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Research Methodology: Methods and Techniques of the Scientific Research

Students Guide

Schiopu Lucia

Schiopu Lucia
State Pedagogical University
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Introduction

The students guide book "Research methodology: methods and techniques of the scientific research" aims to substantiate theoretically, methodologically and pragmatically, the different types of investigative approaches characteristic of educational processes, postulating that pedagogical research is a strategy of natural action, specific to any teacher and necessary for the professional evolution of the student in the teaching career.

The students guide book "Research methodology: methods and techniques of the scientific research" has two components integrated within the same discipline:

1. Theoretical component

2. Applied component

The theoretical component focuses on providing the necessary knowledge to conduct a scientific investigation on any educational matter, to get familiarized with methods and methodologies of research in both the classical research as well as in that regarding the methods considered creative in research. Also, this component of the theoretical research needs to be also presented in relation to the quantitative methods and statistical analysis that outlines the research results.

The applied (practical) component links the investigation to the applications on the theoretical and practical sides through seminars and labs. The knowledge acquired within this discipline is to be applied during the elaboration of diploma paper when completing the undergraduate or graduate program.

THE AIM OF THE COURSE is comprehension, description, application, use, analysis, synthesis, application and proposal of methods and viable research techniques sustainable and resilient within a research design.

This course contributes to the preparation of undergraduate and master degree students for conducting research and involves the development of skills according to the study program. The students will gain experience in using research methods in the various phases, stages of research, will be aware of the value of research issues and will design research activities in correspondence with linguistic education.

It should be noted that the guide book provides informational and logistical support in discussing the profile of the pedagogical student as a researcher, who possesses the competences of research and knowledge of innovation of the educational reality, these being, especially in the context of the increasingly challenged educational reform.

1.   Scientific approach and research methodology

There is a difference between common sense and scientific sense, according to researchers. Common sense (also known as sense) is a sound, practical judgment about everyday affairs, or a basic ability to see, understand, and judge in a way that practically everyone can grasp (wiki). Scientists and scientific thinkers have a set of skills that allow them to question and assess information in the scientific sense. The ideas of common sense and scientific sense will be clarified by the following statements:

a) both the scientific and common sense approaches rely on conceptual schemes, i.e., causal linkages of limited usefulness. In science, these explanations are constantly examined, contrary to popular belief;

b) any attempt at generalization must first pass through the stage of experimental truth, or assumption. This precaution does not exist in common sense: false certainty is chosen over relative certainty;

c) in science, only what can be verified is true. In common sense, what everyone considers to be true at a given time and in a certain circumstance or context is true;

d) knowledge in science is established by laws (giving it a lasting quality), but knowledge in common sense is expressed in the immediate and fluctuating form of opinion.

In fact, the didactic act can be conceived as an uninterrupted scientific approach and a process of creation as a state of mind and a way of thinking indispensable to the truly effective teacher.

A relationship is established between pedagogical research and educational practice in the sense that pedagogical research can be a real regulatory and a self-regulatory factors and a condition to promote general progress in education.

Conducting an educational process and conducting educational research both necessitate the same attributes and a blend of teaching and personal exploration that assures the foundations for a more flexible and innovative practical pedagogy. When addressing the characteristics of a good teacher, there is a growing focus on the talents of the researcher and innovator of reality, which are increasingly in demand, particularly in the context of educational reform. Pedagogical research, on the other hand, has its own aim, namely actions or facts that are dominated, challenged, orientated, adjusted, or, as necessary, deleted in the research. Everything that contributes to the intended changes, deliberate in the sphere of education, and influences the educational activity's yields is referred to as pedagogical actions and facts. Examples of pedagogical facts subjected to

research can be: curriculum, training strategies, methods, textbooks, teaching materials, classroom ergonomics, the personality of the teacher, the child, the educational relationship and so on.

As a result, educational research entails the implementation of scientific approaches, the study of pedagogical facts, and the execution of specific actions in relation to all aspects of the educational phenomenon: curriculum, educators, students, educational environment, instructive educational activities, textbooks, and so on.

Essentially, the goal of pedagogical research is to formulate descriptive inferences, deductions based on the accumulation of facts and information, and explanatory or causal facts, the use of available data to learn about other phenomena that are unobservable, and knowledge of causes and causal mechanisms, all while capitalizing on data.

As a result, pedagogical research is a critical, dynamic, and ongoing process of knowledge in which we formulate systematic questions regarding the educational phenomenon's components and factors. We define Research as:

- Any honest attempt to study a problem systematically or adding to universal education knowledge new aspects.

- The application of the scientific method to a practical environment.

- A systematic process of collecting and logically analyzing information.

The research should be:

1. Logical and systematic – it should be reasonable and understood by others.

2. Creative – it leads to new solution, theory or technology.

3. Generalizable- it investigates a small sample which can be generalized to a large population.

4. Replicable – others can test the findings by repeating it.

5. Open to all – it includes presentation to others.

The research is needed:

• To analyze, dispute an existing situation, problem.

• To come up with solutions to problems.

• To investigate and examine broader concerns.

• To design or develop a new technique or system.

· To explain a recent occurrence.

• To contribute to the creation of new knowledge.

• A mixture of two or more of the aforementioned options.There should be targeted the following steps to conduct a scientific research:

1. Delimitation of the research topic and problem

1.1. Notifying and identifying a relevant issue or problem, as well as determining its scope of application.

1.2. The research problem is operationally defined.

1.3. Documentation and information on the research topic.

2. Putting the research plan into action.

2.1. Identifying the research goals.

2.2. Developing research theories.

2.3. Creating a unified and cohesive study project.

3. Pedagogical research organization and development entails putting the research project into practice, emphasizing the implementation of methodologies in order to test the hypothesis, as well as recording and collecting data and outcomes.

4. Analyze, process, and interpret the information gathered.

5. Development of the research's final conclusions.

6. Confirming the research findings.

7. Introduction and dissemination of the acquired experience, of the new outputs on the educational practice.

2.   The taxonomy of pedagogical research

The term *experiment* comes from the Latin *experimentum*, a term that has the meaning *trial, verification, experience*; in the case of pedagogical research it is a question of verifying a hypothesis, which justifies the experiment, and ensures its meaning.

Unlike observation, which includes the researcher observing educational occurrences without intervening, the experiment entails a deliberate alteration in the context in which the phenomenon develops. The data from the experiments is objectively documented, and these conditions are subjected to controlled systematic modifications. As a result, the psycho-pedagogical experiment, also known as a didactic experiment, is a purposeful, stimulated observation. It is also known as the method of observation, but it is more rigorous and precise than observation because it entails the intentional or unintentional modification of educational

phenomena in order to study them in depth, as well as the identification, observation, quantification, and evaluation of the factors influencing, casing, or affecting them.

While conducting the experiment there must be described the following objectives of the experiment:

- identifying the real state of facts;

- comparing the data and final results with the starting ones for both categories of samples;

- establishing the relevance of the differences between the obtained results, the extent to which the experimental sample detached significantly from the control one;

- establishing the efficiency of the new way of working.

At this stage, when it is formulated the hypothesis, we are interested whether the hypothesis is confirmed in the research.

The actual experiment or experimentation consists in testing and verification of the hypothesis, formulation of the assumptions by the researcher. So, the purpose of the experiment is to confirm or refute the research hypothesis and to suggest other questions or hypotheses.

The forms of the psycho-pedagogical or didactic experiment can be versatile.

There are several ways to classify psycho-pedagogical experiments, based on different criteria.

a) According to the criterion of the number of subjects involved, we distinguish two types of experiments:

- individual

- collective.

b) According to the criterion of their duration, the psycho-pedagogical experiments are:

- long lasting

- of short duration.

c) According to the criterion of experimentation or developmental conditions, the following forms of psycho-pedagogical experiment are known:

- The natural experiment - which consists in conducting the research in the natural context, in any ordinary educational contexts and environments: classrooms, music rooms, labs, gyms, workshop, offices. Usually, these are random situations which are not based on a hypothesis and these experiments are based on introduction of a controlled change in the development of the phenomenon, and recording the results in the everyday setting.

- Laboratory experiment - which consists in observing the phenomena in special conditions, in a laboratory or in a specially arranged space, thanks to the integration of certain devices. These types of experiments are used more in psychological researches; the influence of random independent variables is practically eliminated, but the reproduced situation is not real, it is artificial, as the number of variables is reduced to 3-4 and only the action of certain variables of the studied context is ensured. In this case, we are talking about deliberately created situations, in which the phenomenon occurs artificially in laboratories or in specially designed spaces.

d) According to the relations that are established between the experimental and the control sample, there are distinguished:

- the classical experiment, in which, at the beginning, identical conditions for the experimental and control samples are identified,

- the quasi-experiment is similar to experimental research in that there is the manipulation of an independent variable. It differs from experimental research because either there is no control group, no random selection, no random assignment, and no active manipulation.

There are multiple possibilities for classifying pedagogical research, based on different criteria. The different types do not appear in pure form, but combined with each other, one and the same research can be analyzed and explained using several taxonomic criteria.
Depending on the purpose and complexity of the issue addressed there are:

1. Basic research, also called pure research or fundamental research, is a type of scientific research with the aim of improving scientific theories for better understanding and prediction of natural or other phenomenon; generally uses the findings from existing works to develop new ideas through analyzing existing theory and explanations. These new ideas are not tested through collecting evidence in the form of primary data.

2. Applied, practical research, which consists in the elaboration and verification of improvement measures, optimization, concrete steps that addresses an issue for to find immediate practical applicability. Applied research is undertaken to solve a specific problem or provide a solution to a practical question.

3. Exploratory research - takes place where there is little or no prior knowledge of a phenomenon. This type of research attempts to gain some familiarity with the appropriate concepts and looks for patterns or ideas without any preconceived ideas or explanation.

4. Descriptive research - describes a particular phenomenon, focusing upon the issue of what is happening, or how much of it has happened, rather than why it is happening.

5. Explanatory research - this type of research is involved in explaining why something happens, and assessing causal relationships between variables.

6. Pure research - takes place to explore a particular concept, or issue, without focusing on a specific problem, and may be carried out to simply gain a better understanding of the overall concepts.

7. Primary research - refers to research that has involved the collection of original data specific to that particular research project, for example through using research methods such as questionnaires or interviews.

8. Secondary research - refers to research where no such original data is collected, but the research project uses existing sources of data.

9. Empirical research supports the development of new ideas through the collection of data that is empirical means of observation or measurement rather than theoretical reasoning.

The main Stages of research are:

1. Defining the Problem
2. Data Collection
3. Data Analysis
4. Action

Finding and reading a few publications from inside an area the researcher is familiar with is an excellent method to start a research project. The next stages are:

2. Read about issues that interest you.

3. Start with the abstract.

4. Determine the research question and goals.

5. What approaches were used to acquire data?

6. What were the most significant discoveries?

7. Don't get too caught up in statistical analysis.

8. Be objective while remaining critical.

2.1. The stages of the research

Most authors consider as stages of research the following:

1. Define the topic and problem to be investigated
2. Realization of the research design

3. Organizing and conducting pedagogical research

4. Analysis, processing, and interpretation of the data gathered 5. Development of the research's ultimate conclusions

6. Appreciating the research

7. Incorporating and disseminating the learned knowledge and skills into educational practice.

Requirements that the researched topics must meet:

-to allude to concerns, events, or problematic processes that are a source of genuine difficulties,

-to be significant, crucial for the educational field, to be current with the priorities of theory and educational practice within a given framework,

- to be educationally relevant and meaningful,

- to be unique and real, leading to new and unique contributions as a researcher

- to aim for one of the goals of pedagogical research: description, explanation, modeling, clarification, improvement, optimization, or prospecting of instructive-educational activity,

- to have a sufficiently solid and reasoned theoretical explanation and substantiation, which should allow the researcher to make correlations with other aspects, with broader issues, etc., thus ensuring that the researched horizon is sufficiently wide,

- to aim for one of the goals of pedagogical research: description, explanation, modeling

- to include a dose of uncertainty, in order to justify the investigative efforts and approaches and for them to be stimulated in order to find explanatory, ameliorating prospects,

- to make a real contribution to the development of educational theory and practice, to solve the problems identified in the educational reality.

After choosing the problems to be investigated, there will be established and specified, as the following specific variables, setting the boundaries and contextualizing the problem to be researched, placing it more rigorously in the vast field of education.

The operational formulation of the research problem is an aptitude related to the scientific spirit of investigation, the analytical, synthetic and critical spirit, the pedagogical talent, the imagination and creativity - qualities and skills necessary for the researcher in the field of education.

There should be avoided the following issues:

- the research topic should include a degree of novelty, and the research outputs should not repeat the outputs of previous researches;

- the formulation of the research problem should not focus on some trivial things, banalities, or statements to which the status of the problem is assigned, but which are devoid of the dose of uncertainty;

- the research problem should not focus on some trivial things, banalities, or statements to which the status of the problem is assigned, but which are devoid of the dose of uncertainty;

- failure to ensure the correspondence between the topic, title of the research, the title of the chapters and their contents; the ties between the research hypothesis and the correspondences that must be established between the researched topic, title and:

- the intended end date

- the research hypothesis

- the scope of the investigation

- the findings

- the reached conclusions.

The following criteria will be considered while generating, formulating, and evaluating the problems to ensure their educational relevance:

- to meet the functional requirements of the research

- to be formulated in an operational, clear and precise manner, in precise and rigorous terms specifying the undertaken steps

- not to represent a false problem

- not to be based on imitation

- to be verifiable within the frameworks offered by the educational phenomenon.

Delimitation of the topic and the problem to be researched

Notifying and recognizing a topic and an issue having an impact on the field of education, as well as a topic that is necessary or worth exploring, are critical for research advancement and ensuring relevance and practical utility. It improves our collective ability to construct verifiable

scientific explanations for particular educational features by posing significant questions and arranging research to solve them.

The operational formulation of the research problem is an aptitude related to the scientific spirit of investigation, the analytical, synthetic and critical spirit, the pedagogical talent, the imagination and creativity - qualities and skills necessary for the researcher in the field of education.

Information and documentation on the research topic is an active approach and critical inventory of data and outcomes relating to the researched problem that have been gathered and understood up to that point, in order to assess the status of prior field and targeted issue study. As a result, the researcher broadens his knowledge, comes into contact with different scientific viewpoints, avoids duplication, and discovers new challenges.

Formulation of the research hypothesis

When writing a thesis, the hypothesis is a critical tool: it involves looking at cause and effect links, concomitant relationships, and interrelationships between two or more variables, and it is where the majority of the study begins. To put it another way, the hypothesis is a central assertion about the relationships between two or more variables that has clear consequences for testing existing associations.

In an ascertaining-ameliorating research, the hypothetical reasoning is frequently used:

"if… then…", "as much as… ", "it is possible that…", "what would result if…" and then frequently uses terms for establishing the relationships between variables the following: "determines", "leads to", "produces", "is the cause", "is the effect", "varies with…", "reflects", "influences", "generates" and so on.

Depending on how the investigations are carried out auxiliary working hypotheses can be formulated, which in turn are important for research.

From a pragmatic point of view, the hypothesis directs the processes of collection of data, ordering, structuring and understanding of data in the process of gaining knowledge; it represents the reference element to which we strive during the research and which provide the necessary bridges between:

1. the theme and title of the educational research and its finality and, implicitly, the actions of research

2. the investigative approaches, the outline and the way of carrying out the research, the nature and the volume of the efforts of those involved

3. the results and outputs obtained

4. research conclusions.

See an example of *the following hypothesis*:

Implementation of the Technological Model of personalized English language learning on the development of communication competencies (writing, listening, reading and speaking) in English by capitalizing on cognitive regulation strategies and meta-cognitive strategies for writing, reading and listening to pedagogical students at the State Pedagogical University "Ion Creanga" will strengthen and enhance the process of learning English.

So, the hypothesis means the anticipation of a possible answer to the question; it is a hypothetical statement, a provisional idea, an assumption relating to two or more variables.

Sources of pedagogical research topics and problems related to it:

- the researcher's subjectivity, preferences, and personal experience, as well as certain generalization potential;

- the fields, aspects, topics, and themes on educational concerns that drive and thrill the researcher;

- when the researcher is specialized in a particular field of education, when the researcher has a strong desire to investigate certain problems;

- approaching and consulting bibliographical resources that can in turn lead to spontaneous formulation of the topic and problem to be researched moderating a dysfunction, a negative aspect, a deficiency in the teaching process;

- when the researcher is specialized in a particular field of education, when the researcher has a strong desire to investigate certain problems;

- keeping in mind educational policy papers, manuals, and laws that are aligned with educational reform in mind;

- alignment to the curricular document**s.**

Organizing a pedagogical research and formulating the objectives

The organization of pedagogical research refers to the timing of the activity, the way in which the elements anticipated by the research methodology are combined and articulated, and the procedures for monitoring and collecting data from the research, all while taking into account the specific conditions of the activity and possible constraints.The main objective of research is to explore the theoretical and practical backgrounds and unlock new ways to solve the problem.

Research objectives outline the specific steps that the researcher will take to achieve the research aim. Objectives respond on the questions: what, why, who, when and how. The objectives should be regularly checked during the research project to ensure that the researcher is staying focused, and decides if there is a need to review or revise them. The objectives help the researcher to clearly understand the purpose of his research. The objectives also make a research meaningful. Steps to Writing Clear and Measurable thesis Objectives:

• Determine the level of knowledge required to meet the objectives.

• To ponder and reflect on the type of change the researcher wishes to effect.

• Choosing an action verb.

• To come up with a set of objectives.

• To review the objectives on a regular basis.

See an example of objectives of a thesis:

The objectives of the experimental investigation included the following actions:

O1. identifying learning difficulties on the cognitive and meta-cognitive dimension of English writing, reading, speaking and listening competencies and investigating the level of development of students' meta-cognitive knowledge and strategies;

O2. capitalizing on a rich spectrum of tools for developing strategies and meta-cognitive knowledge during the academic semester;

O3. experimenting and validating the Technological model of personalized English language learning on the development of writing, listening, reading and speaking competencies by capitalizing on meta-cognitive strategies of writing, reading and listening in English and meta-cognitive strategies for regulating cognition, which capitalize on the cognitive aspect, meta-cognitive and the organization of the educational environment in a personalized approach.

The actual development of the pedagogical research consists in the application in practice, of the stages and sub - stages provided in the research project, in order to verify the hypothesis and secondary assumptions. It involves performing specific activities in order to achieve research objectives, respectively the introduction of certain modifications and changes in the course of the educational phenomena, in order to study the effects and results they produce. During the research, different parameters are followed and the data is recorded with significant aspects of the research, related to:

    - independent and dependent variables

- the conditions for carrying out the instructive-educational activity

- methodology of instructive-educational activities

- methods of initial evaluation (pre-testing), continuous, summative (post-testing) and remote evaluation (retest)

- encountered difficulties

- performance and results of the researched subjects

- the attitudes and behaviors of the researched subjects

- the opinions and wishes of the researched subjects, etc., depending on the objectives of the research, its justified conclusions, in a primary variant and, if necessary, to reformulate the hypotheses.

Analysis, processing and interpretation of the obtained data

The quantitative data means the data obtained by applying different research methods and is presented quantitatively, in numerical form, so that it is suitable for statistical processing. During the first stage, the data is subject to summary processing, respectively it is analyzed, ordered, grouped, classified, systematized. A critical evaluation of the research, based on the positive aspects and negative aspects; it is not unimportant to note the mismatches, differences, things with which research does not correlate. The condensation of the data obtained in the diagrams, tables, the calculations of percentages, classifications, reports to evaluation scales, structure charts, comparison charts, drawing graphs, calculations of statistical indices that express the central trend in a group like: average, median or variation: amplitude, simple deviation, mean deviation, dispersion, deviation standard.

To measure the fidelity of the tests there are used different methods. The methods for verifying the fidelity of the tests are: 1. the method of internal consistency; 2. test-retest method; 3. the method of parallel tests; 4. the method of halving the test. From the variety of test fidelity verification methods, there may be used the internal consistency method. The Cronbach's alpha method for scales / tests with several items is the most used fidelity coefficient. This coefficient indicates the inter-item consistency of the analyzed scale and it is based on an average of the correlations between the scale items. A scale is considered to have a satisfactory fidelity when the fidelity coefficient is greater than 0.70 and a very good fidelity, if the fidelity coefficient is greater than 0.80.

The Formula is: $\alpha = \frac{K}{K-1}\left(1 - \frac{\Sigma_{i=1}^{K}\sigma_{y_i}^2}{\sigma_X^2}\right)$ (3.1)

Remote verification or retest has the role of establishing at a longer time interval the order of the steps of the action plan, and the durability of the acquisitions acquired in the certain conditions, investments of time and energy within a certain temporal framework. See the following example:

1. **Average**

It is called the average of the characteristic x of the number:

$$\bar{x} = \frac{\sum_{i=1}^{k} n_i x_i}{n}, \text{ where } \sum_{i=1}^{k} n_i \text{ is total number of population}$$ (3.2)

Another technique in the data analysis is the factor rotation. The factor rotation technique also assumes the existence of two equivalent samples and applying the independent variable from the beginning to the first sample and then to the second. Every variable is applied to each sample, which solves the problem of group equivalence. The technique of factor rotation is the most advisable and the most difficult, and it presents practical inconveniences, due to the difficulty of organizing the rotation of the factors in the conditions of ordinary training.

Subsequently, an in-depth analysis of the data must be performed, so there are analyzed the correlation variables, the relationships and the dependencies between variables that are known as correlations, associations, regressions.

Elaboration of the final conclusions of the research

Following the analysis, processing and interpretation of the research results, the conclusions are established in the end, by permanently reporting to its hypothesis or hypotheses to the research objectives. Mandatory, the conclusions of the research will be related to its basic hypothesis, and if there have been formulated secondary hypotheses, these will be targeted. They can also capitalize on the systematic observations made by the researcher throughout the investigations, they being very valuable, even if it provides only qualitative information about behaviors of the subjects.

The final conclusions drawn from the investigations imply the personal, original contributions of the researcher. They contain a qualitative and quantitative analysis of their own

research results, accompanied by the researcher 's critical comments, his own analysis, reflections and evaluations, considerations, additions, restructurings, predictions.

Therefore, a research is not completed when it has been established with the help of statistical techniques whether the working hypothesis has been confirmed or not, but when proposals and suggestions were advanced as a result of own investigations and analysis, then alternatives are offered, so then there are established research conclusions.

The relevant characteristics of pedagogical research:

- It can be inductive in character, based on experimental data, and then involving the collection of experimental and theoretical methodological data in order to scientifically substantiate action and theoretical approaches that deepen and steer education theory and practice.

- It can be deductive in nature - when logical or historical analysis of some paradigms, theories, statements, and correlations between concepts, theories, and principles are established, when there are established consequences with an ameliorative character, not just ascertaining, descriptive, and explanatory, as it leads to optimizations, improvements, and sometimes innovations. It aims at achieving educational purpose and shaping the personality according to the requirements of social development.

- It can highlight other aspects related to the educational phenomenon or related to it other than those proposed for investigation, which formed the basis of the wording.

Categories of variables involved in an experiment

In an experiment, there are mainly two categories of variables: independent variables and dependent variables. The independent variables represent, in practice, the experimental factors controlled or manipulated by the researcher, respectively the modifications, the changes that were introduced in order to study the effects which they produce. A variable is said to be independent when its levels are established by the experimenter before starting the experiment and therefore they are independent of any things that happen in the experiment; thus, the independent variable precedes and potentially influences the measurements performed in the experiment. E.g.

The independent variable included in the experimental model consists in the systematic promotion of the Technological Model of personalized English language learning at university level, which includes the development of communication competencies (writing, listening, reading and speaking) in English by capitalizing on cognitive regulation strategies. of the meta-cognitive

strategies of writing, reading, listening competencies within English and communication and Didactics of English.courses.

The dependent variables of the research, established in correlation with the independent variable, are the following: a. The capacity to capitalize on the procedural, declarative and conditional knowledge; b. the ability to regulate cognition, capitalizing on meta-cognitive regulation strategies: understanding, information, planning, evaluation, development; c. ability to capitalize on meta-cognitive strategies during reading: global reading strategies, problem-solving strategies and reading support strategies; d. ability to capitalize on meta-cognitive strategies during writing: planning, monitoring, awareness, evaluation strategies; e. the ability to capitalize on meta-cognitive strategies during listening: problem solving, planning, directing attention, mental translation and person-knowledge.

We emphasize that the independent variables are introduced only in the experimental groups and their effects are systematically monitored and in the control groups educational process takes place under normal conditions according the National Curriculum.

The experimental method has a wide use in pedagogical research, which was explained in detail by W. McCall (1923):

1. The single sample technique is based on using a single group to apply the independent variables, tracking and assessing their influence at various phases. The approaches of the unique group correspond to an intra subject experimental design, which entails tracking and analyzing the group during the investigation.

The main practical difficulty associated with this technique is that, at various times,

the conditions of the group do not remain identical. The impact of different factors determine certain changes, which cannot be rigorously always known, thus risking the false attribution of a change to a certain experimental factor which is, in fact, nothing but a natural result.

2. Parallel sampling technique

The most commonly in pedagogical experiment it is operated with two samples of subjects equivalent in terms of average or capacity. It follows the variation of the dependent variable in relation to the independent variable in the experimental group and, on the other hand, the variation of the dependent variable on conditions that it does not intervene with the independent variable in the control sample.

Some well-known statistical tests and procedures

1. **The T StudentTest** determines the significant statistic differences for independent and paired samples

$$t = \frac{\overline{x_1} - \overline{x_2}}{\sqrt{\dfrac{S_1^2}{N_1} + \dfrac{S_2^2}{N_2}}}$$

(3.3)

2. **U Mann Whitney Test** determines the significant statistic differences for nonparametric variables for independent population.

$$U = N_1 N_2 + \frac{N_1(N_1 + 1)}{2} - R_1$$

(3.4)

3. **Wilcoxon Test** determines the significant statistic differences for nonparametric variables for paired samples.

$$Z = \frac{4W - N(N + 1)}{\sqrt{\frac{2N(N+1)(2N+1)}{3}} \left(\pi^+ + \pi^- - (\pi^+ - \pi^-)^2 \right)}$$

(3.5)

Therefore, the control sample - with a level comparable to that of the experimental sample, as similar to it; in the control sample the working method will be the usual one, not influenced by the independent variable manipulated in the experimental sample.

As the two types of samples do not differ significantly at the beginning of the experiment, being equivalent, the differences found in the end of the experiment are, very probably due to the new factor. Such an experimental design in which it is operated with experimental sample and control sample and intergroup comparisons are made between them, thus the evolution is studied comparatively of the two samples, and is called inter-subject experimental design.

Independent samples and paired or associated samples

The samples can be:

1. Independent samples: two samples made up of probabilistic methods that are chosen at random without regard for their component elements; a component element of the first sample has no bearing on the components of the second sample.

2. Paired or associated samples are two homogenized samples that have a similar composition and power quantum. Each component in a sample corresponds to a specific element from the other sample, with almost identical properties; in other words, each component in a sample forms a pair with a specific element from the other sample.

The post - experimental stage consists in the application, in the end of the experiment, of some samples of assessment and final tests of knowledge also identical for the two types of samples - experimental and control, for the purpose of revealing the evolution of the experimental and control samples in different stages of the experiment.

Except for the independent variable, the circumstances of the experimental and control samples should be equal in theory. The independent variable and intervention should be the only differences between the experimental and control samples. We can infer and derive that any difference in magnitude of the dependent variable is related to the independent variable if we're certain of that. If there are multiple variations between the two samples, we don't know which differences were responsible for the intervention's impacts.

Bibliographic information and documentation

The scientist's first and most important tool is scientific conceptions, followed by the relevance of bibliographic information and documentation activities. This entails looking for and gathering data and information from the most appropriate bibliographic sources, such as books, magazines, monographs, master's theses, and doctoral theses, on the issue at hand. We must not lose sight of the reality that authenticity must not be confused with creativity, even in big doses. The data and information gathered through reading must be processed, which requires a process of analysis, processing, and interpretation, as well as filtering them through the researcher's own thinking. As a result, regardless of the kind of text reading, both when reading the text and later, in the elaboration of the reading notes, it is important for the researcher to show attitude: active and interactive, reflective, impersonal and objective.

The requirements for a correct and efficient, qualitative documentation activity are mainly the following:

- To be selective, in the sense of being based on bibliographical references, relevant and valuable, with important contributions to development of educational theory and practice: encyclopedias, treatises, doctoral theses, monographs, books, studies, articles, etc.
- To be based, as far as possible, on consulting the original, primary, authentic sources for being sure we perceive and understand the terms, meanings and concepts correctly.

For example, we will not refer to a paper based on reading a review of that paper in which the text could be distorted by infiltrating the subjectivity of the author of the review, of his own opinions, feelings. So, the bibliographical resources must be carried out in an interactive manner, with a participatory research, and active attitude.

Interactive approach to text and information means:
- to encourage reflective research, reflexive, interrogative attitudes, and questionnaires, to encourage the researcher's curiosity in relation to the data and information he acquires through documentation;
- to encourage full involvement in the documentation process, adopting active and interactive search behaviors for the new problem solving situation, problematization through imagination, creativity;
- to encourage full involvement in the documentation process, adopting active and interactive search behaviors for the new problem solving situation, problematization through imagination, creativity;
- a curiosity in the topic at hand, as well as ongoing personal and inner reflection on new ideas and life experiences;internal dialogue, self-questioning, practicing thinking, reflective and reflexive thinking;
- the researcher's critical attitude in the reception of material, the manifestation of the spirit of discovery, of the critical spirit, the non-acceptance of an assertion without reflection and without questioning its value;
- the presence of initiative and critical lucidity to adopt an impersonal and objective attitude, not to be involved in reasoning and preconceived ideas;
- to cultivate respect for scientific data, for the scientific - theoretical and methodological substantiation of the new results;
- clarification of aspects and contents, elaboration of new ideas and suggestions, argumentation of ideas and experiences, outlining new openings and developments.

Citation rules

Any scientific work must include bibliographic references and citations, which constitute a collection of prescribed facts provided in the same sequence and identify a publication mentioned in the paper. The diploma paper's bibliography lists the bibliographic references cited in the text (books, journals, and web pages) and must be written in such a way that the reader can easily locate

and consult these sources.The list of bibliographic references is placed at the end of the study and is entitled

Bibliography

The recommended criterion for arranging bibliographic references is the alphabetical order of the first word in the reference - author's last name, and then the first name. All references are numbered by Arabic numerals (1, 2, 3 ...). If an author has several works, the order in the bibliographic list is made chronologically, in ascending order. If there are more than three authors, the first name of the author will be written in the bibliographic list, and the other authors will be inserted under label et al.

First the bibliographic references will be ordered with Latin characters (Romanian and foreign), then those with Cyrillic characters. The number corresponding to the reference in the text must be specified in Arabic numerals in square brackets which coincide with the serial number of that reference in the bibliography list. E. g [42, pp. 12-39]. The reference number must be specified in the text and if the author's name is specified then it must be indicated in the square brackets e.g.: Anderson I. [15] argues ....The number corresponding to a bibliographic reference must be specified each time the reference is quoted in the thesis.

If multiple consecutive references are cited for a particular text, the hyphen is used to make the connection between the first and the last number. To separate multiple reference numbers which are not consecutive, the comma is used (no space after the comma), eg: [2-5,7,10]. The place of the reference number is next to the text to which it belongs.

Only one citation style will be used in the bibliography, that of the APA.

When the cited source is indirect, i.e. taken from another author, the name of the author's first name and the year of publication, with the indication in parentheses of the author and the year of the emergence of the indirect source from which it was cited will be written. For the sources downloaded from the Internet, the web page addresses will be noted in the bibliography; they must be found at the end of the list.

• *Books:*

• Entwistle, N., Ramsden, R. Understanding Student Learning. London: Croom Helm, 1983. 265 p.

• Estes, W. Approaches to Human Learning and Motivation. Vol. 3. Psychology Press, 2014. 382 p.

Vrăşmaş, T. Şcoala şi educaţia pentru toţi. Bucureşti: Ed. Miniped, 2004, 362 p.

Articles in the Newspapers

• Vărzaru, E. Dificultăţi de învăţare ale elevilor. În: Revista învăţământului preuniversitar, 2011, februarie, p. 11-13.

• Brozek, A. Bochenski on Authority. In: Studies in East European Thought. Springerlink.com, 2013, vol.65 (1), pp. 115-133.

• Barkley, R.A. Behaivioral inhibition, sustained attention and executive functions: constructing a unifying theory of attention deficit hiperactivity disorder. In: Psychopharm. Bull, 1997, vol. 121, No 1, p. 65-94.

Scientific, methodological works

• Popovici, D. V. Integrarea şi incluziunea educaţional şcolară a copiilor cu deficienţe. În: Tratat de psihopedagogie specială. Bucureşti: Ed. Universitatea din Bucureşti, 2011, p. 1007-1130.

• John, P., George, S.K., Mampilly, A. Handbook on Poor School Performance. In: New Delhi: Central Board of Secondary Education, 2001, p. 50-56.

Scientific reports or articles from conference materials

• Timuş, A., Racu, A. Programmatic aspects of the research of the educational integration process and social skills of students with disabilities. In: Issues of inclusive education in the Republic of Moldova - perspectives and solutions. Theses of the International Scientific-Practical Conference, Bălţi: University State Pedagogy, Alecu Russo", 2012, pp. 230-23

Articles published in the electronic magazine

• Serena, C., Pastor, F.J., Gilgado, F., Myayo, E., Guarro, J. Efficacy of Micafungin in Combination with Other Drugs in a Murine Model of Disseminated Trichosporonosis Antinicrob. Agents Chemother [serial online] 2005 [accesat 14 martie 2012]; 49:497-502 Avaible from: URL: http://aac.asm.Org/cgi/content/full/49/2/497

E-book

• Management of agricultural research: A trainig manual [CD-ROM], Roma: FAO, 1999. Cerinţe de sistem: Windows 95/98/NT; 32 MB RAM; 11 MB hard disk space. ISBN 92-5-104251-9.

Rules of ethics

The diploma paper fully reflects the student's work. All bibliographic sources will be mentioned in the bibliographic list, otherwise the student will be accused of plagiarism.

Plagiarism means the full or partial acquisition of a scientific paper composed by someone else, being presented as a personal creation, without indicating the author. Plagiarism represents an unquoted use of tables and figures. Plagiarism in the thesis is sanctioned with the cancellation of the research.

DEFENDING THE DIPLOMA PAPER

It is offered to the student up to 10 minutes for presentation. In order to make efficient use of the time allotted for the presentation, it is recommended that the student develop a plan for the presentation of the research report, which would contain data on:

• the topic of the thesis and its topicality;

• purpose and objectives;

• scientific-methodological basis;

• research results (concrete data);

• own contribution;

• conclusion.

After a brief presentation of the thesis, the student answers the questions of the members of the Committee for defending the diploma paper. The answers must be clear, concise and the student must demonstrate both a deep understanding of his/her topic of research and elaboration of some practical solutions to the topic of the thesis.

The PowerPoint presentation will contain between 10 and 15 slides:

- 1st slide with the title of the paper, the name of the graduate and the name of the teacher-coordinator;

- 2nd -3rd slides with text (topicality, problem, purpose, research sample);

- 4th -8th slides with basic content of the thesis, elucidating the experiment (tables, figures, with the help of which it will be presented the achievement of objectives);

- 10th -12th slides for conclusions.

Note: Slides will NOT contain too much text (maximum 7 lines of 7 words each), and the student will not read the information from the slide. It is recommended to use tables, figures, images to synthesize the information. The student will make a brief comment on the information presented on slides.

3.   The concept of methodology

The system of methods and procedures for collecting research data is a collection of methods and procedures that can be used in pedagogical research to gather and collect data and information about the topic and problem studied, with the goal of clarifying and solving the problem and improving educational practices.

The term *method* comes from Greek, from the term *methodos*, *metha* - path, road,*odos* - to, towards, which gives it the meaning of path to follow; the set of practical actions, which are carried out according to a plan, in order to achieve certain goals.

While the method is a generic approach to obtaining the truth, the process is a specific aspect of the method that pertains to the action's execution, thereby acting as a tool of the method. As a result, a method can be thought of as a unified system of chosen procedures, actions, and operations based on a set of criteria to achieve a certain goal, such as changing a behavior, setting, framework, or pattern.

Techniques are the physical manifestations of procedures. Most of the time, the technique involves a tool to be put into practice. Examples of tools: questionnaires, tests, apparatus for measuring various physiological variables, instruments, tools; therefore, the instrument materializes the technique.

The concept of methodology designates a system of principles and rules for organizing research, rigorously established and shaped through methods, procedures and research techniques.

Methodology, as an area of study, is the systematic and cohesive study of a subject in a logical manner, based on the rules that govern examination and research in that field. Although the guiding principles of the research are drawn from the theory, the methodology should not be mistaken with the theory. The term "methodology" refers to the collection of study methodologies and processes. It is the product of the interaction between theory and research practice.

Another requirement for the method's efficiency is that it be based on a theory that has been tested in practice. There is no apparent distinction between theory and method in the learning process. Depending on the degree of study sophistication, the border is even more difficult to spot. The coherence of theory and method can be seen on at least three levels:

A. Theoretical notions provide a normative and methodological function, and the technique relies on the foundations or sources of an earlier theory, which serves as a premise for research that could lead to a new theory.

B. The set of procedures is always integrated in a theoretical-methodological vision that allows the phenomena to be explained.

C. A main objective of the research is also to understand the phenomena to elaborate the methodology that involves epistemological or philosophical aspects. The method also conditions the modalities, procedures, which are more independent of method rather than techniques.

Research technique - is a set of requirements relating to how to approach the phenomena in order to obtain valid knowledge. It has relative independence in relation to the method, but the possibility to adapt and develop a technique is conditioned by the method. The method can be conceived as a research strategy, because the researcher makes a projection on facts.

Procedure - has in view the formal organization of the data. It has a narrower meaning than method, derives from the method and it depends on it. In essence, a procedure is an order of successive operations that there are imposed on the methods of researcher.

The purpose of the procedure is the analysis of the primary information that highlights correlations, reports of probability between phenomena.

Heuristics studies the emergence of the new, original and valuable technique, art, through collaboration between conscious and subconscious, logical, illogical, as well as the strategies and techniques.

Heuristics is about creativity, and philosophers considered heuristic law the science of the art of invention.

Heuristics is transformed into a philosophy of creation. The definition of heuristics, on the one hand as philosophy and, on the other hand, as science, takes into account both its historical and present dimensions. Heuristics originated as a philosophy of creation, as practiced by famous philosophers such as Tversky, Kahneman, and Descartes, and later evolved into a science and philosophy through meta-heuristics, without abandoning the human being. It expresses the qualities of broad generality that it possesses. A number of disciplines and branches, as well as relationships between them, make up the heuristic system. The disciplines that make up the system are at various states of development: some are mature, some are just getting started, and a few are simply a project. Heuristics is the science of the introspection of thought, the art of creation, science of research and discovery of ideas or the relationship between the world and ideas, the art of thinking and inventing, the science of creative thought mechanisms, is an approach to discovery, learning and problem-solving that uses rules, estimates or assesses guesses to find a satisfactory solution to a specific issue.

- There are three types of heuristics, according to Amos Tversky: availability, representativeness, and anchoring and adjustment. Each heuristic is used to reduce the mental effort required to make a decision, although they are employed in various situations.
- Availability heuristic.
- Representativeness heuristic.

- Anchoring and adjustment heuristic.

- Quick and easy.

While they all play a part in decision-making, they do so in various situations. Understanding the many types of heuristics can help us figure out which one we're employing and when. The emergence of the heuristic disciplinary system exemplifies a major trend in contemporary science: the marriage of knowledge and creation. Scientific study is viewed as a form of creation and creative endeavor.

4.   Taxonomy of research methods

MAIN RESEARCH METHODS, considered CLASSIC are:

Application theory occurs when a well-known theory is applied to a new reality in the field for which it was developed. It entails making a theory-based claim or argument.

Method of combination of two or more theories

- It is a little more daring in that the uniqueness of the results frequently stems from the latent tension between the two hypotheses.

- To operationalize the integration of the two scientific stances, it is necessary to take two perspectives and share a single dependent variable.

Method of sustainable renovation

Assumptions:

- it necessitates rigor;

- it is not merely a continuation of the course;

- it entails the quest for further hypotheses of a more fundamental nature.

- In modern science, truth has become a source of skepticism; thus, the approach is modern since it calls the matter into question.

Method of proof

Because most researchers are tempted to oppose a theory, disagreement with it only becomes a heuristic approach when it is backed up by solid derived arguments based on a thorough understanding of the theory.

Major scientific debates show the method: Chomsky vs. Piaget, Kuhn vs. Popper.

This procedure is as follows:

- prohibits assertions based on experiments from becoming dogmas;

- necessitates anarchist tendencies;

It has the potential to lead to radical positions.

The strategy is still useful when it comes to unlocking a certain horizon at the start of a new world.

Method of criticism

- the criticism is only based on the outcomes;

- in order to be credible, you must find at least one situation in which to refute the theory;- the highest result is proposing a new theory in science;

- it is typically the preoccupation of scientists who go on to become philosophers, and it necessitates a high level of erudition.

Method of renovation (RENEWAL)

- science is meant to be "renovated" by reconstructing and reformulating an old theory in a new language, assumptions, reasoning and even results;

- a quarter of scientific papers in the 1950s and 1960s were tributary to this method;

- the most sought after languages are those offered by cybernetics, the general theory of systems and structuralism, post-structuralism;

Method of transfer of concepts

- this method emphasizes the relativity of any classifications of sciences by taking a vocabulary from one field and transplanting it to another;

- the transfer is not always from sciences considered "undeveloped", to those "Evolved", but also vice versa;

- this method highlights the relativity of any classifications of sciences.

Limit method

To compute the partial fraction coefficients, the limit method applies limits as the denominator factor approaches zero. Although less effective than other partial fraction decomposition methods, it provides a theoretically sound foundation for some of the more efficient ones. The limit method:

- applies two separate concepts, even if they are diametrically opposed, in a larger field;

- removes the barrier between the two theories, replacing concepts with continuum;

- offers to transform the "and - and" paradigm.

The main unconventional research methods considered creative are:

Matrix decomposition method

- there are addressed phenomena in a decomposition matrix that correspond to known, unknown, and impossible phenomena;

- is a method for detecting problems and malfunctions.

Method of presentation or representation (diagram method)

Diagrams are explicit forms of expression of concepts or relationships. Diagrams, graphs and other types graphical representation can be used in any field of research.

Visualization method

In the turning of invisible occurrences into visible phenomena, visualization method is unrivaled.

Mark making method

When we have an ensemble complex of sizes, species, classifications, and so on, we employ **mark making method**

Lawyer's method

- used to overcome doubt about taking a position;

- a decision is made, despite the uncertainty, ignoring counter-arguments;

- there is a risk of "captivity" to the accepted position.

Although the number of research methods (heuristic) in intellectual innovation is very large, they can fall into two large groups:

I. CLASSICAL METHODS (considered LESS CREATIVE)

-are less dangerous but more secure;

-are most commonly utilized in "Classic research" (Thomas Kuhn), that is, in a research program guided by the same paradigm.

II. UNCONVENTIONAL METHODS (considered CREATIVE)

Unlike the first, which are variations on a particular theme, there are methods that can lead to success starting from "nothing." These methods do not have to be based on a certain theme; on the contrary, they might generate new topics.

The components of the pedagogical research methodology and its main subcomponents are:

1. **The system of research data collection methods**:

- self-observation method

- observation method (systematic)

- the method of observation as a participant

- psycho-pedagogical / didactic experiment

- survey method

- the method of analyzing the portfolios / products of the activity of the education subjects

- the method of researching curricular documents and other school documents

- method of tests and other written assessment tests

- case study method

- sociometric methods

2. **The system of research data measurement methods**

3. **The system of mathematical-statistical processing methods and interpretation of research data**.

Research methodology in linguistic education

A. Self-observation

B. Observation (systematic)

C. Survey

D. Interview

E. Analysis of portfolios / products of the activity of education subjects

F. Researching curricular documents and other documents

G. Tests and other written assessment tests

E. Case Study

A. Self-observation is a research method that entails the researcher immersing himself in a personal experience or situation and studying his own feelings, thoughts, inner states, feelings, motivations, expectations, desires, reactions, behaviors, and benefits in order to gain a thorough understanding of the phenomena under investigation. It is, in fact, an experienced observation, or an examination of one's own circumstances or experiences.

Basically, self-observation makes possible processes that we could grade as follows: self-assessment, self-knowledge, self-analysis, self-questioning, self-criticism, self-planning, self-monitoring, etc. So, self-observation creates the premises of Valli's "reflection on action", "reflection in action" , "deliberate reflection", "personalistic reflection" and "reflection for action".

B. Observation method

The term "observation" comes from the Latin word "servant", to which is added the prefix "ob", giving it the meaning of "to have before the eyes", "to have the eyes on", "to research". In general, observation involves the intentional and systematic pursuit of objects, phenomena, and events, in their natural state, in normal conditions of existence and development, for the purpose to know them as deeply as possible and to discover their essential features. In addition to their quality of being observable, the facts must also be objective. In the scientific approaches, objectivity means that an observation can be repeated, replicated, i.e. performed by several people in a variety of conditions. If more researchers register the same effect under different conditions, the observation is objective, and the fact is required to be included in the theories.

The method of systematic observation, as a data collection method in pedagogical research, entails the intentional, methodological, and systematic pursuit of an event or a complex of educational events in their natural state of existence and development (without the researcher's intervention), in order to explain, understand, and improve them. The observer states and identifies educational facts, interpreting them from the standpoint of their inherent meanings and the research hypothesis; the observer states and identifies pedagogical facts, interpreting them from the perspective of their intrinsic meanings and the research hypothesis.

The observation is best accomplished by direct contact with the research item or through the use of various audio-video recording devices; in both situations, the observers must be eyewitnesses to the phenomena under investigation. However, systematic observations on the recorded materials can be made in addition to direct observations.

Depending on the degree of involvement of the researcher, the observations can be:

- non-participatory: passive, empirical, in which the observer does not hide his own identity as a researcher;

- participatory observations: active, systematic, in which the observer becomes a member of the group, participates in the development of pedagogical events, without leaving the impression that he is researching them.

Regarding the observation, it can be spontaneous, natural- the research is not purpose-oriented) or deliberately induced- research is based on a specific purpose, clear objectives and possibly a hypothesis, an observation protocol with good observation indicators delimited.

Regardless of its nature - spontaneous or induced observation involves not only contemplation but driven careful attention to objects and phenomena, skillful interpretations,

comparisons, correlations and interrelationships with other objects and phenomena. The act of sensory perception needs to be completed and extended through making personal reflections, mental operations, reasoning, judgments, interpretations on those also observed through scientific approaches that reveal as well as possible the causal relationship.

Observation protocols are structured and adaptable instruments that are adjusted according to the researcher's goals and objectives and represent main documents that supply the information needed for subsequent analysis and interpretation. The following are the structural aspects that go into the creation of observation protocols:

a) the characteristics of the observation: the subject of the observation (dimensioning of the observed field), the purpose of the observation, the objectives of the observation, the type, nature of the observation: transversal (during a learning unit, a semester or school year) or longitudinal (the same classes are pursued during school years);

b) the context of the observation: date, place of development, setting, context (formal, non-formal or informal) in which the observation is made, the extension of the observation in time, the periodicity of the observation of the phenomena, the concrete aspects that will be observed, the categorical framework and the thematic framework of observation;

c) the samples or populations involved (revealing the characteristics of interest from perspective of observation and research);

d) the instruments necessary for observation;

e) description of observational indicators;

f) the ways of recording, capitalizing and interpreting the observations made - both during the observation, as well as at the end of it;

g) opinions and feelings of the researcher regarding those observed, which could be useful in interpretation of observation data.

In teaching practice, they operate with various types of observation protocols, which contain certain grids of categories that allow the classification and recording of observation data in certain headings. These can refer, for example, to the design, implementation and evaluation of the didactic activity; to the teacher-pupil relationship, to the moments of the activity, to verbal exchanges in the group. It is not advisable for a grid of observations to include more than categories.

Observational indicators are directly observable, identifiable, recordable and

objectively measurable referring to the quantitative dimension of a qualitative manifestation of the investigated phenomenon. They ensure the junction between qualitative and quantitative, between theoretical and practical, the empirical and theoretic in the research and explanation of educational phenomena. Mainly, they refer to issues such as: actions, reactions, behavior of educators, students, the characteristics of the educational environment, the products of the children's activity and aim to cover the multitude of manifestations of the studied phenomenon. Thus, the system of observational indicators allows establishing correlations and interdependencies between the variables of the studied phenomena, as well as the construction of an overview of their complex structure.

C. The method of Survey

The survey is an interactive research method that involves a direct exchange of information between the researcher and the subjects being studied, in which data (opinions, facts, educational needs, interests, motivations, knowledge, behaviors, desires, and aspirations) are collected in relation to specific phenomena, situations, and manifestations. However, in the case of surveys, the communication relationship is dual, but strongly asymmetric, because the researcher designs, conceives, formulates, and addresses a series of questions, stimulating the investigated subjects (students, teachers, parents, and educational system managers) to respond and thus collect information about their personality and behaviors.

The survey makes it possible to conduct extensive research by collecting data and information from a large population of individuals, in order to know as thoroughly as possible the investigated phenomena and, of course, in correlation with the research hypothesis.

The specific tool used in the surveys is the questionnaire (in Latin "questio" means search, research, question, interrogation), which is a system of questions (most often asked questions but there can be also used graphics, drawings, photographs, etc.), usually written, well structured in a certain sequence, based on methodological, logical and psychological considerations.

The researcher will develop a collection of answers connected to researched events, situations, and manifestations by using questionnaires, which he would not be able to know directly and personally due to their spread in space and time.

Written or verbal formulations are the two ways in which the interviewed subjects can provide replies, thus we separate two investigative procedures to correspond to the two variants:

a) indirect survey it is given in written form) b) direct or oral investigation.

The steps that are usually followed in conducting an investigation are the following:

- defining the problem, the desired outcomes, and the purpose of the study;

- selection of respondents;

- development of investigation tools (questionnaires, interview grids);

- conducting the field survey.

The questionnaire is a tool often used in pedagogical research. Usually, the questionnaires include two parts:

a) the introductory part – that consists of the following elements:

- the researchers which are motivated by the need to apply the questionnaire, making a summary integration of this tool in the whole research;

- the general and specific advantages of the respective investigation;

- the purpose and objectives of the research are specified, in a synthetic and comprehensive manner;

- it is specified who initiated the research and investigation and for what purpose;

- the necessary clarifications and recommendations are made regarding the way to complete the questionnaire, emphasizing the importance of sincerity and honesty with which the answers are given.

b) the actual questions: the questionnaires can include from 2-3 questions to quite many, depending on: the object of the research, the type of research, the proposed finality, the technique survey, type of questions, quality and number of survey operators, available material resources, time availability. If the number of questions is very large, the questionnaire can be administered in two or more meetings.

The use of the questionnaire as a research tool requires compliance with certain requirements in formulation of questions:

- to delimit very clearly and in detail the problem to be researched;

- to delimit and operationalize the concepts we work with;

- the questions should be in accordance with the research topic and hypothesis;

- the questions should be clearly and concisely formulated, using accessible language;

- the questions should concern a certain, well-defined aspect and should not suggest the answer;

- to follow the particularities of the interviewed subjects.

The taxonomy of the questions design of the questionnaires

1) Depending on the content, the questions can be:

- factual

- of opinion

- of knowledge.

2) According to the form of recording the answers, the questions can be:

- open

- closed

- mixed, semi-open, semi-closed.

The open-ended questions ask the subjects to construct the answers in the desired way (they are not restricted) and, subsequently, they are mostly accurate and complete. Basically, after recording the text of the question, in the questionnaire is provided a free space, in which the questioned subject will record the answer.

Their main advantages of open-ended questions are:

- they do not suggest answers

- indicate the level of knowledge of the subject about the researched problem

- allow obtaining various information about the researched problem.

However, data processing for open-ended questions is more difficult than for closed questions, especially if the population is characterized by a great variability of opinions. The closed questions only allow the choice of an answer from several possible variants, explicit and fixed in the questionnaire.

The mixed, semi-open, semi-closed questions contain, in addition to the set of explicit variants, another types of statements like: "Give examples of Other situations…", "express other opinion…" etc. The respondent is asked to give the explanation, in the desired manner.

Depending on the composition, the interviews can be:

- specially organized by the researcher

- with spontaneous and informal groups

Group interview

The group interview completes and, at the same time, articulates the data and information related to investigated subjects, obtained in different ways.

Group interviews can be organized with children, parents, community members. Interviewees can be also teachers, managers within the education system paying attention to issues such as:

- the group should not be too large - it is preferable for it to include 5-12 people

- the duration of the interview should be between 1 and 2 hours

- the interviewer should know well the profile of the group, the nature of the interpersonal relations, the particularities of the individual members, aspects related to group life, and thus to succeed in communicating with the group, to overcome difficult moments as easily as possible, to settle tensions and conflicts and, if it is possible, even to avoid them, to encourage them to achieve an authentic communication by making real the opportunity to listen, collaborate, cooperate and respond.

Focus groups

A special attention should be given to a variant of the group interview, known as focus group, which is a structured group interview in which participants can participate in the discussion as follows:

- answering, in turn, a certain common question (circle technique);

- engaging in the discussion generated by launching a controversial idea;

- building answers based on the presentation of a scenario of ideas;

- participation in brainstorming (which can be considered totally unstructured interviews).

It is recommended that the number of questions to be answered in a focus group will not be too large - optimal 7-10 questions, well chosen and clearly formulated in advance. In this way,

the duration of the interview will be in the optimal interval of 1.5-2 hours and in the end of the interview there will be allocated 10-15 minutes for unforeseen questions.

We also remind you that thanks to structured group interviews with experts, it is possible to apply the **Delphi method** - a survey-like *forecasting method*, which requires the interviewed experts intuitive assessments of certain events.

D. Method of analysis of portfolios - products of the activity of the educational subjects

The method involves analysis, in terms of product, but also process, from the perspective of certain parameters, established in accordance with the purpose and objectives of the research, of the data provided by the portfolio owners. It is essential that the analysis performed on the students' portfolios has in view both dimensions of the students' activity products. The portfolio should be viewed as:

- the process of search, information, documentation, research, testing, collection, processing and interpretation of data, i.e. the entire chain of theoretical and applied intellectual actions that precede the elaboration of the product, as well as the dynamics of these actions;

- the final product, which can be: intellectual (software, scheme, drawing, ideal model, idea, explanation, argumentation) or material (material model, device, defense speech).

E. Method of researching curricular documents and other educational policy documents involves analysis, from the perspective of certain parameters, established in accordance with the purpose and objectives of the research, of the data offered by:

- official curricular documents, which are also a source of documentation, as we have shown above and which provides the milestones of educational activities;

- various educational documents, which allow the collection of concrete data related to the didactic process and learning shaping an overview of the organization and the development of the educational activity at micro level and the foreshadowing of some dimensions of the research. The documents analyzed can be:

- component materials of the educators' portfolio: calendar planning, lesson plans of learning units, didactic activity projects, worksheets, psycho-pedagogical worksheets of children, pedagogical tests of knowledge, essays, overhead projector foils, drawings, materials or models, software, personal records.

- official documents: internal regulations, reports, minutes, files / reports of observation of teaching activities, worksheets / evaluation reports of teaching activity, reports pre-inspection and inspection, schedules.

- archived documents.

F. Method of tests and other written assessment tests

The test method has a wide applicability in the educational process precisely in the evaluation, as well as in the pedagogical research allowing to obtain valuable information about the personality of the investigated subjects, their level of skills and knowledge, their behaviors etc.

Tests are research tools made up of a set of items, which aim at measuring knowledge of the informative and formative background acquired by the investigated subjects focusing on identification of the presence or absence of knowledge, abilities, skills, behaviors, mental processes.

The item is a question, a problem, a topic, task or a unit of content that makes up an independent unit of test.

According to the type of cognitive behavior required, the items are classified into two broad categories:

1) Items with open (free) answers, which involve the elaboration, construction of the answer by the subject. The size of the correct answers can vary from very short formulations (a word, a mathematical formula), short formulations and broad formulations (an essay).

2) Items with closed answers, which involve selecting an answer from several offered variants. These items contain the correct answer along with other, incorrect variants, as well as instructions for selecting and recording the answer.

This category includes:

- dual choice or dichotomous items

- items with multiple choice

- pair or association items.

Dual or dichotomous items require the subject to select the correct answer from two variants: "true / false"; "Yes No"; "right / wrong"; "agree / disagree"; "choose variant 1 / variant 2".

Items with multiple choice ask the subject to select the correct answer from several variants already elaborated. They are made up of a premise, namely the wording task (introductory part of the item) and a number of possible answers, one of which is correct, the rest being called distractors. Pair or association items are practically a particular case of multiple choice items, which requires the subject to establish correspondences or associations between words.

Taxonomy of tests:

1) According to the number of subjects to which it is applied at the same time, the following tests are distinguished:

- individual tests (subjects solve the individual test)

- group tests (subjects are organized in small groups of 6-7 students and solve the test within a joint activity)

- collective tests (subjects are organized in groups of more than 6-7 students and solve test together)

- combined tests (combine the above variants).

2) Depending on the field of research in which it falls, the tests can be:

- psychological tests - designed to study the mental configuration of people, psychological tests of personality (for example, aptitude tests, tests of educational success, psychometric tests, psycho-diagnostic tests, memory tests, intelligence tests, projective tests)

- pedagogical tests - intended to study the informational and educational background of the person

- sociometric tests - intended for the analysis of the structure of social groups and relationships, interindividuals within groups.

Pedagogical knowledge tests make up the basic category of knowledge tests and have a wide applicability, extended to the scale of the entire educational process; they can be used in either at the macro level, in order to organize education as a whole, or at the micro level, in order to improve the educational practices.

E. The case study method is both a teaching method and a research method and psycho-pedagogical intervention.

The case study represents a particular experience or situation, often a problem solving situation, which is studied intensively over a period of time.

The case study is a concrete intensive investigation of a contemporary phenomenon in real life context based on multiple data sources; the boundaries between phenomenon and context are not clear delimited.

Efficient use of the case study method as a method of pedagogical research went through certain stages and took into account specific requirements:

I. Clearly establishing the topic and objectives of the research.

II. Creating a coherent theoretical framework with the focus on achieving delimitations and conceptual operationalizations allowing the performance of theoretical analysis, interpretations. The theoretical framework is necessary, because only with the help of sequenced concepts is gained transparency; also it is the main vehicle for generalization of the results in the case study. Therefore, outlining a theoretical framework is a solution to lessen one of the disadvantages of the case study - the fact that it does not allow the formulation of generalizations and for creating the premises for transforming the case into an authentic instrument of investigation.

We draw attention to the fact that the case study is criticized for its lack of rigor and a solid basis for generalizations.

Sociometric methods are used to study the groups of subjects investigated as social groups, organizations, with their own structure. They aim to investigate the nature, configuration and the intensity of interpersonal relationships within a group and the phenomena that appear on their basis: communication, influence, collaboration, competition, tension, leadership, evaluation and so on.

Taxonomy of sociometric methods

Sociometric methods within Social Work Theory are classified into three broad categories, which are distinguished by their objectives:

A.Sociometric test - which highlights the preferential status of the individual in the small group to which he belongs;

B.Social configuration test - which highlights the structure and the overall state of the preferential relationships from the level of small groups;

C.Psychodrama - scientific exploration of "reality and real life" through dramatic method." The approach, which is based on principles of creativity, spontaneity, combines sociometry, group dynamics, and role theory in order to evoke cognitive, emotional, and behavioral responses.

SOCIOMETRIC TEST
Name and surname ………………………………
Group………………………
Date

1) Which of your colleagues would you rather learn / play with?

1……………………………………………..

2……………………………………………..

3……………………………………………..

4……………………………………………..

2) Which of your colleagues would you not like to learn / play with?

1……………………………………………..

2……………………………………………..

3……………………………………………..

4……………………………………………..

3) Name the colleagues you would like to be part of the group you work in and which consists of 5 people.

1……………………………………………..

2……………………………………………..

3……………………………………………..

4……………………………………………..

5……………………………………………..

6 ………………………………………… ..

5. The methodological principles of psycho-pedagogical research

Conducting scientific research involves taking into account some principles:

1. The principle of unity between theoretical and empirical. When considering the concept of unity in a broad sense, it refers to the existence and operation of explanatory models, reflections, and interpretations on prior research and reality. Empirical research entails analyzing the concrete reality, gathering useful data, and employing methods such as survey, observation, and experimentation to allow the researcher to interact with and learn about the aspect of the social reality that interests him.

It is fully accepted the idea that the two dimensions exist in any approach in the socio-human disciplines, so we are talking about a unity between theoretical and empirical: any theoretical construction has a minimal empirical database, just like any empirical investigation assumes a theoretical basis. It turns out that between theoretical and empirical there is a positive feedback among the hypotheses, theories, ideas in general. However it enhances concrete research and collection of empirical data that may lead to the formulation of new hypotheses, interpretations, theories.

It can be concluded the following:

- The theory establishes precise classification schemes;
- The researcher formulates complex concepts that directs the researcher towards concrete facts;
- The researcher formulates research issues relevant from the point of view of scientific research;
- The researcher formulates general ideas about how changes occur, how they can be challenged;
- The researcher relates empirical facts to others;

2. The principle of unity between comprehension and explanation. The principle of unity understanding-explanation starts from the finding that only intuitive knowledge of the social life is not sufficient, it can lead to erroneous results. This principle calls into question the relationship between the subject and object of knowledge.

3. The principle of unity between quantitative and qualitative. Although there are a number of differences between the two approaches: qualitative and quantitative, however it is a strong basis for not allowing the production of a clear rupture between them. From an epistemological point of view, as a general orientation, the quantitative model has its origin in the positivist model borrowed

from the natural sciences. This model presupposes the existence of an objective reality, of structures external to the actors in which subjectivity has no place.

In these conditions, the need was felt to move from simple speculation about the man and the society to effective research, rigorous observation, measurement, counting, estimation. As a result, towards the end of the 19th century a clear distinction began to emerge between the natural sciences and those of culture and spirit. It was highlighted the fact that cultural sciences cannot be based on models devoted to the study of nature. This is because the man as the social being is involved in the process of human subjectivity, of people's motivations, and his knowledge cannot be achieved through a rough explanation, from the outside, but only by understanding human subjectivity that stand behind external facts. The emphasis is on human subjectivity, on a socially constructed background. The researcher appeals to causal schemes, seeks general laws to explain social phenomena, while in comprehension he appeals to intuition, empathy and the experience of one's own feelings. But knowledge of social dimension is not enough.

4. The principle of unity between ascertaining and evaluative judgments. This principle presupposes the moral engagement of the sociologist in his research. Each researcher is to choose the set of methods that are going to be applied. However, a series of deontological codes of the profession also impose certain prohibitions. So, the researcher must not subject people to degrading experiments, to provoke negative, dysfunctional phenomena. He must not harm any data, facts, he must not participate in immoral acts under the pretext of the knowledge. The information obtained from the research must remain confidential and must not be used against those who provided them. In fact, we are talking about a series of rules and regulations of professional conducted research, which is based on professionalism, fairness and objectivity.

6. Structure of the diploma paper

The diploma paper has the following structure:

Introduction

Contents (Development of the topic, topics, ideas)

Chapter 1, Chapter 2, Chapter 3

Conclusions

List of bibliographic sources that has been consulted

Annexes (for example, tables containing values of certain sizes, tables with results of the investigated subjects, containing their initials, figures, standard forms, questionnaires, software).

Some general bibliographical source requirements::

- demonstration of originality, inventiveness and personal creativity of the researcher

- clear exposure style

- coherent and logic development of ideas

- accurate language

- the general aesthetic aspect, the design of the work, the clear highlighting of certain aspects, the more important ideas can be expressed through different graphic means, the intuitive presentation of some aspects through the realization of schemes, figures, tables.

Recommendations for Introduction:

- highlights the topicality and importance of the topic approached from a methodological, scientific point of view

- explains the importance of the topic both theoretically, conceptually and pragmatically.

Recommendations regarding the Contents of the paper:

➢ defining or redefining the terms, notions, concepts we work with, specifying the meanings attributed to them and their operationalization based on literature data and own opinions;

➢ permanent assurance of the correspondence between: the topic, title of the paper and the research, the hypothesis, the titles of the chapters and subchapters and their content and conclusions;

➢ achieving the required terminological and conceptual delimitations;

➢ specification of the explanatory reference system on the theory to which we adhere;

➢ clear formulation of the purpose of the research and its objectives;

➢ the correct and clear formulation, argumentation, justification of the research hypothesis;

➢ consistent pursuit of the purpose and objectives of the research by applying the research plan;

➢ ensuring the balance between the topics and the theoretical and the practical-applicative aspects;

➢ the interdependence, interconnectiveness of the theoretical plan with the practical-methodological one;

➢ making intra- and interdisciplinary connections in order to approach the global investigated phenomena;

➢ the logic of structuring the ideas, of their classification in the different subdivisions and the logic of the rendering the ideas, the logical, systematic and comprehensive way of their development;

➢ the usage of the clear, scientific language;

➢ accessible active and interactive attitude and critical attitude towards information and data;

➢ associating scientific data with personal opinions;

➢ scientific accuracy in supporting and arguing certain ideas;

➢ the scientific rigor manifested in the presentation of the data while processing and interpreting the research results;

➢ the extent to which the author and his text succeeds in bringing convincing scientifically based argumentation.

Recommendations regarding formulating conclusions:

- clear and concise formulation of the personal, original qualitative and quantitative conclusions that emerge from the theoretical and practical investigations, also personal assessments, critical comments, reflections, analysis, interpretations, evaluations and personal predictions

- ensuring the organic correspondence between the title of the paper, the hypothesis, the formulated contents and conclusions: descriptive, explanatory or predictive

- advancing proposals and suggestions, useful approaches in the future,

Recommendations regarding the bibliographic sources consulted and how to cite them:

- the relevance of the bibliographic sources from the perspective of the research theme;

- the analysis of recent bibliographical sources related to the studied topic;

- the critical view on the selection criteria of the bibliography and the ways of information processing;

- correct citation of data related to bibliographic sources;

- recording the bibliography in the bibliographic list in accordance with the methodological norms; in the text, in the case of quotations, it will be specified the author, the year of publication of the book and the page in which it appears the text of the quotation.

Recommendations regarding the speech presentation:

- comprehensive, synthetic, logical and coherent structuring and organization of the speech;

- the intuitive and illustrative means used in the presentation: drawings, samples, photographs, slides, audio, video tapes, software;

- the quality of the verbal language used: scientific accuracy, clarity, accessibility, elegance;

- voice qualities: voice volume, voice pitch and intensity, intonation, diction, accent, speed pronunciation, pauses in speech;

- nonverbal, mimic-gestural language: facial expression, gaze, gestures, body position, posture;

- visual contact with the audience;

- the connection with the audience and giving the precise responses on the questions;

- the capacity to synthesize and condense the information extracted from different bibliographic sources;

- the ability to reveal and argue the strengths of the paper, the practical applicability of recommendations, their ameliorating and optimizing effects;

- the extent to which it convinces the audience;

- time frame for presentation.

Analysis and processing of data obtained

Most often, the data obtained by applying different research methods is presented in quantitative, numerical form, so that it is suitable for statistical processing.

In the beginning, they are subjected to a summary processing, so they are analyzed, ordered, grouped, classified, systematized. The data obtained in the tables is condensed, in calculations of percentages, classifications, reports according to the evaluation scales. Then the structure diagrams are drawn up, the comparison charts and graphs are drawn, statistical indices are calculated that express the algorithm or mean deviation, dispersion, standard deviation.

Subsequently, an in-depth analysis of the data is performed, there are established the joining and correlation variables, there are studied the relationships and dependencies between variables - correlations, associations, regressions, and in the last part there are built, based on the conclusions, the models of dependence. The mathematical statistical apparatus (e.g. T student tests) is used to determine whether the differences between the experimental and control groups are statistically significant; there are statistical inferences made (the data obtained is generalized on work samples for the entire population).

In summary, the steps involved in this stage refer to:

• analysis, processing of qualitative and quantitative interpretation (mathematical-statistical) of data and results obtained;

• analysis, interpretation, validation and verification from a psycho-pedagogical and methodological perspective of the data and the collected results;

• analysis, interpretation and capitalization from a managerial perspective of the data and collected results.

In order to be useful in explaining the studied phenomenon, to lead to verification hypothesis, these data must be subjected to processing and interpretation operations. Only as a result of these operations they acquire meaning, lead us to solve the investigated situation and contributes to the advancement of knowledge.

Verification of information is an operation of a qualitative nature to which we submit the information obtained in the investigation phase, regardless of the methods used, to establish the level of fairness with which we operated and, consequently, the increase or decrease in the measurement must be proved through formulas in order to get authentic information and results. This operation is vital, moreover, not only in the case of a proper research, carried out on a population of hundreds or thousands of cases, but also in more modest approaches, such as an individual psycho-pedagogical investigation or a social inquiry.

Following the verification, we can get to the stage when we have obtained uncertain data, which will be left aside or when we have obtained less information than it is necessary to test the hypothesis, then we will return to the investigative stage, and again we will start the process all over again to confirm / refute the hypothesis.

This is especially the case for novice researchers, but that does not mean that many of the experienced researchers do not go through such experiences.

The research approach is perfectly outlined in the mind of the researcher, and then the tools of the investigation will have gaps that will produce information shortages. It doesn't matter that oversaturation of information or undersaturation of information may occur, the serious thing is just not realizing it! And the purpose of verifying the information itself is: to help us realize the occurrence of these.

It is the statistical methodology that gives us the opportunity to address numerical or qualitative phenomena in quantitative terms, as an essential, indispensable step of access to qualitative interpretation of information. Through this methodology we gain the opportunity to address the investigated phenomena in their multitude and variety, structured shapes on groups of

population. The population under investigation, grouped according to certain criteria form what the science of quantity calls- statistical populations, and the relationships that are established within them: quality through quantity relation. For this reason we can argue that the statistical processing of research data it is also the first step towards interpretation.

In specialized language, the measurement is called indices of statistics. These are: arithmetic mean, median, modulus, dispersion and indices of correlation. The arithmetic mean, median and modulus are statistical indices that specify "value or "central trend" of the data collected through investigation and retained, after verification, to be processed. These statistical indices are established as follows: the data is grouped on certain criteria called values and later are entered in a table by classes. Following the operation we will obtain:

-arithmetic mean – it is calculated

- median - if the "values" are in odd numbers, this is represented by the value which divides the series into two equal groups;

- module - is the value that is repeated most of the time in the series.

Finally, the dispersion expresses the degree of concentration of the values and their deviation to the "central tendency". There are several types of deviations, such as type deviation, deviation standard etc. The calculation of the dispersion is very important especially in the selection of data operation for interpretation being a kind of verification data more accurate, more rigorous and more objective.

7. Graphical representations used in processing and interpretation

There is a huge variety of graphical representations used in processing and interpretation of educational phenomena, the most used are: structure diagram, comparison diagrams, Cartesian coordinates, histograms and statistical curves.

Statistical graphs are (see fig. 1.1-1.4.)**:**

- ➢ structure diagram (when data is grouped into several categories or expressed under form of percentages)
- ➢ comparison chart (as percentages)
- ➢ histogram
- ➢ frequency polygon
- ➢ frequency curve / distribution curve.

Histogram models estimate the probability of data occurrences by counting the frequency of occurrence and detect anomalies by comparing the new data with each of the categories in the

Histogram of arrivals
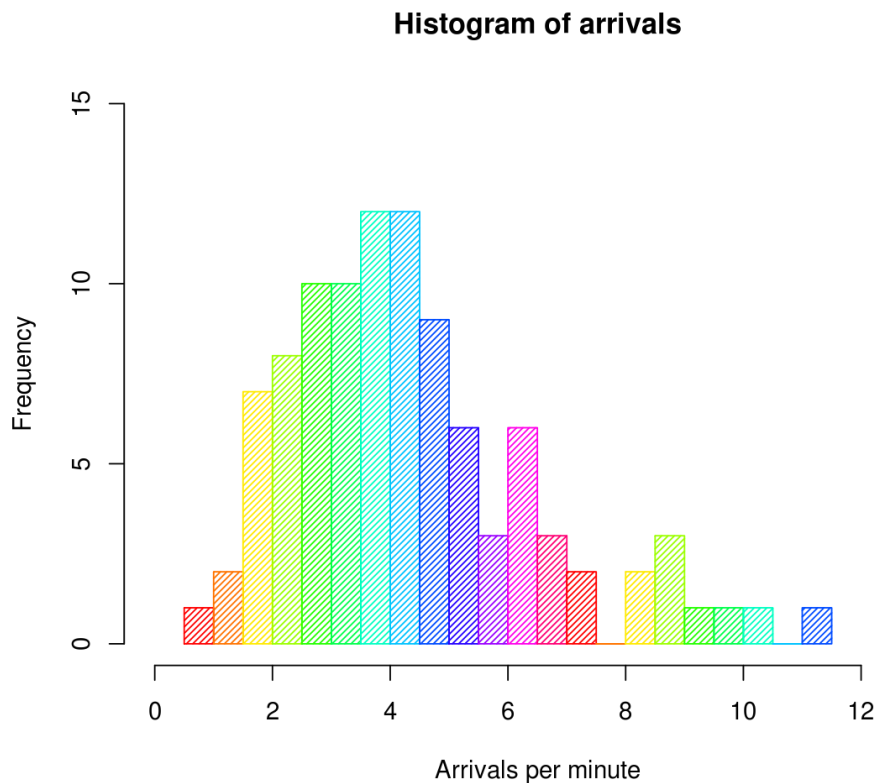
histogram.

Fig. 1.1. Histogram of arrivals. Source:

(https://commons.wikimedia.org/wiki/File:Histogram_of_arrivals_per_minute.svg)

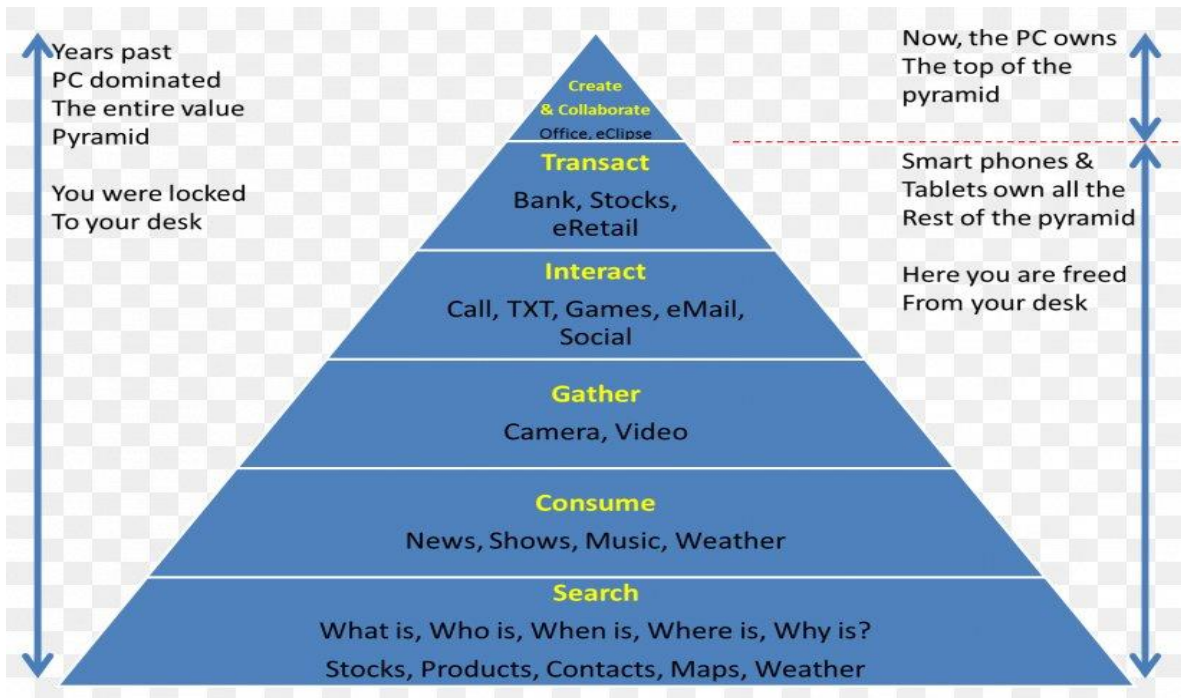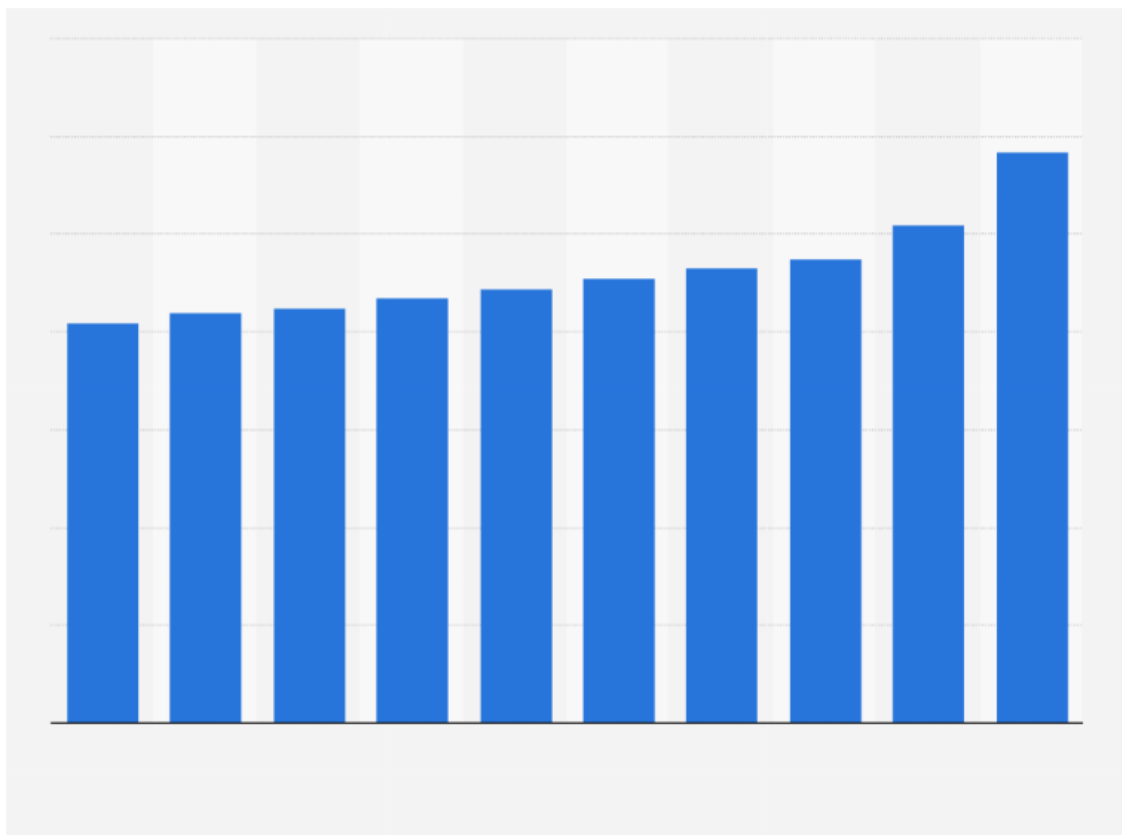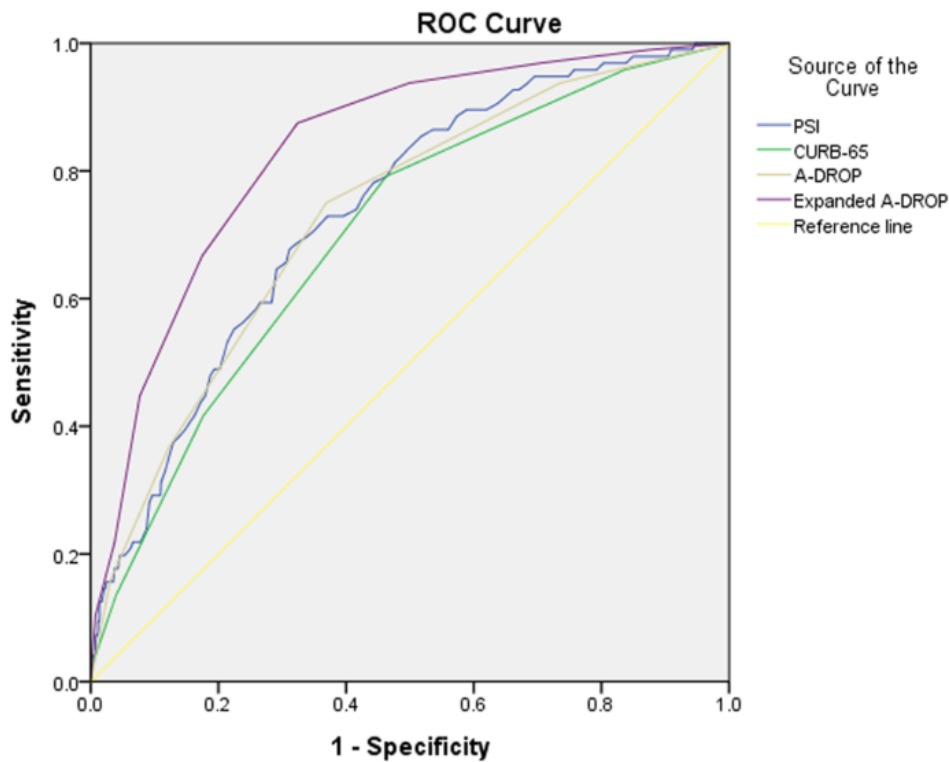Fig. 1.2. Organizational diagram. (Source: https://www.subpng.com/png-wqfpfl/)

Fig. 1.3. Comparing diagram

Fig. 1.4. Statistical curbs (Source: https://www.nature.com/articles/s41598-018-32750-2)

7.1. The researcher's profile

Morris and Norman (2004) highlight three types of skills involved in the research:

• methodological skills - the ability to understand the strengths and weaknesses of different methods, as well as options for rigorous analysis and quality assurance;

• managerial skills - regarding the coordination of the program and staff of the project;

• interpersonal skills - the ability to engage or attract different types of people in research and to communicate effectively with potential user groups.

A teacher or educator with a chance to be and actually assert himself as an authentic researcher possesses by definition an open mind, proves courage and originality, has respect for ideas and solutions to others, he discerns the novelties, knowing how to distinguish exquisite knowledge from truly new ideas. The spirit of his observation is always alive and fresh, he can look at a problem from several angles, he/she is nonconformist, but rigorous, imaginative, but always willing to test honestly the solutions, to thoroughly test the hypotheses. Enthusiasm is combined with lucidity, adaptation to reality with initiative. Independent, persevering and resilient to effort, the research teacher is in the constant struggle with routine, with the official spirit. Critical

spirit, team spirit, balance and probity are other traits that define his personality. The competency profile must include:

- ➢ assimilation of methods and techniques for researching the concrete educational phenomenon;
- ➢ to see new possibilities in creating experimental situations;
- ➢ the ability to pertinently define the research objectives;
- ➢ the ability to organize the conditions for verifying a hypothesis;

8. Practical assignments

Assignment 1. Describe the methods of research using the following structure:

Methods	Contexts	Advantages	Disadvantages
1 2 3 4			

Assignment 2. Creating a Research Question

The table below provides samples of four research topics and illustrates how to develop a research question from a broad topic. Follow the four examples down the columns to see how the questions develop.

Broad topic	Pollution	Animal rights	Obesity	Steroids
Restricted topic	Wetlands	Circus	Obese children	Steroids used in athletics
Narrowed topic	Wetlands in Boston	Use of animals in China's circuses	Obese children ages 5-11.	High school athletes and steroids

Research question	How did the degradation of wetlands in Boston contribute to Hurricane Katrina's devastation?	Should use of animals for circus entertainment be outlawed?	How do we address the issue of childhood obesity in primary schools?	Should high school athletes be subjected to steroid testing?

Now use these themes to try it out for yourself. Make up your own subjects for the last two columns.

| Broad topic	Anxiety	Privacy	Your topic #1	Your topic #2
Restricted topic				
Narrowed topic				
Research question				

Assignment 3. Triangulation

Complete the following exercise to help you develop your study topic:

1st step: Fill in the blanks with your broad topic:

Step 2: Use the general search box on the library's website and scholar.google.com to find information on your topic. Examine the potential subtopics provided by Google, as well as the articles returned by your search. Make a list of at least 6 subtopics related to your main issue. (For example, hospice care is a broad issue.) Subtopics include hospice for children, hospice for cancer patients, hospice nursing plans, caregiver stress during hospice care, optimum hospice settings, and   medications   and   hospice care)._____

_____

_____

_____

_____

_____

_____ _____

Step 3: Focus your search and your research topic. Fill in the top box of the pyramid below with your general theme (Issue). Fill in the boxes at the bottom of the pyramid with one or more of the subtopics you discovered in Step 2. (Clarifying aspect). Often, you'll start with one subtopic and then add a limiting factor, such as location, to further focus your search. (Example: Palliative care; elucidating aspect #1: caregiver stress; elucidating aspect #2: stress-relieving techniques).
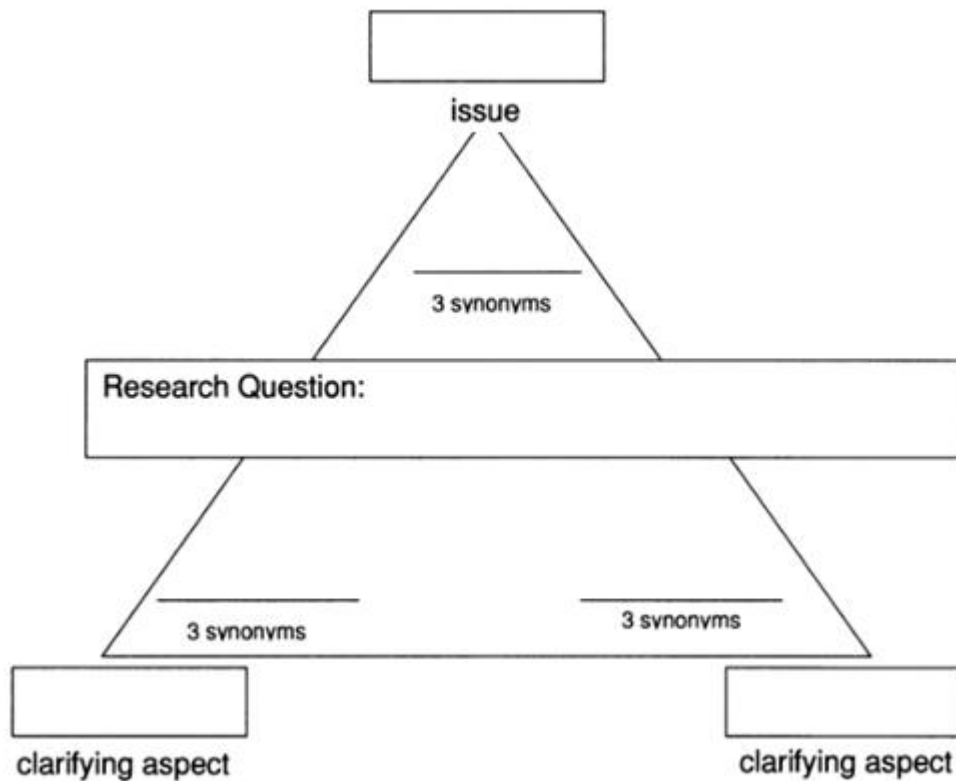
Step 4: Your search phrases for further study will be the Issue and two clarifying characteristics you established in Step 3. Fill in the blanks inside the pyramid with three synonyms for those search terms.

Step 5: Using those search terms, select at least 5 items that you think are worth downloading, reading, and adding to your annotated bibliography. If necessary, refine your issue and clarify parts as you search. If necessary, add more synonyms.

Step 6: Now that you've completed some preliminary investigation, write your Research Question in the pyramid's center box. (For example, what are the most effective ways for reducing stress among hospice caregivers?)

Step 7: Continue researching your topic using the search phrases you created in this exercise.

Assignment 4. Determining the research topic

Question:	Model	Student's Topic:
Who?	Who is responsible for monitoring thunderstorms?	
What?	What causes a volcano? What is the biggest volcano on record?	
Where?	Are volcanoes more prevalent in some parts of the world? If so,where?	
When?	When have major volcanoes occurred in the Philipinnes?	
Why?	Why is it important to monitor volcanoes?	
How?	How do you measure a volcano?	

Assignment 5. Brainstorming and clustering

This activity is intended to assist you in thinking about words and concepts and seeing how they are related.

Directions: Create your own diagram using the "Animal Shelters" diagram as a guide (on the next page). Start with a broad topic. Fill in the three existing circles with topics that are linked. Add your own lines and circles for extra concepts for 15 minutes. Examine your diagram at the conclusion of the 15 minutes. To identify interrelated topics, use arrows or lines.

YourTopic:

_____
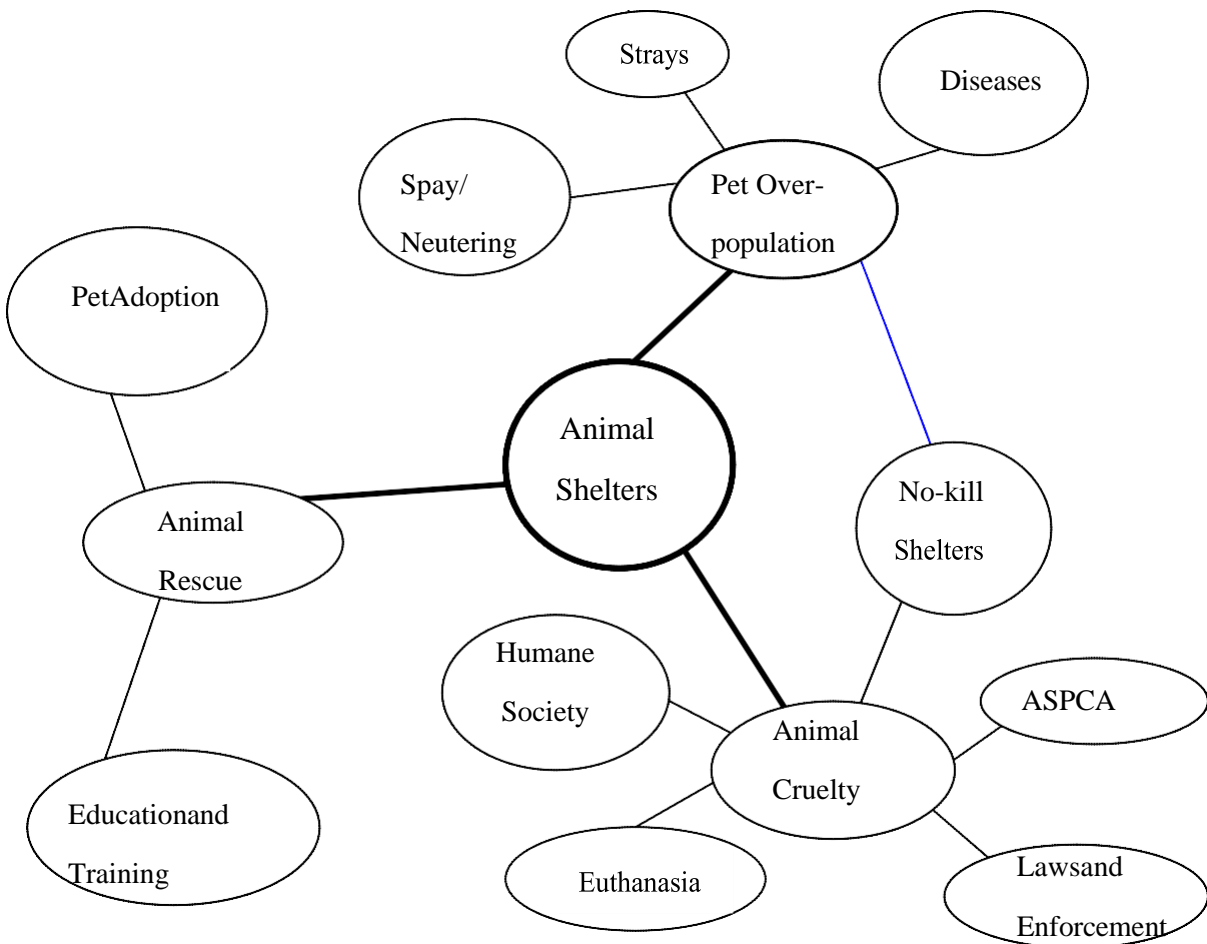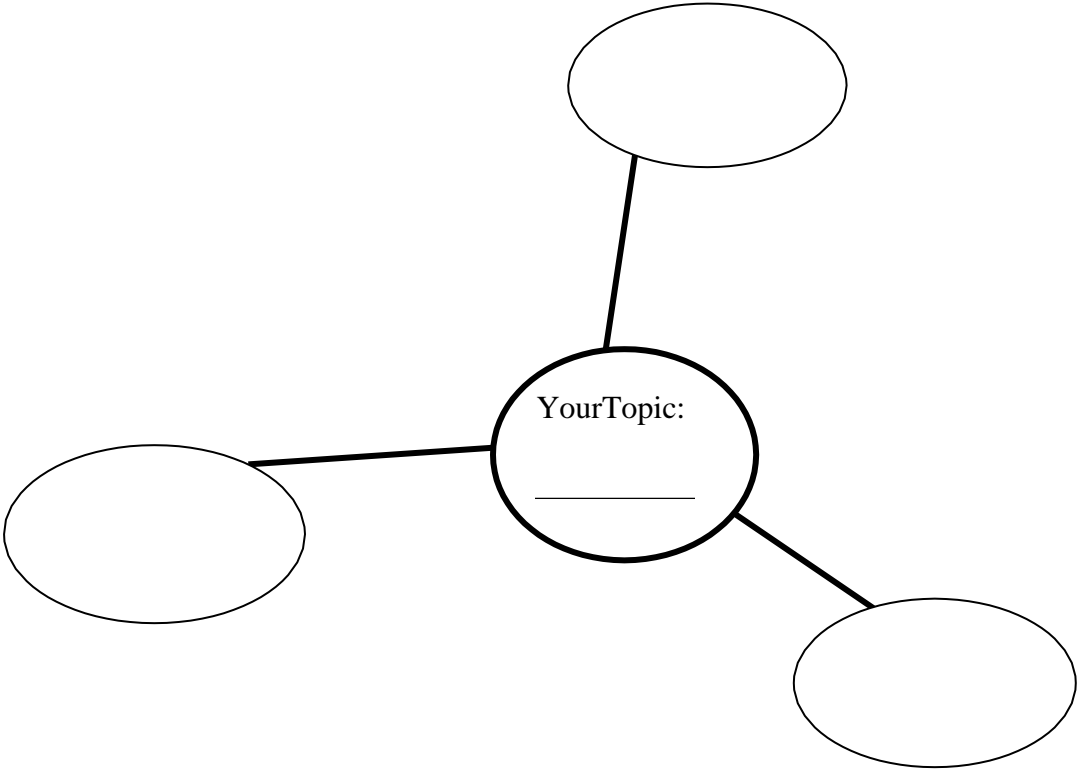
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