The latter requires the researcher to have a critical attitude free of prejudice towards personal values (Fogg-Rogers, 2017).

It must be original: each investigation must aim to discover new knowledge. That is why it is recommended that scientific research focuses on novel or little-addressed aspects. If based on an existing investigation, the author will have to focus on a different area of the problem. In this way you can search for alternative results to those presented in the first place (Ekanem, 2013).

2.3. Ethics in Research and Reading

Ethics in Research

There are multiple reasons why it is necessary to adhere to basic standards of scientific conduct during academic research. The credibility of the scientific community and

the public's perception of judging and accepting new results depend largely on the authenticity of the results that have been published (Mirghani et al., 2012).

It is particularly important to make a clear distinction between acceptable and unacceptable behavior, especially when humans or animals participate in a study. Given the competitive nature of research, it is increasingly difficult for scientists to report unique and pioneering research. However, some members of the research community continue the practice of not appropriately reporting data and scientific results obtained. (Seneviratne, 2023).

Ethical principles applicable to research

The researcher is responsible for the exercise of his scientific activity towards the institution that sponsors his studies and towards society itself (Mohapatra, Chaudhry, & Dogra, 2018). It must encourage ethical reflection in the design and execution of projects and ensure that they contribute to the improvement of living conditions.

Puesto que las características personales y sociales del investigador pueden influir en sus decisiones que toma durante el proceso de la investigación, el mismo debe revisar qué intereses personales, profesionales o financieras animan la elaboración y ejecución de sus proyectos; es importante que el investigador conozca estas tendencias y las haga conocer (Seneviratne, 2023).

In this regard, the following four principles must be observed:

- Diseño adecuado de la investigación.

The study must be carried out following well-planned research protocols, preferably examined by researchers in the given scientific field. They must be carefully and rigorously designed, taking into account current standards in order to produce significant results and optimize available resources (Probert, 2006).

Good use of economic resources and accountability

As stated by Ferreira et al. (2022) indicates that accountability ensures that organizations act ethically and effectively, maximizing their positive impact on society.

Material and economic resources must be used effectively and efficiently, managing them correctly and responsibly, taking into account compliance with the proposed objectives and deadlines. The use of resources for private purposes should be avoided. All researchers must observe principles of correct, transparent and effective financial management (Berezka, 2010).

The resources used in the investigation process must be accounted for before the corresponding organization. Publicly funded researchers are also responsible for the effective use of taxpayer money. Researchers must cooperate with any audit that the Ethics Committee or other authorized body may want to carry out of their research (Delgadillo, 2016).

The results of original research funded by the University should not be published in another medium, without prior permission, except when the article has been rejected by

those responsible or peers for institutional publications (Akram et al., 2022).

- The main researcher and collaborators

It is the responsibility of the principal investigator to determine whether the people on his or her team are qualified to perform the investigative functions and interact with the study participants (Delgadillo, 2016).

To be a co-author of a publication it is required to have participated in the preparation of the proposal, in the work design and to have carried out part of the theoretical framework, analysis or discussion of the results; which determines an equal association a (Husain et al., 2021).

All researchers who have actively and significantly participated in the entire work must appear as authors or co-authors of the publication. The order in which the authors appear should be done according to the importance of the contribution of each of them.

All authors referred to in a publication must be aware of its content and assume responsibility for it, unless otherwise specified (Delgadillo, 2016).

- Relationship with the environment

In accordance with Lai and Chen (2020) suggests that better environmental health and ecosystem vitality are crucial for high human performance, underscoring the importance of the environment in scientific research to improve human development. Meanwhile, (Cluzel et al., 2020) highlights that, to initiate a sustainable transition, it is crucial to consider the environmental impacts of all

human activities, including scientific research, underlining the importance of the environment in scientific research to promote more sustainable practices.

Environmental science, by addressing ecological and environmental problems, provides the necessary scientific basis for political decision-making and sustainable development, further emphasizing the importance of the environment in scientific research (Zhu et al., 2021). Based on Ventura and Davel (2021) explains that reflecting on the future of the Earth and its inhabitants is essential to guarantee a possible tomorrow, so socio-environmental impacts must be a universal and inevitable concern in all production of scientific knowledge

Research and its relationship with Reading

According to Jannah, Nimah, and Hasanah, (2023) indicates that reading is essential in scientific research because it promotes a critical and deep understanding of topics, which can generate new ideas and innovative approaches. The study found that strategies to increase interest in reading among students, such as using appropriate articles and activities, improve their comprehension skills and motivation in learning.

Reading is essential in scientific research as it fosters a deep and critical understanding of topics, which can generate new ideas and innovative approaches. The close relationship between research, reading and writing allows researchers to understand, interpret and propose

transformations of the world around them. Furthermore, as per Bozan (2024) reading and comprehension skills are essential from an early age, and improving these skills can positively influence students' academic and cognitive performance.

To undertake the following reflection it will start from the premise: the reading of scientific literature and scientific activity are differentiated processes; In other words: reading scientific texts is not the same as doing science. This, of course, does not mean that close relationships are not established between both processes. For a scientist to carry out his scientific activity, he also needs to be informed about the state of his science by reading specialized texts. As stated by Aktaş, Çetinkaya Özdemir, and Kaya Özgül (2023) scientific reading is crucial in research because it fosters comprehension and writing skills, essential for generating and communicating new knowledge.

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