23-03-2022

Key types of research methods

Test 01. KEY STAGES OF INVESTIGATION

9 test questions

Research Hypothesis and its falsification

IMRAD

22-03-2022

Research Hypothesis

ABOUT YOUR SCORES

Observation and Research question

Specifying the stages of research

Choice of material

Choice of measurable variables

Choice of methods

Setting the attainable key objectives

Doing exploratory research

Specifying the research gap

Formulating the hypothesis

Setting the range of tasks

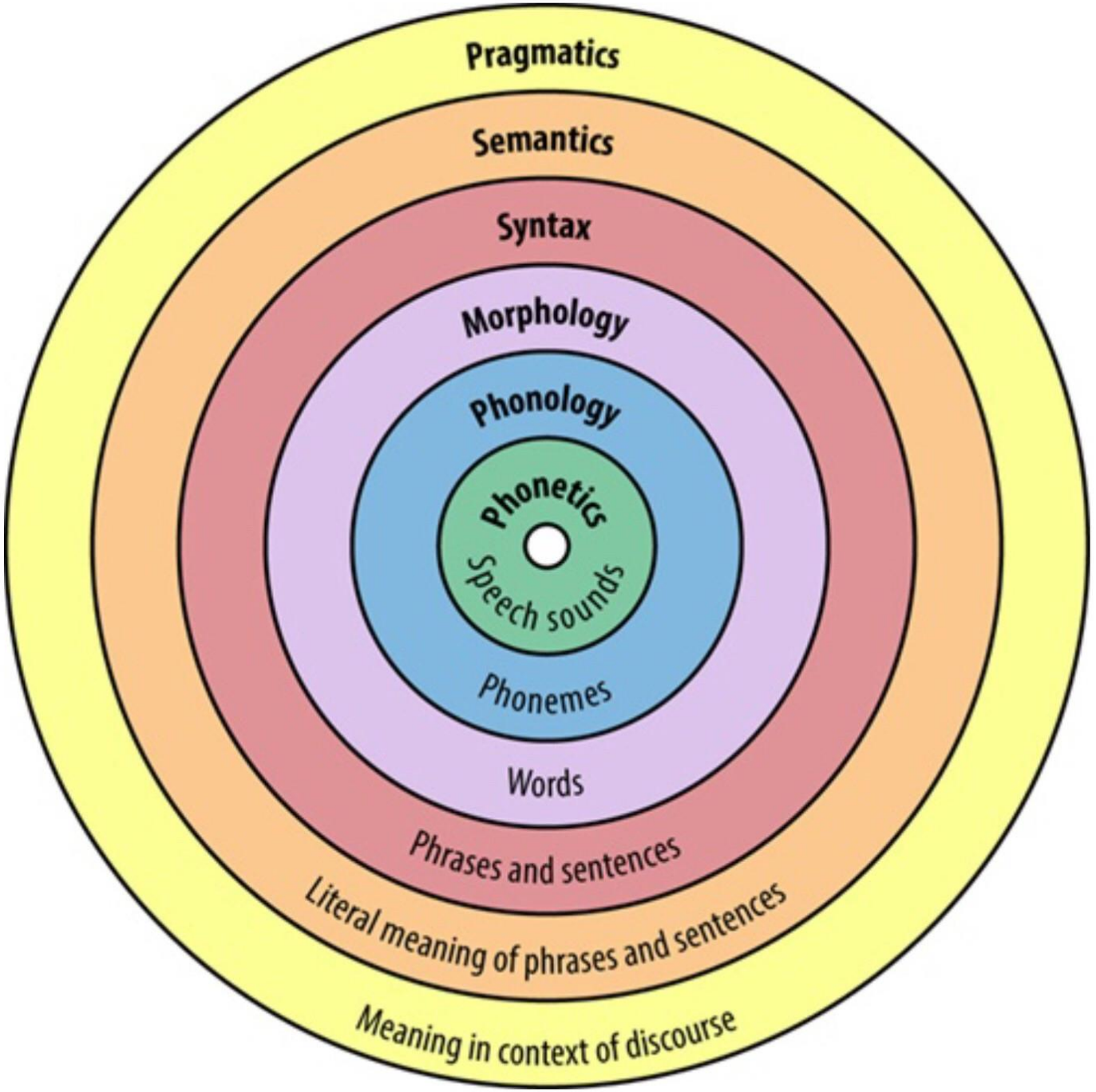
Data collection

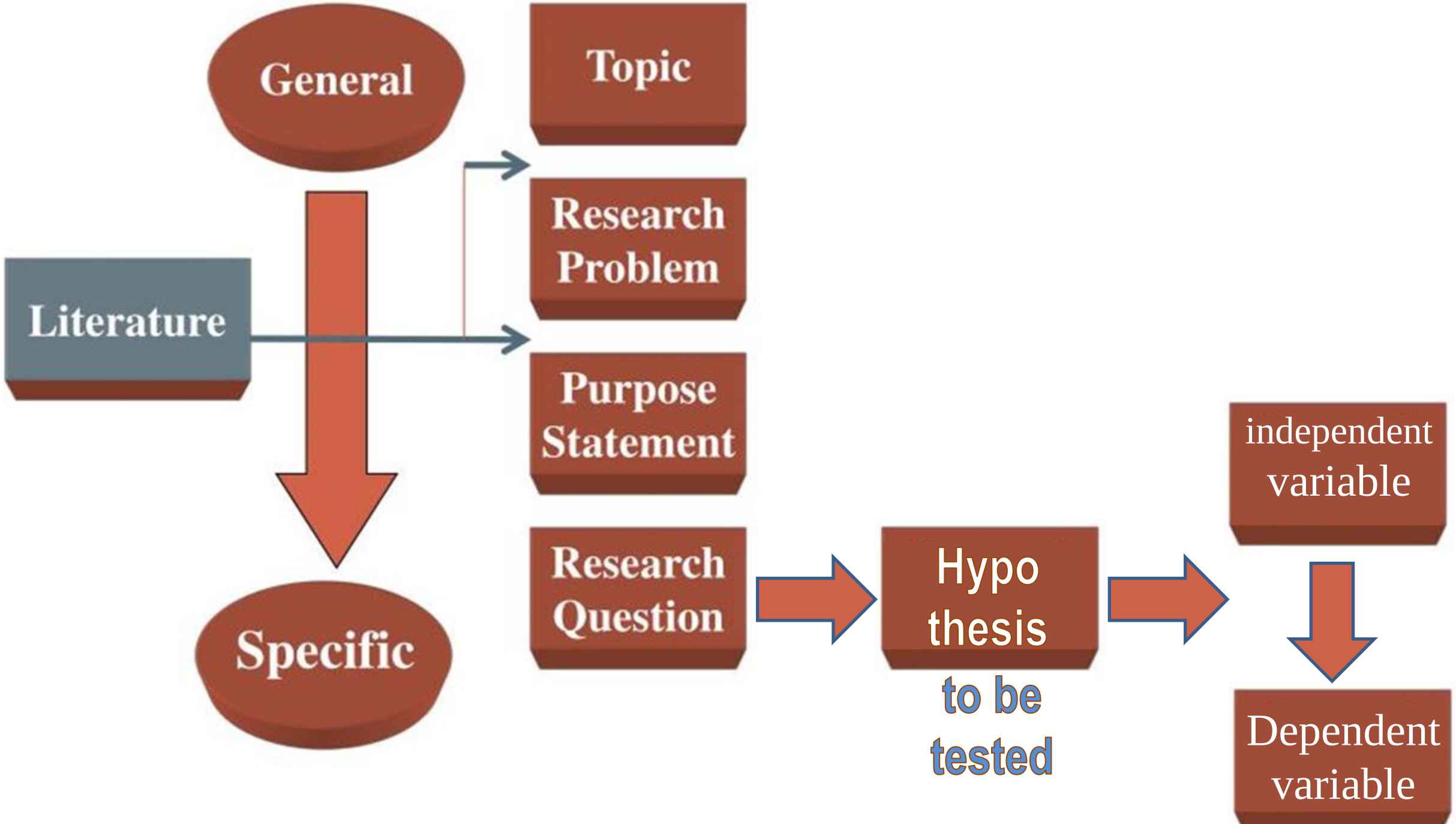
Testing the hypothesis

Collected Data Analysis

Making a discovery

Description & Analysis of Results


Pragmatics
Semantics
Syntax
Morphology
Phonology
Phonetics
Speech sounds
Phonemes
Words
Phrases and sentences
Literal meaning of phrases and sentences
Meaning in context of discourse


General
Topic
Literature
Research Problem
Purpose Statement
Research Question
Specific
Hypo thesis
to be tested
independent variable
Dependent variable

Exercise

This exercise is intended to give you some idea of how language attitude data is collected and of the kind of results which emerge. In order to make the exercise manageable, I suggest you use just two taped voices and ask for responses from a small number of people. To obtain results you could generalise from, it would be necessary to use more voices and many more respondents.

Tape a person from your community with a local accent telling you a story from their personal experience. Then tape someone with a standard accent (such as RP in England) from the television or radio, if possible talking on a similar personal topic.

Then play excerpts from the two speakers to two or three of your friends or family and ask them to rate the speakers on the following scale.

Speech rating scale

Listen to the tape and then indicate with a tick where you would place the speakers on the following scales.

Speaker **1 2 3 4 5**

Exercise

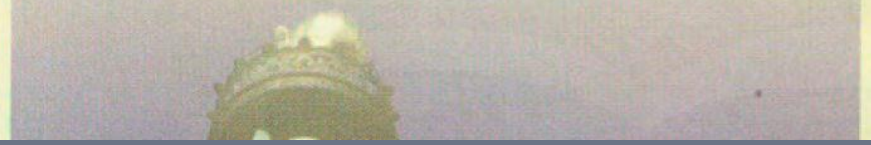
MODEL A

New York is a very big city and lots of people live there. Lots of people go to see New York when they go on holiday.

There is a lot to see in New York. You can see the Statue of Liberty, the Brooklyn Bridge, Central Park, the Empire State Building, the World Trade Centre, City Hall, Carnegie Hall and the New York Stock Exchange. You can also go to Broadway and Yankee Stadium. If you don't want to see any of those you can just walk around. You can also go to a restaurant or a bar or a nightclub.

New York is very big. It has got a lot of cars and buildings and a lot of people. New York also has a lot of roads and noise.

New York is a very nice city and everyone loves it very much. Everyone must go to New York because it is good and you can see everything there.



MODEL B

New York City isn't a city that can easily be ignored even by the most demanding visitor. Located on the east coast of the United States with a population of over ten million people, it is the destination of thousands of visitors who come every year to experience the excitement of one of the busiest cities in the world.

The streets of New York are incredibly noisy, with the sounds of car horns beeping, people shouting and police car sirens wailing. Amazingly tall skyscrapers rise up everywhere.

The most exciting thing about New York is how much there is to see and do there. For sightseers there is the Statue of Liberty, the Brooklyn Bridge and Central Park, while lovers of culture can visit the theatres of Broadway or some of the city's hundreds of art galleries. Alternatively, if you are a sports fan you can even catch a game of baseball at Yankee Stadium. The night life in New York is equally brilliant, with a wide variety of restaurants, bars and nightclubs to choose from.

New York is a lively and exciting city to visit with something for everyone, and is recommended to anyone seeking fun, variety and adventure.

Speech rating scale

Listen to the tape and then indicate with a tick where you would place the speakers on the following scales.

Speaker **1 2 3 4 5**

pleasant —— —— —— —— —— unpleasant
attractive —— —— —— —— —— unattractive
self-confident —— —— —— —— —— un-self-confident
likeable —— —— —— —— —— unlikeable
fluent —— —— —— —— —— not fluent
reliable —— —— —— —— —— unreliable
sincere —— —— —— —— —— insincere
ambitious —— —— —— —— —— unambitious
friendly —— —— —— —— —— unfriendly
intelligent —— —— —— —— —— unintelligent
good sense of humour —— —— —— —— —— no sense of humour
leadership skills —— —— —— —— —— no leadership skills
highly educated —— —— —— —— —— uneducated
high status job —— —— —— —— —— low status job

What differences are there in the ratings? How would you explain the

MULTIMODAL DISCOURSE

1.What is Scientific Knowledge? What features seem specific for it?
2.What is a scientific method? Why do we need it?
3.What features should scientific results have to fit a notion of a method-based study?
4.What is methodology? What meaning does English word ‘methodology’ have?
5.What levels of methodological thought can you name?
6.Are all possible methodological approaches just the same?
7.What is a scientific approach? Is it just a system of belief? Is it a sort of a model?
8.What is Meta-Language? Why do we need it?
9.Are all methods equivalent in Research?
10.What are key stages of scientific research?
11.What is the difference between theory analytical review and empirical research?
12.What is the difference between qualitative and quantitative methods in English Research tradition?
13.Can you name various qualitative and quantitative methods in English Research tradition?
14.What role should an observer play in the research? Should one stay visible or invisible?
15.Can observer influence research results?
16.Can you tell the difference between linguistic scientific research methods and general research methods?

WHAT IS RESEARCH ?

- Research is "creative and systematic work undertaken to increase the stock of knowledge, including knowledge of humans, culture and society, and the use of this stock of knowledge to devise new applications."

WHAT IS RESEARCH ?

- Research [rɪ'sɜːtʃ]

is a systematic investigation to establish facts or principles (or to collect information on a subject).

WHAT IS RESEARCH ?

- Research [rɪ'sɜːtʃ]
- To research – исследовать.

- to carry out investigations into (a subject, problem, etc.)

- Syn: investigate , study , enquire into , look into , probe , explore , analyse , examine , scrutinize etc.

Criteria for Research Problems

- Good research problems must meet three criteria (Kerlinger, 1973):

  1) First, the research problem should describe the relationship between two or more variables.

  2) Second, the research problem should take the form of a question.

  3) Third, the research problem must be capable of being tested empirically (i.e., with data derived from direct observation and experimentation).

CHARACTERISTICS OF SCIENTIFIC METHOD

Most agree that it is characterized by the following elements:

1. Empirical approach
2. Observations
3. Questions
4. Hypotheses
5. Experiments
6. Analyses
7. Conclusions
8. Replication

IMRAD Стандартная структура научной статьи	
Title (Название статьи)	Указывается тема исследования, автор, аффилиация. В студенческих сборниках также научный руководитель.
Annotation (Аннотация)	Конкретизирует содержание статьи и кратко отражает структуру IMRAD
Key Words (Ключевые слова)	Указываются ключевые термины и понятия исследования
Introduction **(Введение)**	Проблема, актуальность, новизна, объект и предмет; цели и задачи; Аналитический обзор литературы; ключевые понятия исследования.
Methods **(Методы)**	Методы, материал анализа, условия эксперимента, методики и средства проведения исследования
Results **(Результаты)**	Анализ, интерпретация и первичное обобщение полученных в результате исследования новых данных.
Discussion (Обсуждение)	Полученные ответы, их достоверность, значение,
Conclusion (Заключение)	Обобщение полученных результатов и выводов по ним; перспективы дальнейших исследований.
References (Литература)	Библиографические данные статей оформляются по требованиям издания (e.g. ГОСТ). Указываются все процитированные и проанализированные источники.

IMRAD Стандартная структура научной статьи	
Title	
Annotation	
Key Words	
Introduction	
Methods	
Results	
Discussion	
Conclusion	
References	

Discussion	1	2	3	4	5	6	7	8	9
Results	1	2	3	4	5	6	7	8	9
Introduction	1	2	3	4	5	6	7	8	9
Annotation	1	2	3	4	5	6	7	8	9
References	1	2	3	4	5	6	7	8	9
Methods	1	2	3	4	5	6	7	8	9
Key Words	1	2	3	4	5	6	7	8	9
Title	1	2	3	4	5	6	7	8	9
Conclusion	1	2	3	4	5	6	7	8	9

Yes!
Bright!

Back

Not quite, sorry!

Back

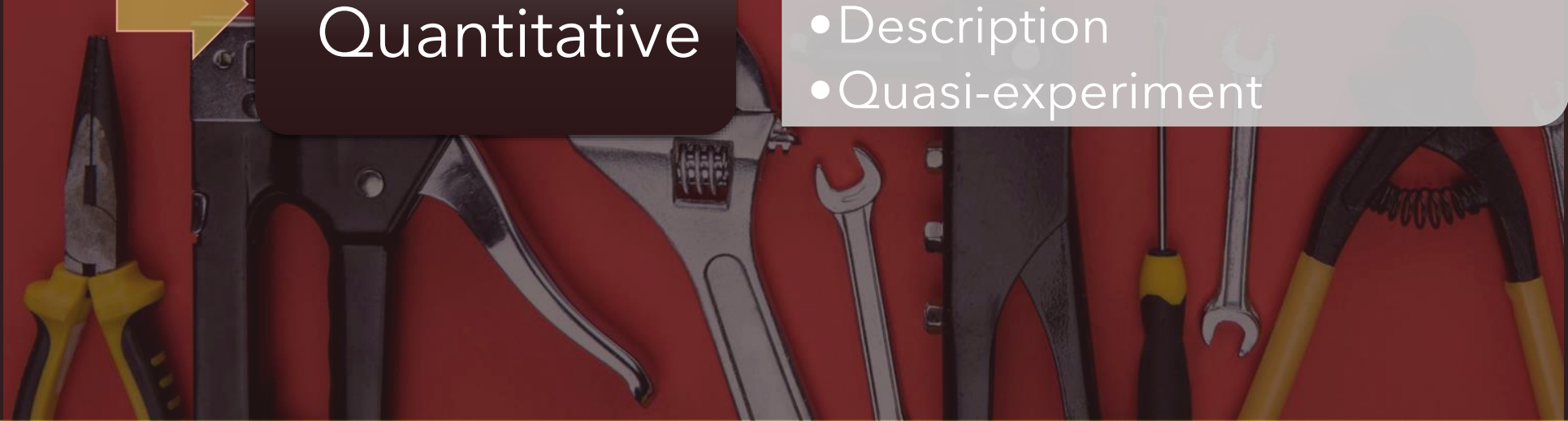
IMRAD 28-02-2028 (learningapps.org)

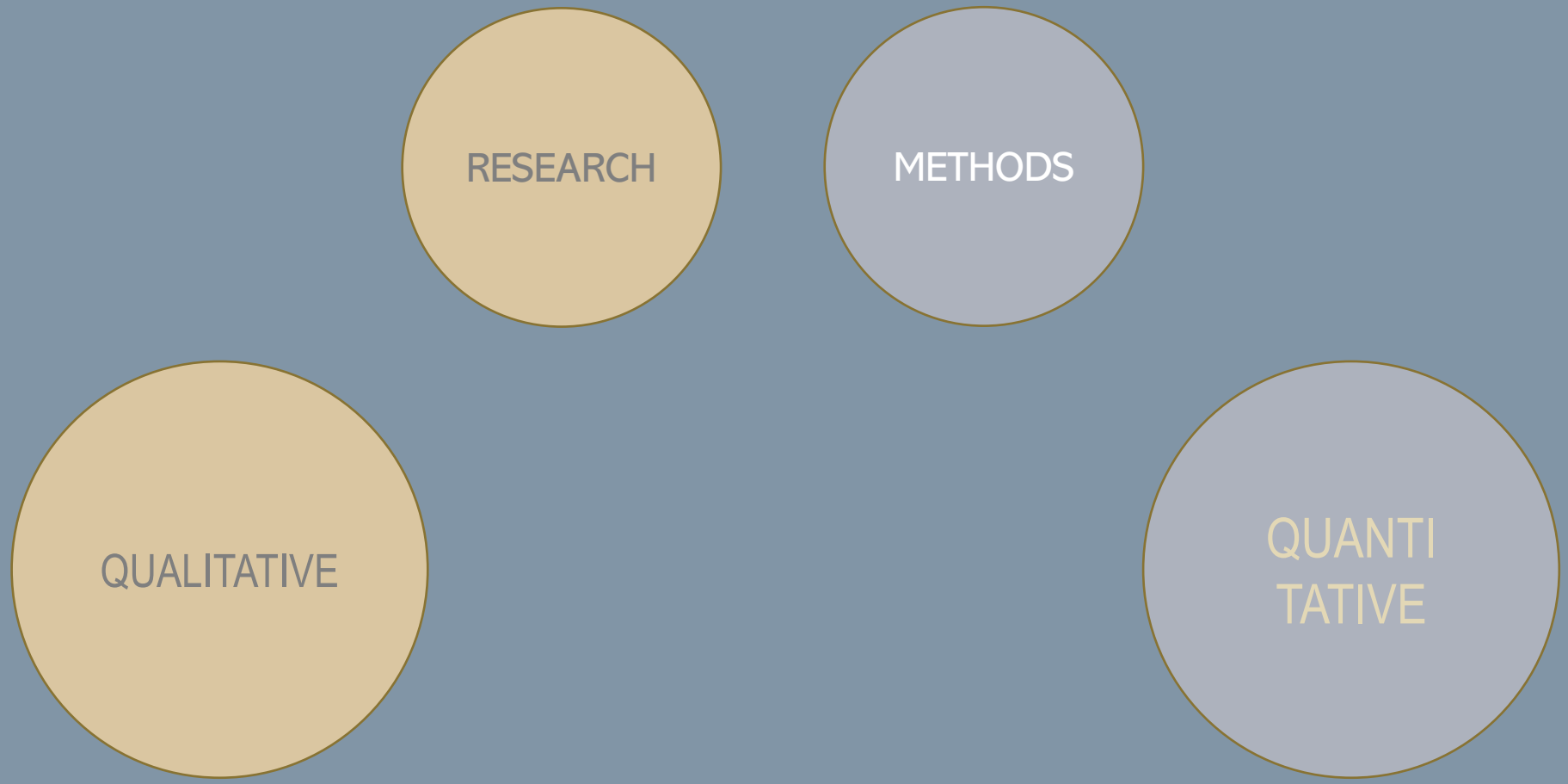
Scientific research manuscript structure (learningapps.org)

Работа с источниками	
Контрольное количество проанализированных источников не соответствует установленному количеству по плану.	0 баллов
Контрольное количество проанализированных источников соответствует установленному количеству по плану.	1 балл
Обозначенные точки зрения на вопрос не подтверждаются ссылками на источники.	0 баллов
Обозначенные точки зрения на вопрос подтверждаются ссылками на источники.	1 балл
Ссылки на источники не приводятся.	0 баллов
Приводятся ссылки на источники.	1 балл
Приводятся постраничные ссылки на источники.	2 балла
Анализ источников не осуществляется.	0 баллов
Анализ источников осуществляется по авторам.	1 балл
Анализ источников осуществляется по концепциям.	2 балла
Невозможно судить о концепции, лежащей в основе исследования.	0 баллов
Автор принимает устоявшуюся концепцию (или одну из многих) за основу своего исследования.	1 балл
Автор уточняет (и в чем-то дорабатывает) устоявшуюся концепцию (или одну из многих) как основу своего исследования.	2 балла
Автор выступает с принципиально новой концепцией, ложащейся в основу исследования.	4 балла
Возможная оценка:	от 0 до 10 баллов

The research methods

- **Qualitative**
  - Classroom observation
  - Introspective method
- **Survey**
  - Questionnaires
  - Feedback
- **Quantitative**
  - Experiment
  - Description
  - Quasi-experiment




RESEARCH
METHODS
QUALITATIVE
QUANTI
TATIVE


RESEARCH
METHODS
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RESEARCH
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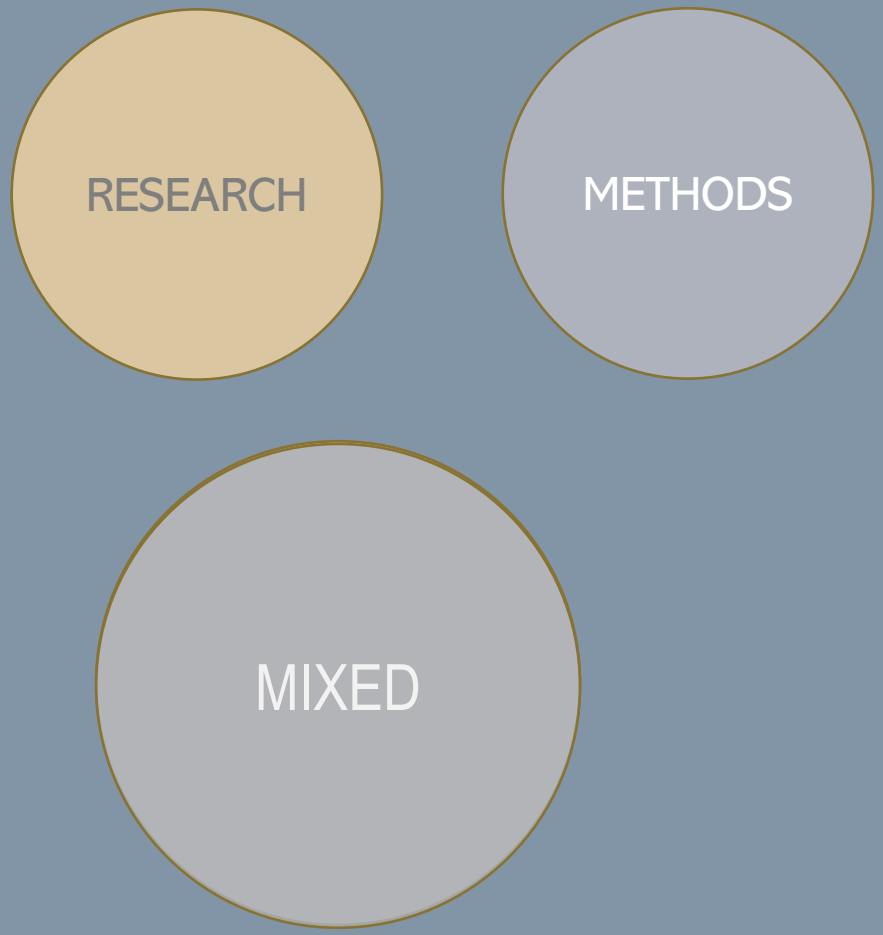

RESEARCH
METHODS
MIXED


MIXED

Classification of Types of Research

Research

exploratory [ɪk'splɔrət(ə)rɪ], [ek-], [-splɔː-]
explanatory [ɪk'splænət(ə)rɪ], [ek-]
descriptive [dɪ'skrɪptɪv]
Qualitative ['kwɔlɪtətɪv]
Quantitative ['kwɔntɪtətɪv]; [ˈkwɒntɪˌtətɪv, -ˌteɪtɪv]
experiment [ɪk'sperɪmənt],
quasi ['kweɪzaɪ], ['kwɑːzɪ]

METHODS

Type of scientific procedure	Example of the kind of scientific procedure
Empiric	Observation, measuring, experiment
Theoretical	Inductive, deductive
“Other”	e.g. heuristic

	Description	Example
THEORETICAL	• uses purely theoretical methods (analysis, synthesis, induction, deduction, modeling) • usually does not work with specific data • specific phenomena are viewed from a theoretical point of view	Pedagogical behavior of a teacher is clarified through models or constructions... It can be described verbally or with a scheme... It is treated only theoretically regardless of specific agents...
EMPIRIC	• always works with specific data • reaches specific pieces of knowledge via exact methods • its subjects are animate subjects (teachers, students) or inanimate objects (textbooks, essays written by students)	A novice teacher (Šimoník, 1994). Specific teachers, specific methods (questionnaire), arrives at specific results.

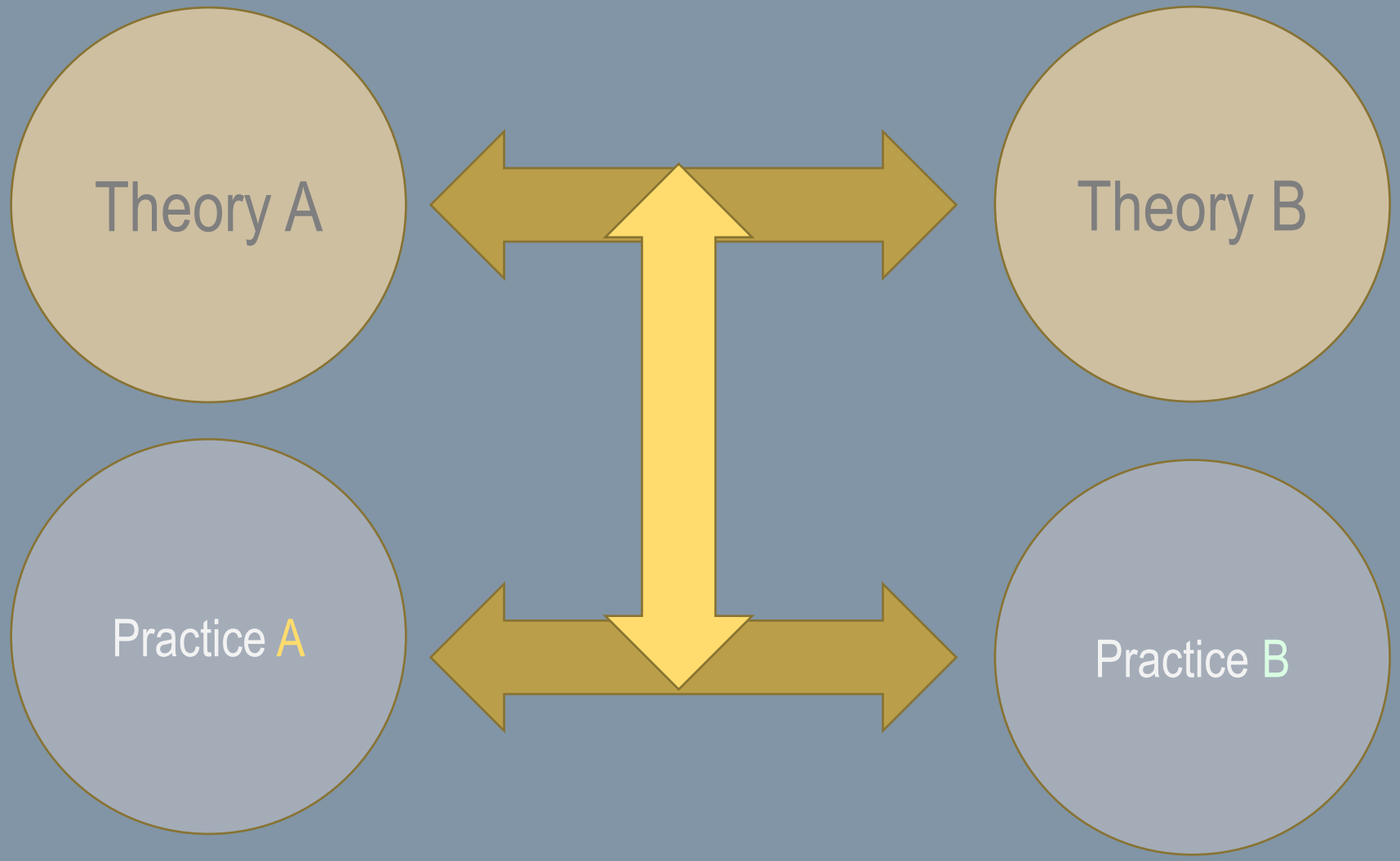
Differentiation of general scientific methods relative to explanation and interpretation

Types of methods	Kinds of methods	Example of individual kinds of methods
Explanation	Empiric	Observation
		Measuring
		Experiment
	General-theoretical	Analysis
		Synthesis
		Induction
		Deduction
		Analogy
		Comparing
		Specific
Interpretation	Narrative	Narration
	Hermeneutic	Understanding a text

Features of A Good Problem Statement

1. It should be clear and precise.
2. It should be able to identify the problem, examine the problem, its key fact and perimeter to be studied.
3. It deals with the gap in information.
4. The statement of problem should be short and snappy
5. It should be adequately important to add to the available body of the work.
6. It should lead to further research.
7. The problem statement should be for the audience.
8. The problem should submit itself for inquiry during the data collection.
9. It should be importance to the researcher and go well with his/her skills, time, and resources
10. The advance towards resolving the problem should be fair.
11. The writing style should be dignified.
12. Your terminologies should be well explained.
13. The range of the problem statement should be kept under control.
14. The problem statement should be compelling and researchable.
15. It should be able to address the five Ws (who, when, why, where, and what)

Research Problem highlights a contradiction



Classification of Types of Research

There are various types of research that are classified according to their objective, depth of study, analysed data, time required to study the phenomenon and other factors.

It's important to note that a research project will not be limited to one type of research, but will likely use several.

Classification of Types of Research

Theoretical

Applied

Classification of Types of Research

Theoretical

Classification of Types of Research

Theoretical

Theoretical research, also referred to as pure or basic research, focuses on generating knowledge, regardless of its practical application. Here, data collection is used to generate new general concepts for a better understanding of a particular field or to answer a theoretical research question.
Results of this kind are usually oriented towards the formulation of theories and are usually based on documentary analysis, the development of mathematical formulas and the reflection of high-level researchers.

Classification of Types of Research

Theoretical

For example, a philosophical dissertation, since the aim is to generate new approaches from existing data without considering how its findings can be applied or implemented in practice.

Classification of Types of Research

Theoretical

Basic research

Basic research is the research to find the basic knowledge or to refine the basic knowledge. Basic research is also called pure research and fundamental research.

For example, an airplane is already flying but now today we want to research how airplane can fly.

Classification of Types of Research

Applied

Here, the goal is to find strategies that can be used to address a specific research problem. Applied research draws on theory to generate practical scientific knowledge, and its use is very common in STEM fields such as engineering, computer science and medicine.

Classification of Types of Research

Applied

This type of research is subdivided into two types:

1. Technological applied research: looks towards improving efficiency in a particular productive sector through the improvement of processes or machinery related to said productive processes.

Classification of Types of Research

Applied

<u>This type of research is subdivided into two types:</u>

2. Scientific applied research: has predictive purposes. Through this type of research design, we can measure certain variables to predict behaviours useful to the goods and services sector, such as consumption patterns and viability of commercial projects.

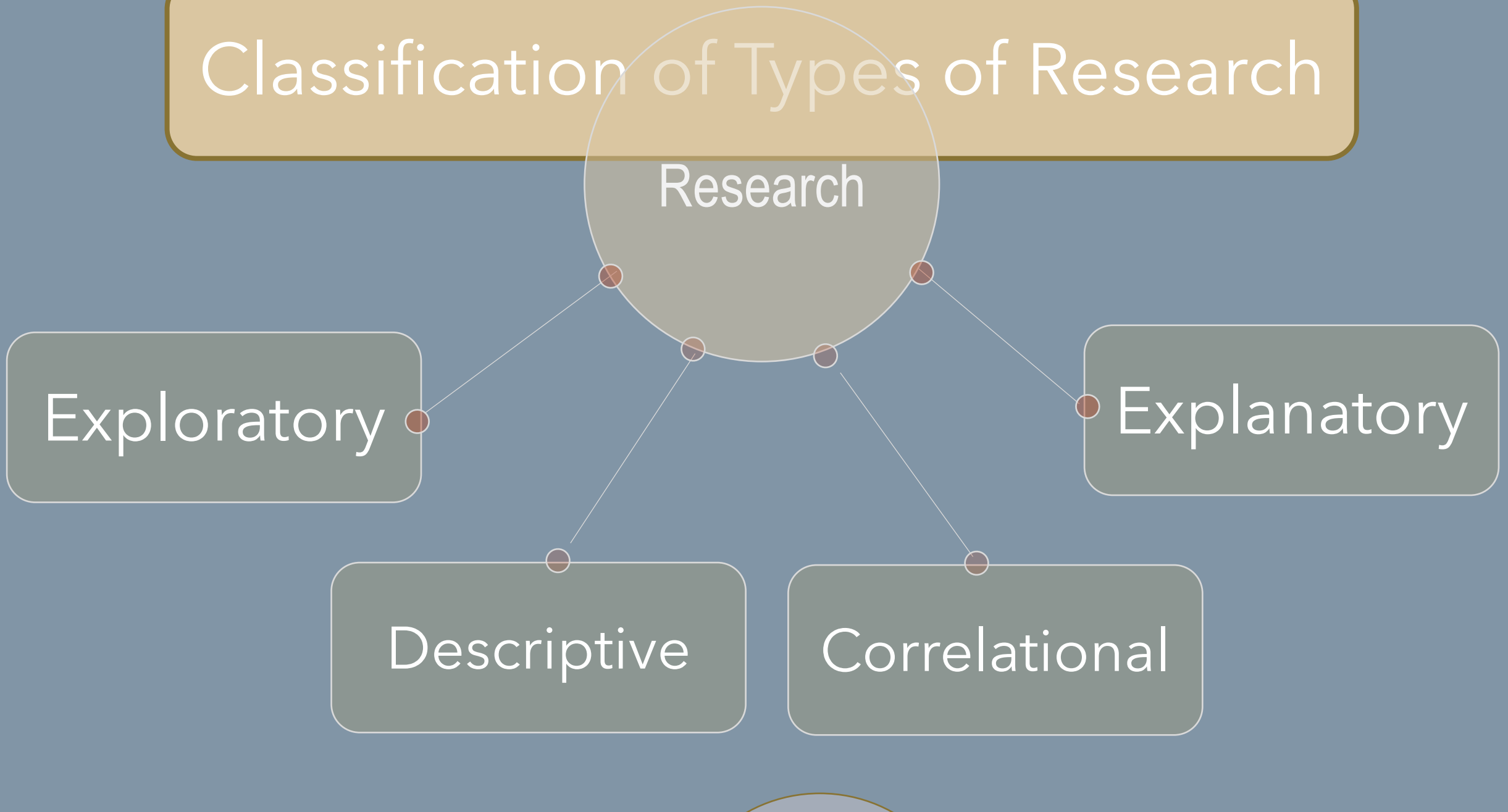
Classification of Types of Research

Applied

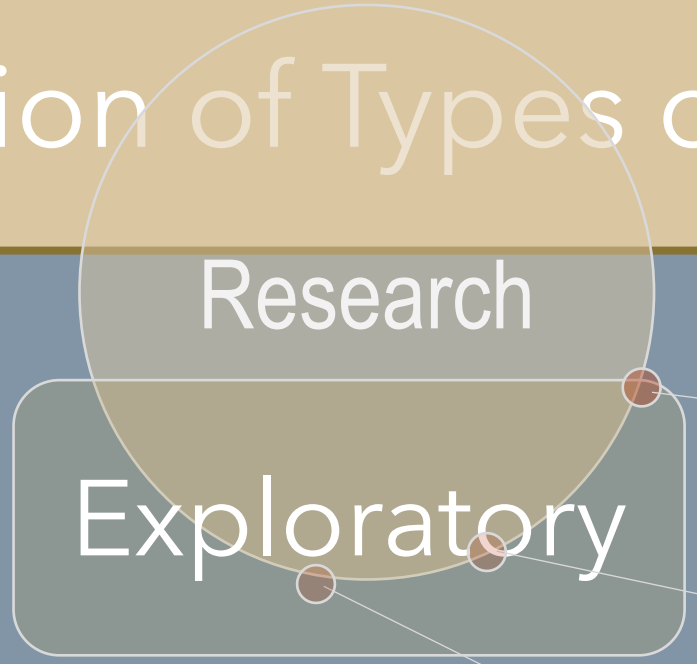
Note: In fact, it is common for research projects to first establish the theoretical framework both to define the field of study and to identify possible theories that could be tested or applied to solve the specific problem posed in the project.

Classification of Types of Research

Classification of Types of Research



Classification of Types of Research




Exploratory
Space Explorers


NEWS
00:02:39:04
angel / flight record / remote 2

Exploratory

Exploratory

«Задач и вопросов было хоть отбавляй. Какова поверхность Луны? Вдруг космический аппарат утонет в тоннах пыли? Вдруг под тонкой поверхностью окажутся пустоты? Как управлять аппаратом с Земли? Успехи в проектировании сменялись поражениями, которых было много: три первых запуска аппаратов серии Е-1 закончились аварией ракеты-носителя. Во время четвёртого запуска в январе 1959 года удалось вывести в космос "Луну-1", но станция прошла мимо Луны: инженеры не учли время прохождения командного сигнала с Земли до Е-1 и обратно.»

Exploratory

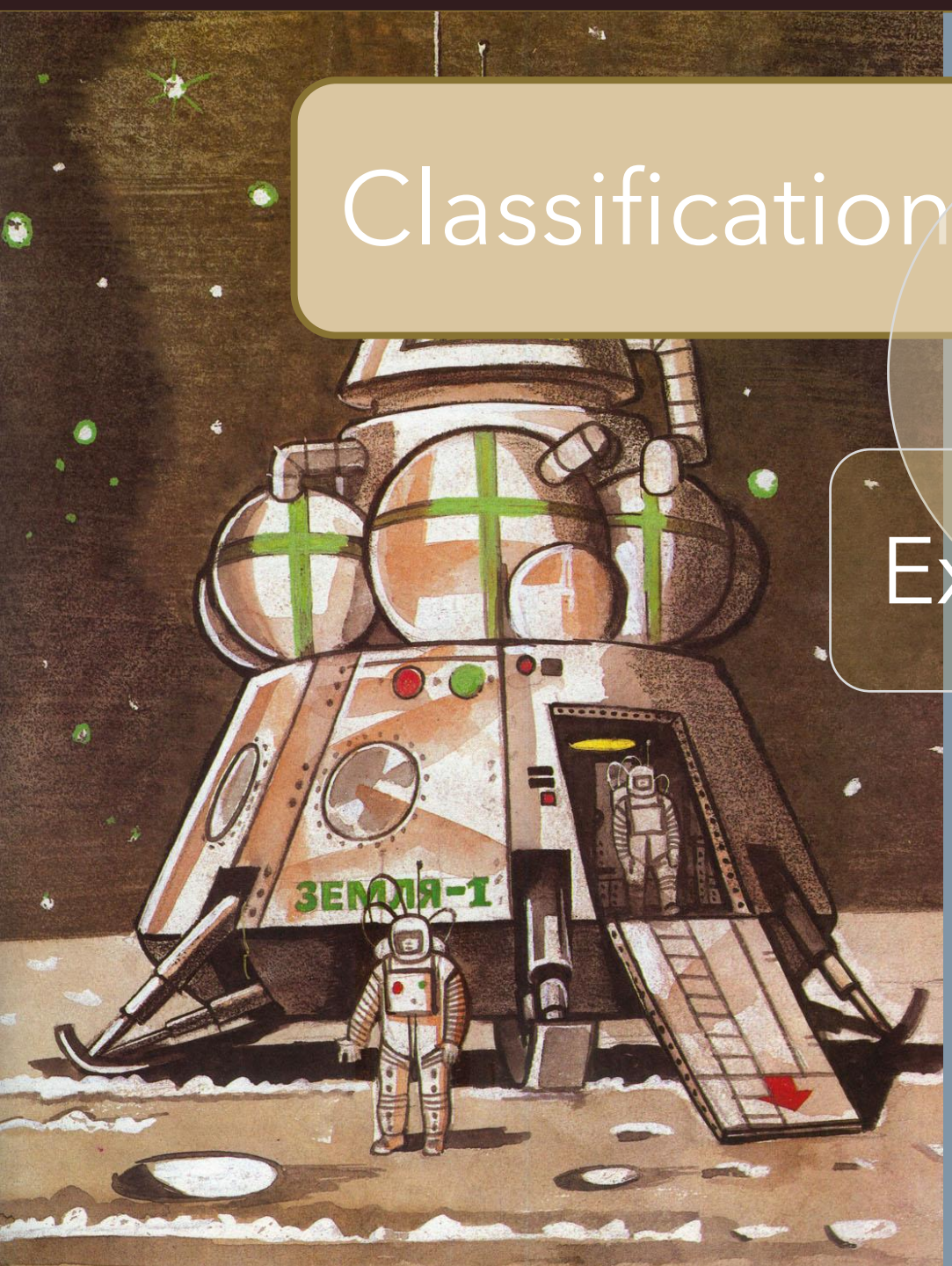
"Луна-1" сделала несколько открытий: зарегистрировала наличие у Земли радиационного пояса, обнаружила отсутствие магнитного поля у Луны, нашла в космосе ионизированный газ и сумела измерить параметры "солнечного ветра". Американцы, узнав об этом, заявили, что Советы лгут, но вскоре лаборатория реактивного движения в Калифорнии приняла сигнал от "Луны-1" — и скептикам пришлось умыться.

Exploratory

Следующие два запуска окончились авариями. 12 сентября 1959 года СССР запустил к Луне аппарат "Луна-2", который через двое суток врезался в поверхность спутника Земли на скорости 3,3 км/сек. Облако лунной пыли можно было видеть во все телескопы мира. Так в СССР выяснили, что поверхность луны твёрдая, и "пометили" территорию, доставив на спутник "вымпелы" – металлические шары из пластин с гравировкой (название страны, герб и пятиконечная звезда).

Exploratory

США были раздавлены. Запуск "Луны-1" и "Луны-2" доказывал, что у Хрущёва есть баллистические ракеты, способные долететь до Вашингтона, и что Америка проигрывает. А СССР, словно в издёвку, уже 10 октября запустил станцию "Луна-3", которая первой в мире выполнила гравитационный манёвр вокруг спутника и отсняла его обратную сторону двумя камерами, отправив на Землю 17 фотографий. Советы, как первооткрыватели, получили право именовать открытые объекты, и тут же на Луне появились море Мечты и море Москвы, кратеры Менделеев, Складовская-Кюри, Джордано Бруно и другие.



Classification of Types of Research

Research

Exploratory

Classification of Types of Research

Research

Exploratory

Exploratory research is used for the preliminary investigation of a subject that is not yet well understood or sufficiently researched. It serves to establish a frame of reference and a hypothesis from which an in-depth study can be developed that will enable conclusive results to be generated.

Classification of Types of Research

Research

Exploratory

Exploratory research is used for the preliminary investigation of a subject that is not yet well understood or sufficiently researched. It serves to establish a frame of reference and a hypothesis from which an in-depth study can be developed that will enable conclusive results to be generated.

Classification of Types of Research

Research

Exploratory

Because exploratory research is based on the study of little-studied phenomena, it relies less on theory and more on the collection of data to identify patterns that explain these phenomena.
For example, an investigation of the role social media in the perception of self-image.

Classification of Types of Research

Research

Descriptive

The primary objective of descriptive research is to define the characteristics of a particular phenomenon without necessarily investigating the causes that produce it.

Classification of Types of Research

Research

Descriptive

In this type of research, the researcher must take particular care not to intervene in the observed object or phenomenon, as its behaviour may change if an external factor is involved.
For example, investigating how the public census of influential government officials differs between urban and non-urban areas.

Classification of Types of Research

Research

Correlational

The purpose of this type of scientific research is to identify the relationship between two or more variables. A correlational study aims to determine whether a variable changes, how much the other elements of the observed system change.

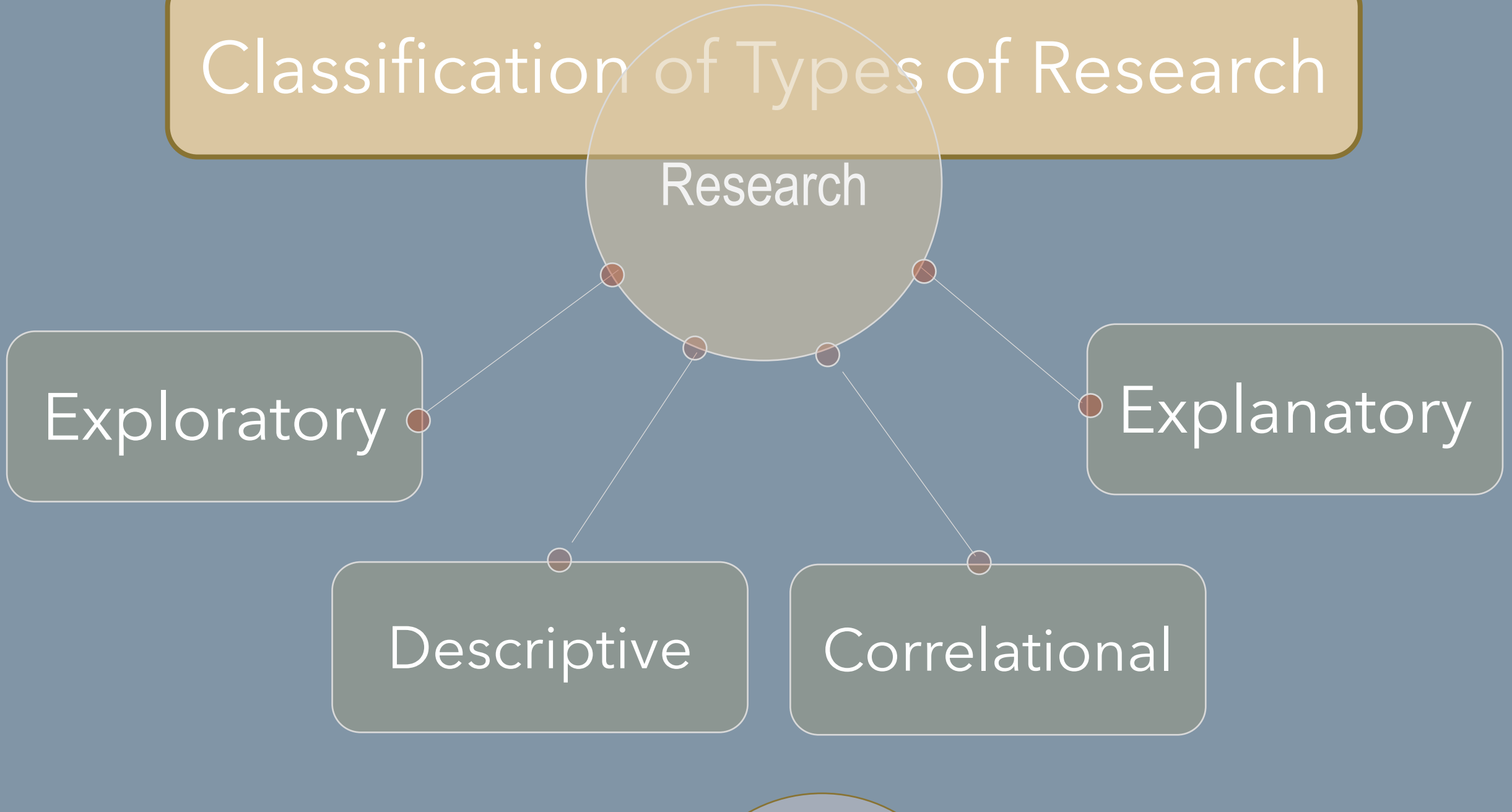
Classification of Types of Research

Research

Explanatory

Explanatory research is the most common type of research method and is responsible for establishing cause-and-effect relationships that allow generalisations to be extended to similar realities. It is closely related to descriptive research, although it provides additional information about the observed object and its interactions with the environment.

Classification of Types of Research



Научными методами эмпирического исследования являются:

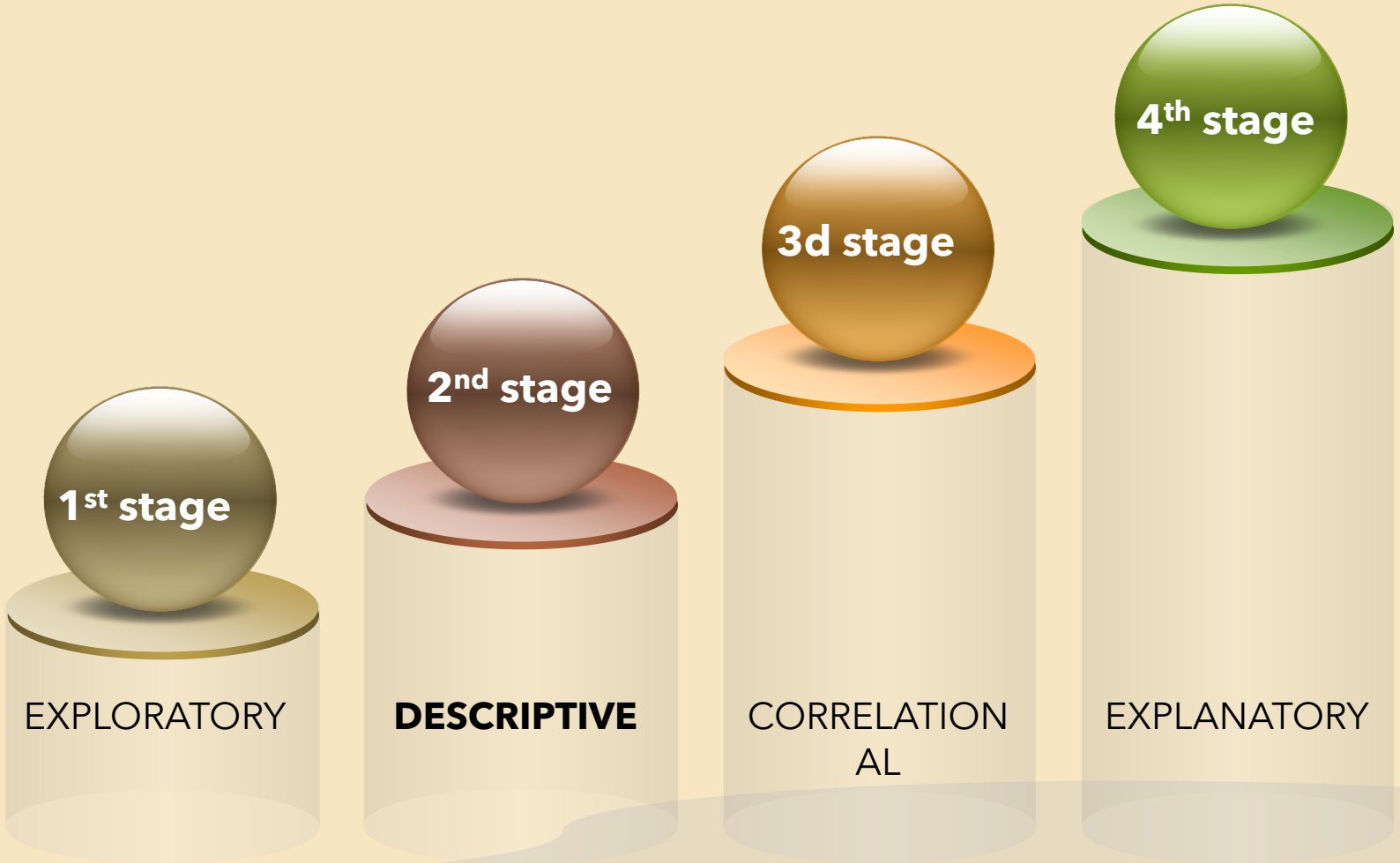
“Methodology” versus "Research Design"

Methodology refers to the principles, procedures, and practices that govern research, whereas *research design*
refers to the plan used to examine the question of interest.

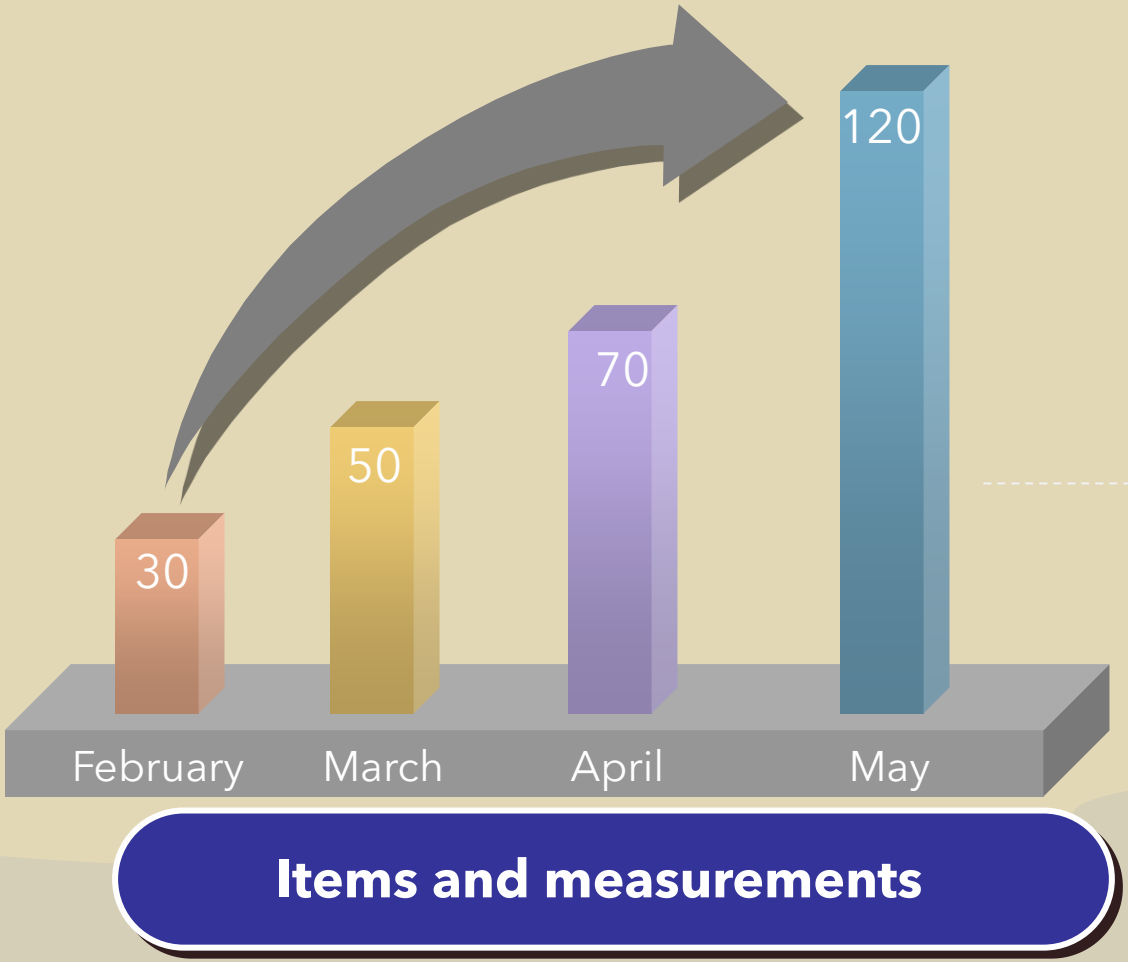
“Methodology” should be thought of as encompassing the entire process of conducting research (i.e., planning and conducting the research study, drawing conclusions, and disseminating the findings).

By contrast, “research design” refers to the many ways in which research can be conducted to answer the question being asked.

KEY STAGES AND DIALECTICS OF RESEARCH PROGRAMME



RELATIONSHIP BETWEEN HYPOTHESES AND RESEARCH DESIGN



1. It is standardly expected that dependent variable dynamics is measured

The variation should be explained in detail

Требуется детальное описание показателей и критериев

2. It is standardly expected that the dynamics is associated with variation of some sort of independent variable

Требуется детальное описание изменений в воздействии независимой переменной на зависимую

KEY STAGES AND DIALECTICS OF MEASURED VARIABLES

Hypotheses can take many different forms depending on the type of research design being used.
Some hypotheses may simply describe how two things may be related. For example, in correlational research, a researcher might hypothesize that alcohol intoxication is related to poor decision making. In other words, the researcher is hypothesizing that there is a relationship between using alcohol and decision making ability (but not necessarily a causal relationship).

KEY STAGES AND DIALECTICS OF MEASURED VARIABLES

Hypotheses can take many different forms depending on the type of research design being used.
However, in a study using a randomized controlled design, the researcher might hypothesize that using alcohol causes poor decision making.
Therefore, as may be evident, the hypothesis being tested by a researcher is largely dependent on the type of research design being used.

FALSIFIABILITY OF HYPOTHESES

According to the 20th-century philosopher Karl Popper, hypotheses must be falsifiable (Popper, 1963).
In other words, the researcher must be able to demonstrate that the hypothesis is wrong. If a hypothesis is not falsifiable, then science cannot be used to test the hypothesis.
For example, hypotheses based on religious beliefs are not falsifiable.
Therefore, because we can never prove that faith-based hypotheses are wrong, there would be no point in conducting research to test them. Another way of saying this is that the researcher must be able to reject the proposed explanation (i.e., hypothesis) of the phenomenon being studied.

THE NULL HYPOTHESIS

The null hypothesis
always predicts that there will be no differences between the groups being studied.
By contrast, the alternate hypothesis predicts that there will be a difference between the groups.
In our example, the null hypothesis would predict that the exercise group and the no-exercise group will not differ significantly in the level of performance.

THE RESEARCH STUDY

After articulating the hypothesis, the next step involves actually conducting the experiment (or research study).
For example, if the study involves investigating the effects of exercise on levels of cholesterol, the researcher would design and conduct a study that would attempt to address that question.
A key aspect of conducting a research study is measuring the phenomenon of interest in an accurate and reliable manner.
In this example, the researcher would collect data on the performance levels of the study participants by using an accurate and reliable measurement device.
Then, the researcher would compare the levels of the two groups to see if exercise had any effects.

ANALYSES

After conducting the study and gathering the data, the next step involves analyzing the data, which generally calls for the use of statistical techniques.

The type of statistical techniques used by a researcher depends on the design of the study, the type of data being gathered, and the questions being asked.

It is important to be aware of the role of statistics in conducting a research study. In short, statistics help researchers minimize the likelihood of reaching an erroneous conclusion about the relationship between the variables being studied.

KEY FINDINGS CHAPTER ONE

✓ .	A
✓ .	B
✓ .	C
✓ .	D
✓ .	E

The Task:
Complete the text. Fill in the blanks based on proper research terms choice. Translate.

Experimental research: In its simplest form, *experimental research* involves comparing two groups on one outcome measure to test some _____ regarding causation.

A	B	C	D	E
Methods	Potential	Technology	Hypothesis	Tools

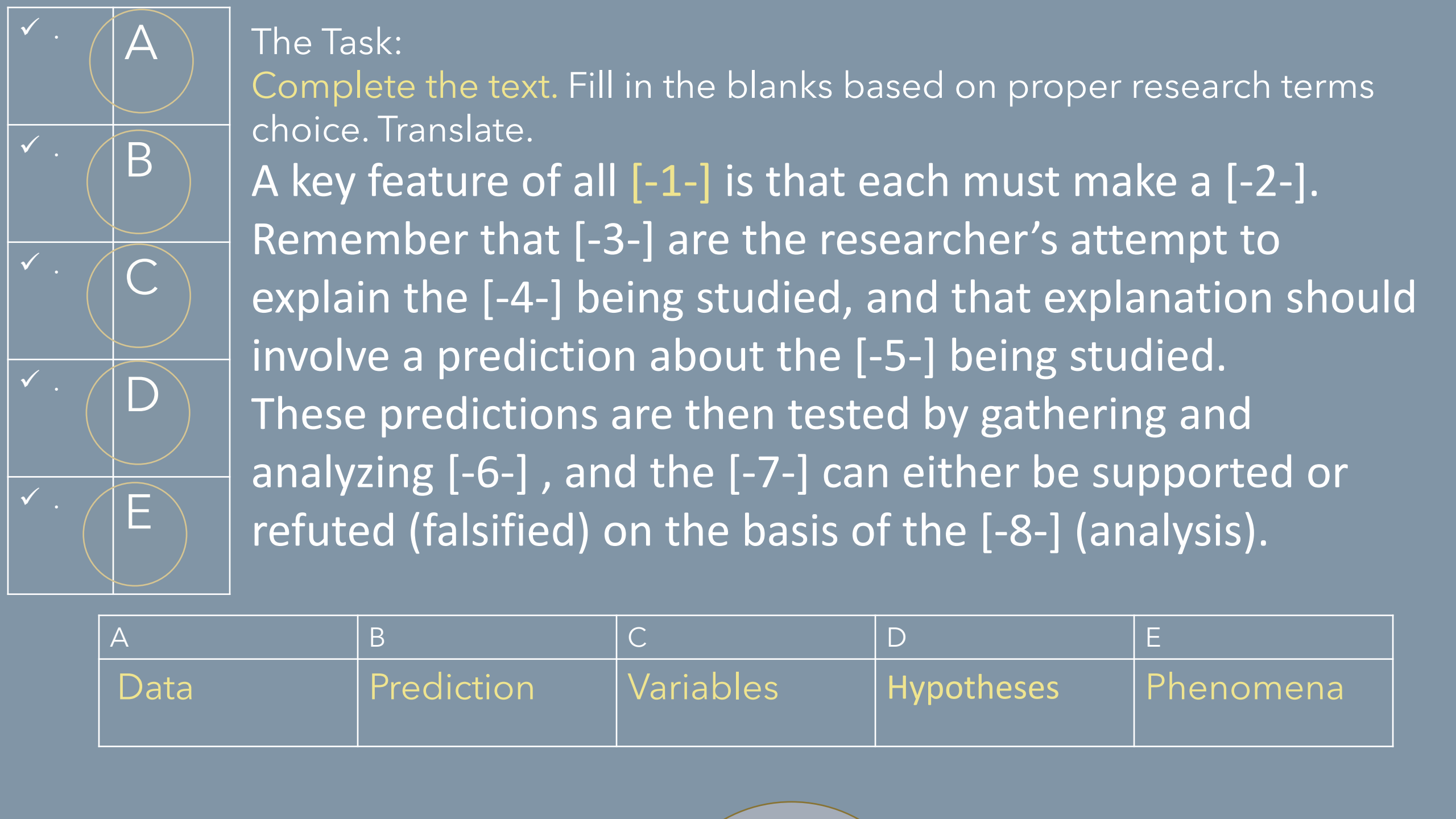
✓ .	A
✓ .	B
✓ .	C
✓ .	D
✓ .	E

The Task:

Complete the text. Fill in the blanks based on proper research terms choice. Translate.

A key feature of all [-1-] is that each must make a [-2-]. Remember that [-3-] are the researcher's attempt to explain the [-4-] being studied, and that explanation should involve a prediction about the [-5-] being studied. These predictions are then tested by gathering and analyzing [-6-] , and the [-7-] can either be supported or refuted (falsified) on the basis of the [-8-] (analysis).

A	B	C	D	E
Data	Prediction	Variables	Hypotheses	Phenomena



✓ .	A
✓ .	B
✓ .	C
✓ .	D
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Data	Prediction	Variables	Hypotheses	Phenomena

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✓ .	B
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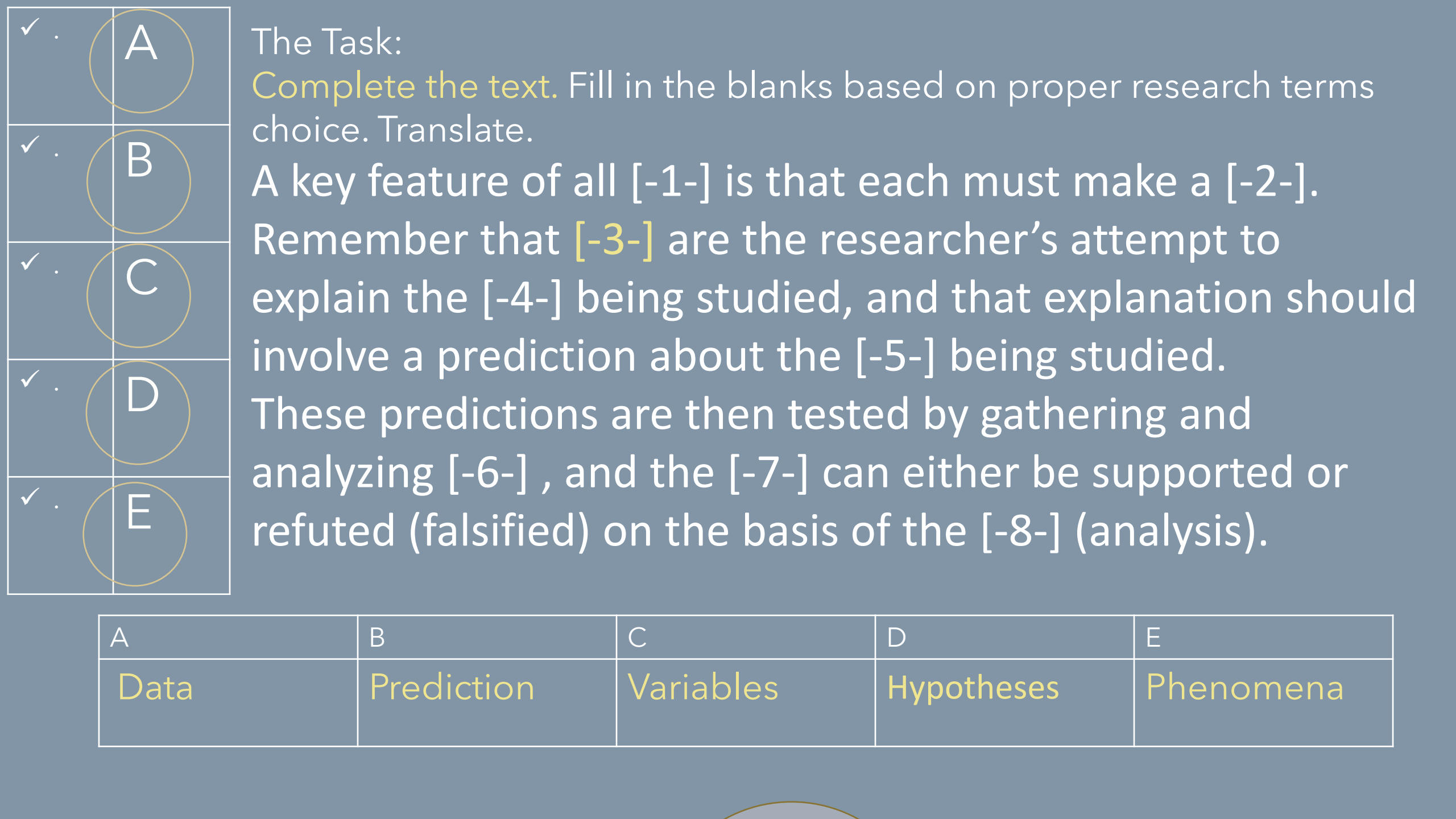

✓ .	A
✓ .	B
✓ .	C
✓ .	D
✓ .	E

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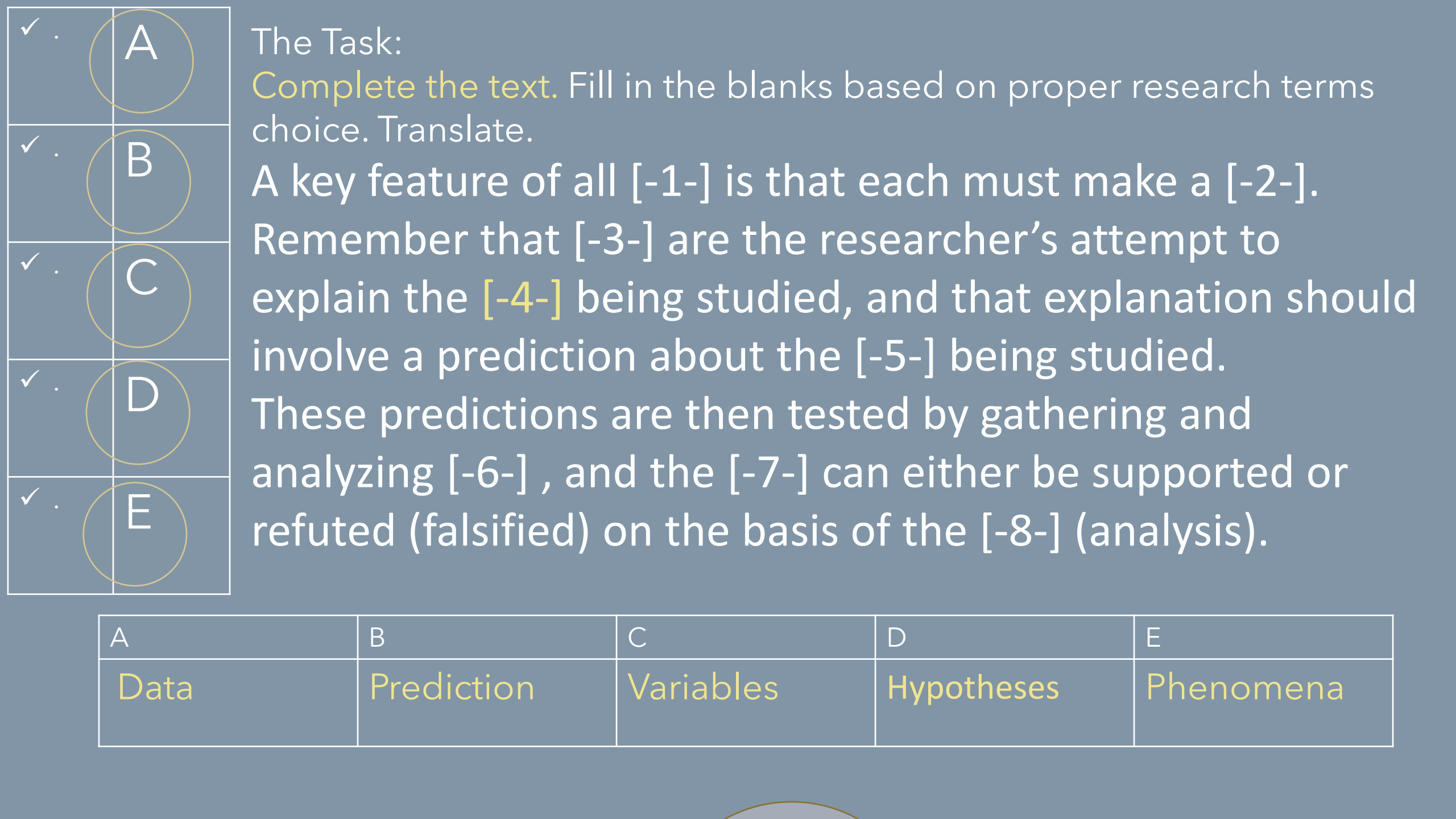

✓ .	A
✓ .	B
✓ .	C
✓ .	D
✓ .	E

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A	B	C	D	E
Data	Prediction	Variables	Hypotheses	Phenomena

✓ .	A
✓ .	B
✓ .	C
✓ .	D
✓ .	E

The Task:
Complete the text. Fill in the blanks based on proper research terms choice. Translate.

(1) … is most simply and comfortably defined as an array of (2) …. that might prove helpful in advancing student learning and may be measured in how and why individuals behave.

(3) … can refer to material objects of use to humanity, such as machines or hardware, but it can also encompass broader themes, including systems, (4) … of organization, and techniques.

Some modern tools include but are not limited to overhead projectors, laptop computers, and calculators. Newer tools such as "smart phones" and games (both online and offline) are beginning to draw serious attention for their learning (5) … .

A	B	C	D	E
Methods	Potential	Technology	Technology of Education / Educational Technology	Tools

✓ .	A
✓ .	B
✓ .	C
✓ .	D
✓ .	E

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A	B	C	D	E
Methods	Potential	Technology	Technology Of Education / Educational Technology	Tools

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Methods	Potential	Technology	Technology Of Education / Educational Technology	Tools

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A	B	C	D	E
Methods	Potential	Technology	Technology Of Education / Educational Technology	Tools

Sample question 2.1.

Sample question 2.2.

Sample question 2.3.

Sample question 2.4.

Sample question 2.5.

Not quite, sorry!

Sample question 01

Sample question 1.1.

Sample question 1.2.

Sample question 1.3.

Sample question 1.4.

Sample question 1.5.

Sample question 1.6.

Sample question 1.7.

Sample question 1.1.

Sample question 1.2.

Sample question 1.3.

Sample question 1.4.

Sample question 1.5.

Sample question 1.6.

Sample question 1.7.

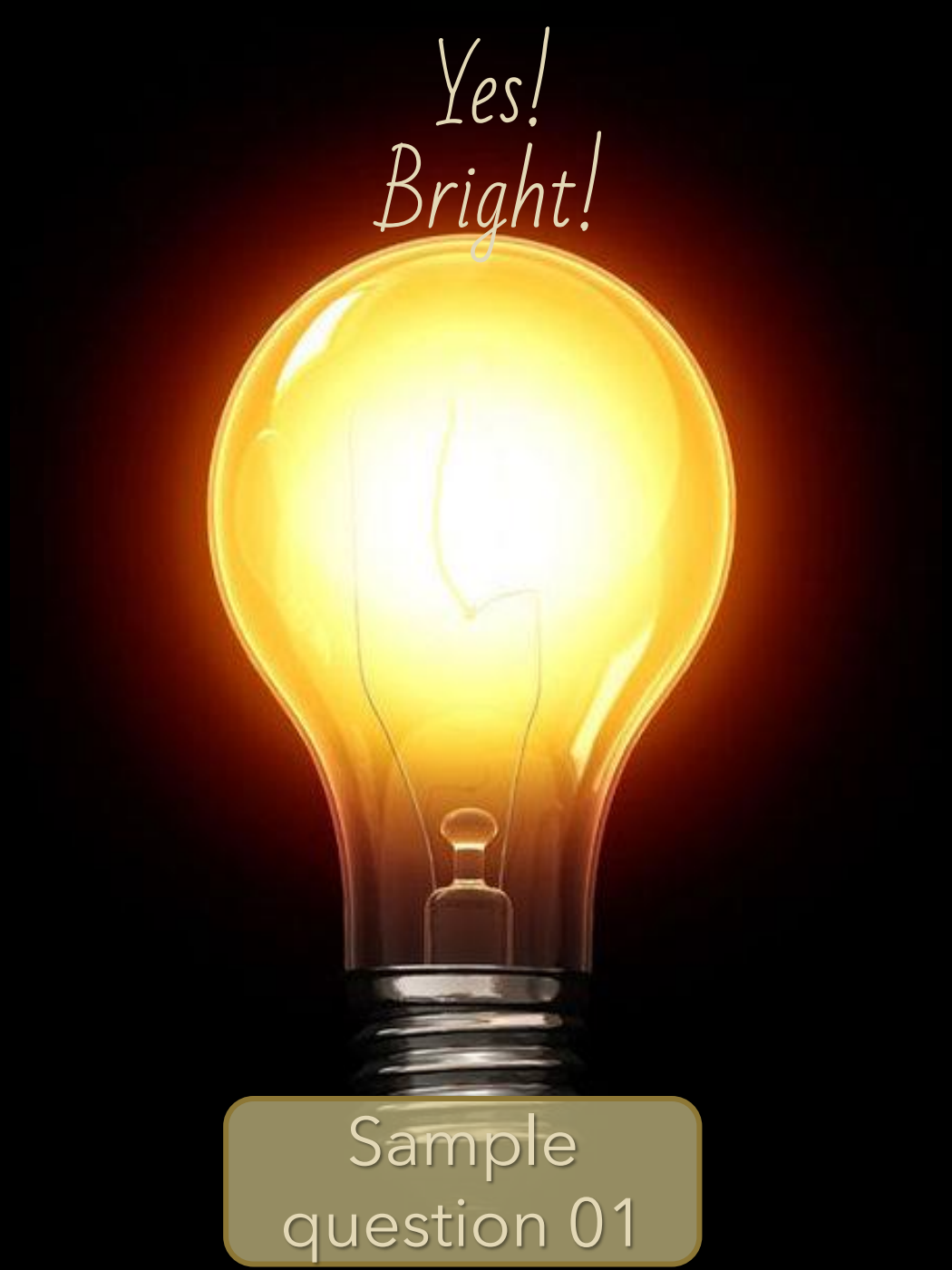
Sample question 2.1.

Sample question 2.2.

Sample question 2.3.

Sample question 2.4.

Sample question 2.5.



Sample question 01


Point of view paradox

Comparing Research Methods

Table 2.3, p. 36

COMPARING RESEARCH METHODS

Research Method	Basic Purpose	How Conducted	What Is Manipulated	Strengths	Weaknesses
Descriptive	To observe and record behavior	Case studies, surveys, or naturalistic observations	Nothing	Case studies require only one participant; surveys may be done fairly quickly and inexpensively (compared to experiments); naturalistic observations may be done when it is not ethical to manipulate variables.	No control of variables; single cases may be misleading
Correlational	To detect naturally occurring relationships; to assess how well one variable predicts another	Compute statistical association, sometimes among survey responses	Nothing	Works with large groups of data, and may be used in situations where an experiment would not be ethical or possible	Does not specify cause and effect
Experimental	To explore cause and effect	Manipulate one or more factors; use random assignment	The independent variable(s)	Specifies cause and effect, and variables are controlled	Sometimes not feasible; results may not generalize to other contexts; not ethical to manipulate certain variables

	Phenomena	Issues	Methods
Structure	typography, orthography, morphology, syntax, discourse schemata	genre characteristics, orality, efficiency, expressivity, complexity	Structural/Descriptive Linguistics, Text Analysis
Meaning	meaning of words, utterances (speech acts), macrosegments	what the speaker intends, what is accomplished through language	Semantics, Pragmatics
Interaction	turns, sequences, exchanges, threads	interactivity, timing, coherence, interaction as co-constructed, topic development	Conversation Analysis, Ethnomethodology
Social Behavior	linguistic expressions of status, conflict, negotiation, face-management, play; discourse styles, etc.	social dynamics, power, influence, identity	Interactional Sociolinguistics, Critical Discourse Analysis

Fundamental Research	Applied Research
1. Tries to eliminate the theory by adding to the basics of a discipline 2. Problems are analysed from the point of one discipline 3. Generalisations are preferred; 4. Forecasting approach is implemented 5. Assumes that other variables do not change 6. Reports are compiled in a language of technical language of discipline	1 Aims to solve a problem by adding to the field of application of a discipline 2 Often several disciplines work together for solving the problem 3 Often researches individual cases without the aim to generalise 4 Aims to say how things can be hanged 5 Acknowledges that other variables are constant by changing 6 Reports are compiled in a common language

	Exploratory research	**Conclusive research**
Structure	Loosely structured in design	Well structured and systematic in design
Methodology	Are flexible and investigative in methodology	Have a formal and definitive methodology that needs to be followed and tested
Hypotheses	Do not involve testing of hypotheses	Most conclusive researches are carried out to test the formulated hypotheses
Findings	Findings might be topic specific and might not have much relevance outside of researcher's domain	Findings are significant as they have a theoretical or applied implication

OBSERVATION

Process type	Example (Process + participants underlined; **Process** in Bold; *circumstances* in italics)
material	the negotiations go on forever
behavioural	everybody laughed
mental	you have to understand what he is trying to say to us
verbal	in this region we usually say that it takes a longer time to sell a project than it takes to build it
relational	the total contract figures is split up in a few different companies
existential	there is quite a large group of ethnic Chinese in Singapore

Classification of Types of Research according to the Type of Data Used

Classification of Types of Research according to the Type of Data Used

Qualitative

Quantitative

Classification of Types of Research according to the Type of Data Used

Qualitative

Classification of Types of Research according to the Type of Data Used

Qualitative

Qualitative methods are often used in the social sciences to collect, compare and interpret information, has a linguistic-semiotic basis and is used in techniques such as discourse analysis, interviews, surveys, records and participant observations.

Classification of Types of Research according to the Type of Data Used

Qualitative

In order to use statistical methods to validate their results, the observations collected must be evaluated numerically. Qualitative research, however, tends to be subjective, since not all data can be fully controlled. Therefore, this type of research design is better suited to extracting meaning from an event or phenomenon (the ‘why’) than its cause (the ‘how’).

Classification of Types of Research according to the Type of Data Used

Qualitative

For example, examining the effects of sleep deprivation on mood.

Classification of Types of Research according to the Type of Data Used

Quantitative

Classification of Types of Research according to the Type of Data Used

Quantitative

Quantitative research study delves into a phenomena through quantitative data collection and using mathematical, statistical and computer-aided tools to measure them. This allows generalised conclusions to be projected over time.

Classification of Types of Research according to the Type of Data Used

Quantitative

For example, conducting a computer simulation on vehicle strike impacts to collect quantitative data.

Classification of Types of Research according to the Type of Data Used

Qualitative

Quantitative

Classification of Types of Research according to the Type of Data Used

QUAN TITATI VE

QUANTITATIVE **– based on positivism, uses** deduction **(Theory – forming hypotheses – observation – testing hypotheses – interpretation and generalization). It is based on theory and presupposes a research project.**

QUALITATIVE **– based on phenomenology, ethnomethodology, symbolic interactionism (interpretative paradigm), uses** induction **(observation – revealing regularity – conclusions – theory). The aim is to reveal the meaning of information (narrative sociology).**

Classification of Types of Research according to the Type of Data Used

QUANTITATIVE – **Quantitative research means collecting and analyzing numerical data to describe characteristics, find correlations, or test hypotheses.**

QUAN TITATI VE

QUALITATIVE – **Qualitative research involves collecting and analyzing non-numerical data to understand concepts, opinions or experiences.**

Classification of Types of Research according to the Type of Data Used

QUALI TATIVE

QUALITATIVE RESEARCH –

Qualitative research involves collecting and analyzing non-numerical data (e.g., text, video, or audio) to understand concepts, opinions, or experiences. It can be used to gather in-depth insights into a problem or generate new ideas for research.

Qualitative research is the opposite of quantitative research, which involves collecting and analyzing numerical data for statistical analysis.

Qualitative research is commonly used in the humanities and social sciences, in subjects such as anthropology, sociology, education, health sciences, history, etc.

Classification of Types of Research according to the Type of Data Used

QUALITATIVE RESEARCH –

Qualitative research question examples

QUALI TATIVE

- How does social media shape body image in teenagers?
- How do children and adults interpret healthy eating in the UK?
- What factors influence employee retention in a large organization?
- How is anxiety experienced around the world?
- How can teachers integrate social issues into science curriculums?

Classification of Types of Research according to the Type of Data Used

Qualitative VS Quantitative: Qualitative research methods focus on words and meanings, while quantitative research methods focus on numbers and statistics.

So ask yourself and answer the question first. Is your research more concerned with measuring something or interpreting something?

One can also create a mixed methods research design that has elements of both.

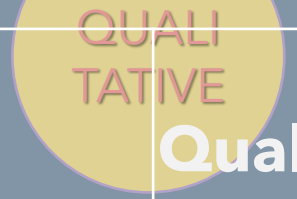
QUALI TATIVE

QUANTITATIVE

Advantages of quantitative research	Disadvantages of quantitative research
A. Testing and validating theories. B. Can be generalized for population. C. The researcher can construct situations in such a way to eliminate interfering variables and prove the relation cause-consequence. D. Relatively fast and direct data collection. E. Provides precise, numeric data. F. Relatively fast data analysis (use of computers). G. Results are relatively independent from the researcher. H. It is useful while examining large groups.	A. Categories and theories used by the researcher do not need to reflect local specialties. B. The researcher may disregard phenomena because he/she is focused only on certain theory and its testing and not on developing the theory. C. Acquired knowledge may be too abstract and general to be applied in local conditions. D. In a reductive way, the researcher is restricted in data gathering.

Examples of quantitative research methods	Examples of qualitative research
experiment, (quasi-experiment) correlative examination more specialized normative examination longitudinal study time series analysis Q-methodology Cluster analysis One-dimensional and multi-dimensional scaling Operative research	Case study Ethnography (including observation and participation observation) Grounded theory Examining narrations based on language examination Ethnomethodology and conversation analysis Discourse analysis, semiotics Document and text analysis

QUANTITATIVE



	Quantitative research	Qualitative research
Philosophical source	positivism	Phenomenology, anthropology, hermeneutics
Aim	Gaining an objective proof, verifying theory / hypotheses	Understanding human behavior in natural environment
Character	objective	subjective
Relationship to a theory	Verifying or rejecting a theory	theory creation
Thought procedure	deduction	induction
Starting point/ the beginning of research	Draws on theory and hypotheses	Starts with entering the ground space
Planning research	Is thoroughly prepared at the beginning, written project following a given structure	The plan is formed during work, research questions and methods may be subject to change => more flexible
Course of research	Systematically tests hypotheses for being correct, finds causal relationships	Gathers a large number of data on specific human behavior and its context, it is recorded and interpreted; hypotheses spring up along the way
Number of examined persons	Representative samples, large number (usually)	Student, class, school
Techniques, methods	experiment (manipulating with variables), questionnaire, testing, standardized observation etc.	Long-term practical research, observation with different levels of participation, the researcher communicates with informants during gathering data without interfering in events

	Quantitative research	Qualitative research
Data processing	Quantitative, computer, statistical, data interpretation	Qualitative encoding, analysis, interpretation
Reliability of results	Done with standard procedures, found statistically (validity, reliability); the research can be repeated	Problematic – the results are subjective; secured via a triangle of data, methods, researchers, theory (data are interpreted by more researchers, comparing with similar results, similar individuals in similar context, using more methods, participants' approving of final report)
Results Form of final report	Generalization of results for population, finding rules; Brief, apposite research report following widely accepted structure: 1/ research topic 2/ methodology 3/ data analysis 4/ results discussion	Explaining human behavior in a certain context; detailed, ether interpretation or only descriptive report, deep narration
Validity of results	Attempt to arrive at results valid for the whole population	Validity for a given class, student or school
Meaning	Prediction, rules	Description, understanding, meaning

QUALITATIVE

Advantages of qualitative research	Disadvantages of qualitative research
I. It provides detailed description and form during examining an individual, group, event or phenomenon. II. It treats a phenomenon in natural environment. III. It makes it possible to study processes. IV. It makes it possible to propose theories. V. It reacts well to local situations and conditions. VI. It looks for local (idiographic) causative relationships. VII. It assists in initial exploration of phenomena.	I. It may not be possible to generalize the acquired knowledge for population and in different environment. II. It is difficult to make quantitative predictions. III. It is more difficult to test hypotheses and theories. IV. Data analysis and collection are often time consuming stages. V. Results are easily influenced by the researcher and his/her personal preferences.

quantitative research methods	mixed research methods	qualitative research methods
Descriptive; Exploratory; Quasi-experimental; Experimental;	Interview; Questionnaire;	Classroom observations; Interactional analysis; Discourse analysis; Case studies;

Элементы методологии

Философия	Философия науки	Методология
Ф. – теоретическая форма мировоззрения, сосуществующая в человеческой культуре наряду с другими формами мировоззрения (обыденным опытом, религией, мифологией, искусством). Предмет философии – рациональная форма мировоззрения, включающая в себя три основные структуры: 1) общую теорию бытия (в частности, общие представления об окружающем человека объектном мире – Космосе); 2) общую теорию человека, включающую в себя общую теорию сознания и познания; 3) общую теорию отношения человека к миру, т. е. структуру мировоззрения.	Философия науки – дисциплина, предметом которой являются общие закономерности и тенденции научного познания как особой деятельности по производству научных знаний, взятых в их историческом развитии и рассматриваемых в исторически изменяющемся социокультурном контексте. Ф. науки – область прикладной философии, предметом которой является общая структура, закономерности функционирования и развития науки как системы научного знания, когнитивной деятельности, социального института, основы инновационной системы современного общества.	**Методология –** общая теория предметно-практической и познавательной деятельности человека, их специфики и взаимосвязи. **Методология науки** – раздел общей методологии познания, а также часть теории научного познания как учение о методах, средствах и процедурах научной деятельности. **Методология –** тип рационально-рефлексивного сознания, направленный на изучение, совершенствование и конструирование методов в различных сферах духовной и практической деятельности. Понимание М. как науки о методах мышления, когда-то весьма плодотворное сегодня отходит на второй план????

1	2	3	4	5

A	методика и техника исследования
B	философская методология
C	конкретно-научная методология
D	философия методологии
E	общенаучная методология

A. включает общие принципы познания и категориальный строй науки в целом.
B. содержит уровень содержательных общенаучных концепций
C. совокупность методов, принципов исследования и процедур специальной научной дисциплины.
D. набор процедур, обеспечивающих получение единообразного и достоверного эмпирического материала и его первичную обработку
E. выступает как содержательное основание всякого методологического знания.

3D Pyramid with 5 Levels – Slide Template

LEVEL 01

философия методологии

LEVEL 02

философская методология

LEVEL 03

общенаучная методология

LEVEL 04

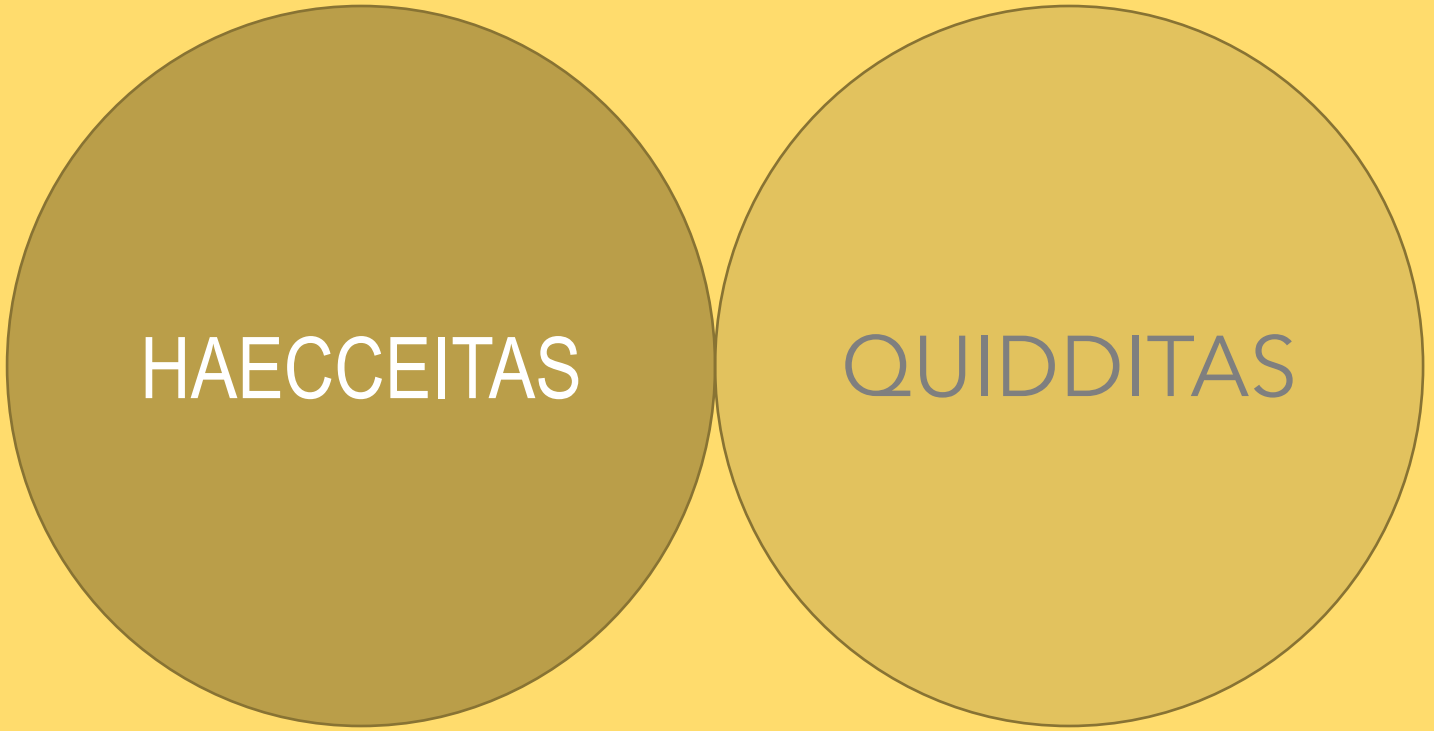
конкретно-научная методология

LEVEL 05

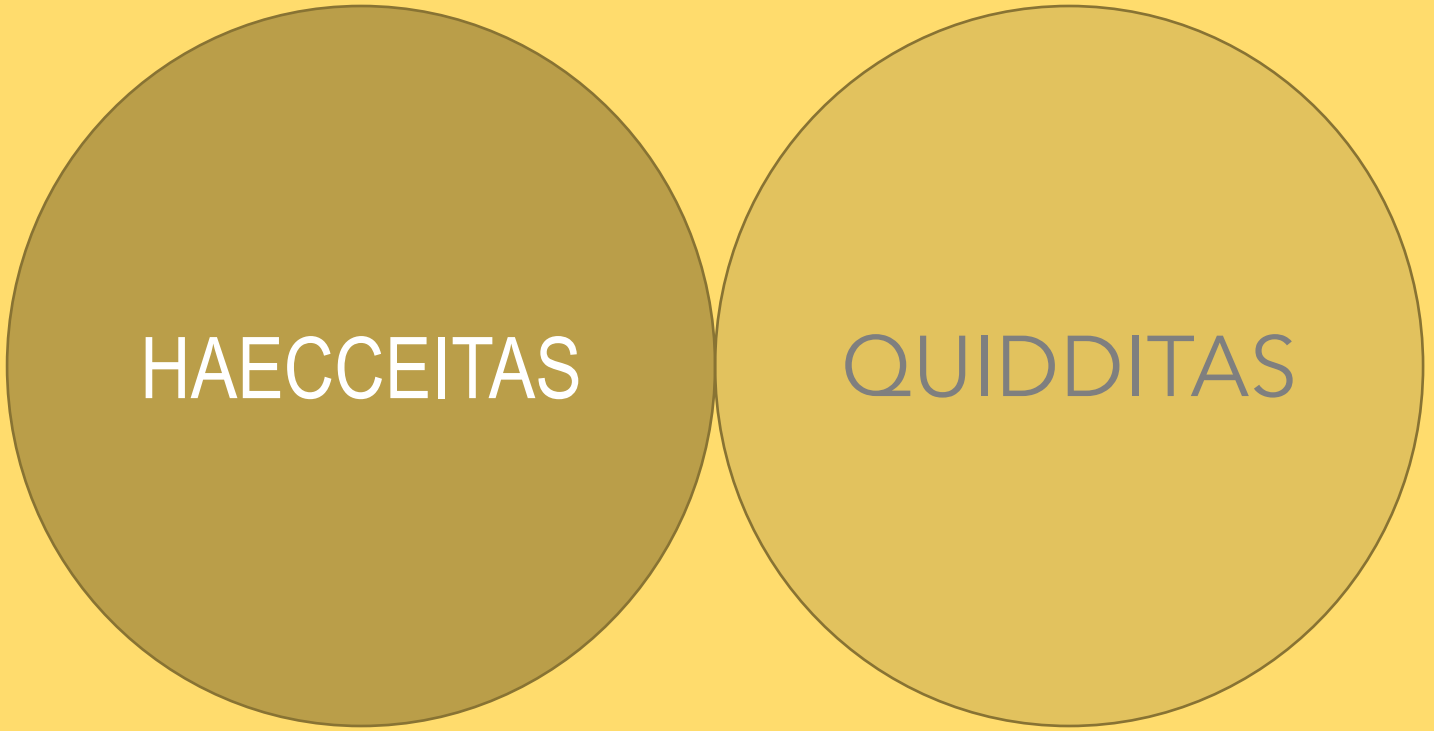
методика и техника исследования

THE SUBJECT OF QUALITATIVE VERSUS SUBJECT OF QUANTITATIVE RESEARCH

THE SUBJECT OF QUALITATIVE VERSUS SUBJECT OF QUANTITATIVE RESEARCH



THE SUBJECT OF QUALITATIVE VERSUS SUBJECT OF QUANTITATIVE RESEARCH

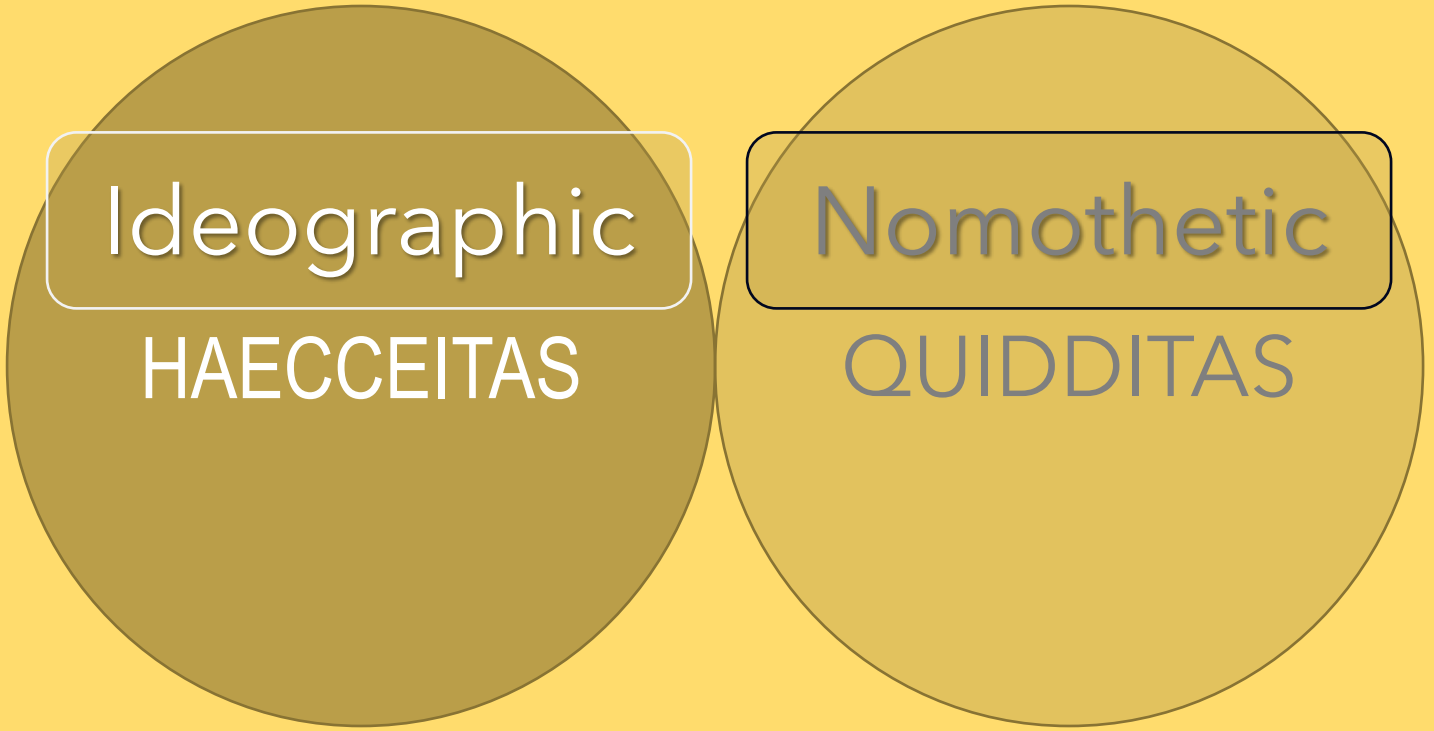


UNIQUENESS

EMIC; TYPE

THE TYPE OF RESEARCH VE

SUBJECT OF QUANTITATIVE RESEARCH



UNIQUENESS

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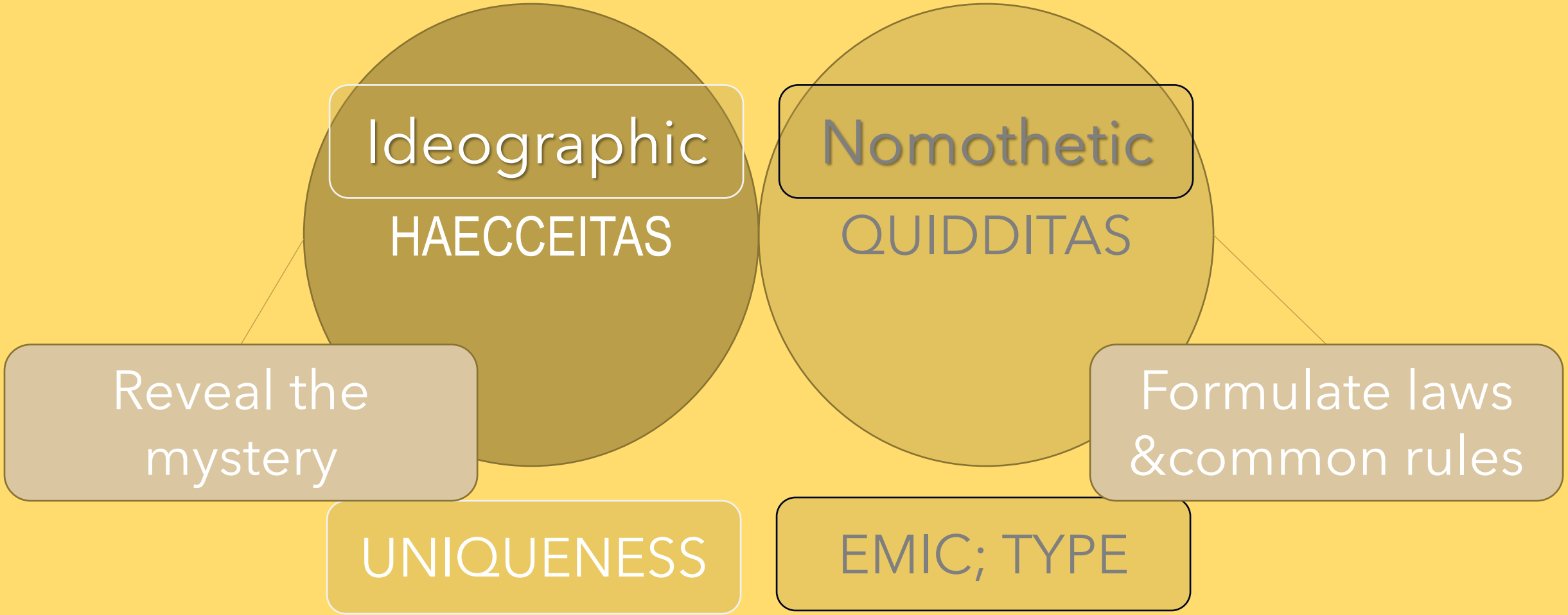
SUBJECT OF QUANTITATIVE RESEARCH



Rules of qualitative research

Openness

Towards tested persons, including their irregularities

Towards used methods

In creating a plan when hypotheses are finalized only during research

Including subjectivity

The researcher's identification with the examined phenomenon; this approach should be of a critical and dialectic distance

Processuality

Both social processes and communication are of a processual character; its features changes (methods, ways of researcher's interpretation etc.).

Reflexivity

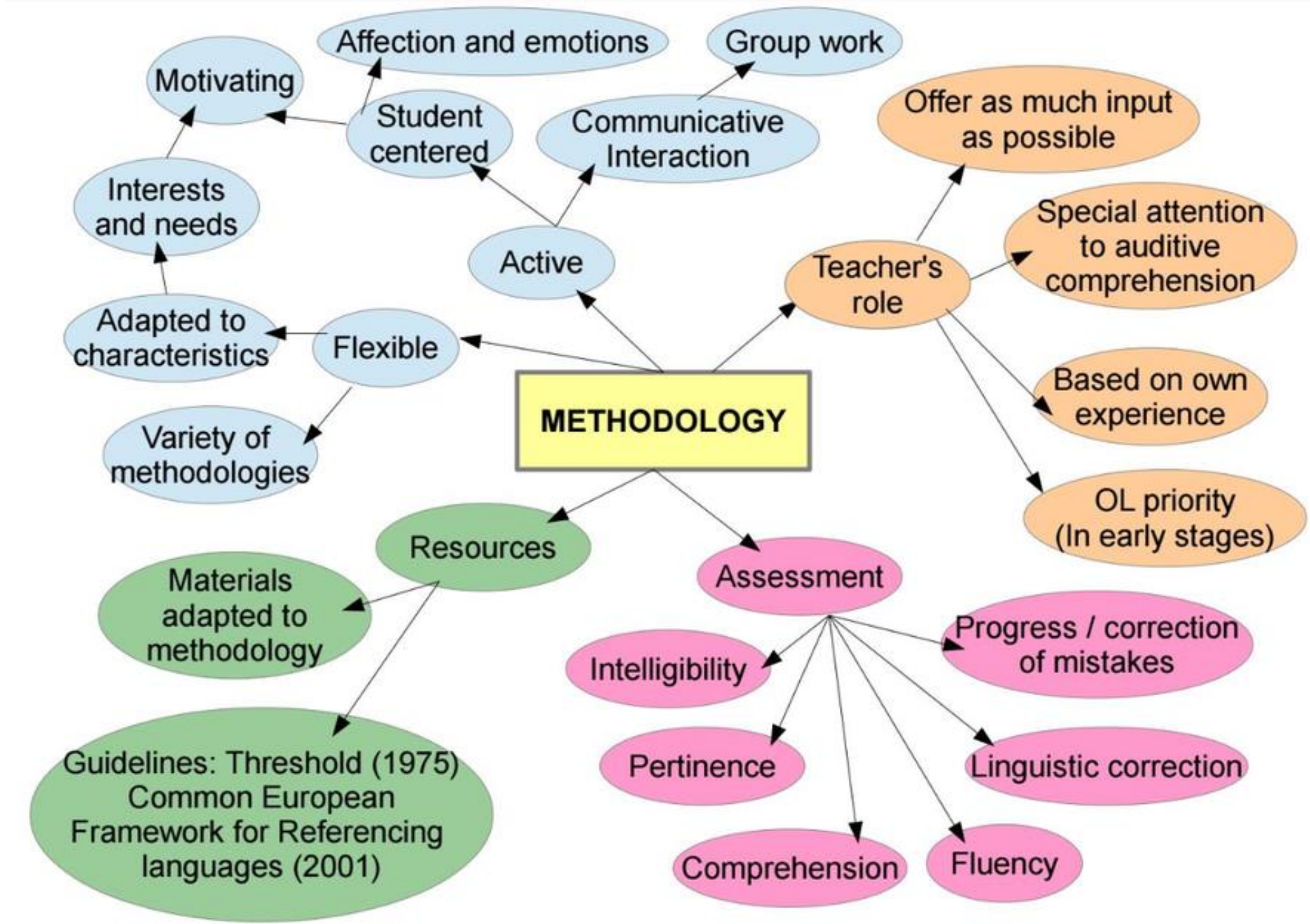
Interpretative understanding; ability to react to new and unexpected situations.

Case-focus

Attention paid to individual cases, detailed description; with the help of cases, theories are proposed and tested.

Rules of qualitative research

History and context
All conclusions must be validated for a given context.
Questioning determinedness
Determinism can be overcome by human interpretation. A certain system must be regarded as a guessed order within which people continuously argue while mutual communication about their intentions and expectations.
Plans of qualitative research (research conception, basic research arrangement)
case study
document analysis
biographical research
ethnographic terrain research
active and critical research
evaluation


METHODOLOGY
Active
Student centered
Motivating
Affection and emotions
Communicative Interaction
Group work
Interests and needs
Flexible
Adapted to characteristics
Variety of methodologies
Teacher's role
Offer as much input as possible
Special attention to auditive comprehension
Based on own experience
OL priority (In early stages)
Resources
Materials adapted to methodology
Guidelines: Threshold (1975) Common European Framework for Referencing languages (2001)
Assessment
Intelligibility
Pertinence
Comprehension
Fluency
Progress / correction of mistakes
Linguistic correction

“Methodology” versus "Research Design"

Methodology refers to the principles, procedures, and practices that govern research,

whereas

research design refers to the plan used to examine the question of interest.

“Methodology” should be thought of as encompassing the entire process of conducting research (i.e., planning and conducting the research study, drawing conclusions, and disseminating the findings).

By contrast, “research design” refers to the many ways in which research can be conducted to answer the question being asked.

Fundamentals of scientific research

- Object and subject of Research
- Research Hypothesis.
- Requirements for the scientific apparatus of the study.
- Qualitative and quantitative research methods.
- Requirements for the results of scientific research.
- Qualitative and quantitative methods of scientific research.
- Competence of applied linguistics and changes in the concepts, relationships and intentions of teachers.
- Language modeling for special purposes and a professional communicator in applied linguistics and education.

II

RESEARCH GAP

Аналитический обзор литературы: Research Gap
Уточнить термины и понятия.
Уточнить базовую онтологию / модель
Гипотеза - вопрос требующий исследования
Методы
Материал
Этапы пошагово

II

- **Technology of education** is most simply and comfortably defined as an array of tools that might prove helpful in advancing student learning and may be measured in how and why individuals behave.
- Educational Technology relies on *a broad definit*ion of the word "*technology*".
- Technology can refer to material objects of use to humanity, such as machines or hardware, but it can also encompass broader themes, including *systems*, *methods of organization*, and *techniques*.
- Some modern tools include but are not limited to overhead projectors, laptop computers, and calculators. Newer tools such as "smart phones" and games (both online and offline) are beginning to draw serious attention for their learning potential.

II

What blessings did technology bring?

I’ve searched on the internet and I've read a lot of information about the topic, including articles about how technology has been a blessing for us. These advances made our daily lives easier with decreased hard labor and increased mechanize labor. Technology has made modern life considerably free from stress or more comfortable than the life that was in the past long years. The word "technology" is really extensive or board that it could covers all. It helps us in so many ways, as well as being a teacher. Technology helps us to be more effective in teaching students and to do PowerPoint presentations in the lectures even in our meetings. It enable us to perform better that we could ever imagine, do things quickly and efficiently, which totally saves our time and money. It’s not only for educational reasons but also for building up communications, business, and to make our society better.

II

ОБУЧАЮЩАЯ ТЕХНОЛОГИЯ ЭТО КАТЕГОРИЗОВАННАЯ ВОСПРОИЗВОДИМАЯ СИСТЕМА ДЕЙСТВИЙ, ОСНОВАННАЯ НА АЛГОРИТМЕ И НАПРАВЛЕННАЯ НА ДОСТИЖЕНИЕ ОБРАЗОВАТЕЛЬНОЙ ЦЕЛИ НА ОСНОВЕ ПРИМЕНЕНИЯ ИМЕЮЩИХСЯ РЕСУРСОВ И ИНСТРУМЕНТАРИЯ С УЧЕТОМ КОНКРЕТНЫХ ПАРМЕТРОВ И ОСОБЕННОСТЕЙ СКЛАДЫВАЮЩЕЙСЯ КОММУНИКАТИВНОЙ СИТУАЦИИ.

MO

Definition of “Research”

Research is generally defined as an examination of the relationship between two or more variables. *Research* is an examination of the relationship between one or more independent variables and one or more dependent variables. In even more precise terms, we can define research as an examination of the effects of one or more independent variables on one or more dependent variables.

MO

Criteria for Research Problems

- **First,** the research problem should describe the relationship between two or more variables.
- **Second,** the research problem should take the form of a question.
- **Third,** the research problem must be capable of being tested empirically (i.e., with data derived from direct observation and experimentation).

II

RESEARCH GAP

1 Что уже известно
2 Что еще неизвестно
21 Что неизвестно и никогда не будет известно
22 Что неизвестно сегодня но может быть выяснено в результате исследования
221 То что я могу узнать при опоре на метод и что действительно представляет интерес
222 Где пролегает граница между известным и тем неизвестным что представляет интерес для меня и может быть мной выяснено на основе научного метода

MO

Methods

By *methods*,
we normally mean that range of approaches used in educational
research to gather data which are to be
used as a basis for inference and interpretation,
for explanation and prediction.
Traditionally, the
word refers to those techniques associated with the positivistic model – eliciting responses to predetermined questions, recording measurements, describing phenomena and performing experiments

PRIMARY RESEARCH METHODS

MO

PRIMARY RESEARCH METHODS (learningapps.org)

MO

Methodology

If methods refer to techniques and procedures used in the process of data-gathering, the aim of methodology then is to describe approaches to, kinds and paradigms of research (Kaplan 1973). Kaplan suggests that the aim of methodology is to help us to understand, in the broadest possible terms, not the products of scientific inquiry but the process itself.

MO

The English notion of Scientific Method

The development of the scientific method is usually credited to Roger Bacon, a philosopher and scientist from 13th-century England, although some argue that the Italian scientist Galileo Galilei played an important role in formulating the scientific method.
Later contributions to the scientific method were made by the philosopher Rene Descartes.

MO

The English notion of Scientific Method

Although some disagreement exists regarding the exact characteristics of the scientific method, most agree that it is characterized by the following elements:

1.• Empirical approach
2.• Observations
3.• Questions
4.• Hypotheses
5.• Experiments
6.• Analyses
7.• Conclusions
8.• Replication

WHAT IS HYPOTHESIS?

Hypothesis [haɪ'pɔθəsɪs] (pl. hypotheses [-si:z]) is a supposition or proposed explanation made on the basis of limited evidence as a starting point for further investigation;

Origin: late 16th cent.: via late Latin
from Greek hupothesis ‘foundation’,
from hupo ‘under’ + thesis (= ‘placing)

WHAT IS HYPOTHESIS?

A hypothesis is an idea which is suggested as a possible explanation for a particular situation or condition, but which has not yet been proved to be correct. [FORMAL]

MO

Hypothesis

Scientific research presupposes coming up with a hypothesis, which is (put simply) an educated—and testable—guess about the answer to your research question.

A hypothesis is often described as an attempt by the researcher to explain the phenomenon of interest.

Hypotheses can take various forms, depending on the question being asked and the type of study being conducted.

MO

Hypothesis

Hypotheses attempt to explain, predict, and explore the phenomenon of interest. In many types of studies, this means that hypotheses attempt to explain, predict, and explore the relationship between two or more variables. To this end, hypotheses can be thought of as the researcher's educated guess about how the study will turn out. As such, the hypotheses articulated in a particular study should logically stem from the research problem being investigated.

MO

Hypothesis

Once you've solidified your research question, you should try to develop hypotheses.
Hypotheses are potential answers to your research question, or parts of your research question that are supported by prior knowledge.
This is why a lot of people refer to hypotheses as 'educated guesses', meaning you use information to predict what your study might find.

MO

Hypothesis

Once one has a hypothesis to work on,
the scientist can move forward;
the hypothesis will guide the researcher
on the selection of some observations
rather than others
and will suggest experiments.

MO

Hypothesis

In science, it’s important to not swap this term with the term ‘theory.’ While hypotheses are based on prior knowledge — ideas that have already been supported with evidence — we don’t know whether they’re true yet. Meaning, we don’t know whether our idea will match what happens in experiments, or in nature.

MO

Hypothesis

Theories, on the other hand, are substantiated with evidence, reproducible, fact based, and repeatedly offer reliable explanations of the natural world. Even if you find a lot of evidence in support of some hypothesis, it still doesn't make it a theory. It's a very hard club to get into! Hypotheses are formed before you start gathering data, but they should be supported with data from previous studies or observations.

MO

Hypothesis

Perhaps most importantly, hypotheses need to be testable, and so, they can’t be questions of what’s moral or ethical. To form one you need to consider how you’ll approach the research question, and what factors (called variables) you are comparing or monitoring.

MO

Hypothesis

Post-testing, it doesn’t matter whether your hypothesis is supported by the evidence you gather or not. Even a refuted hypothesis can provide valuable information about a topic and define a reproducible experiment for other scientists to work from.

MO

Types of Hypothesis

Null hypotheses assume that two variables are not related in any significant way.
Ex. There is no difference in the speed of plant growth when plants are grown with or without fertilizer.
It's customary to make this hypothesis before the alternative hypothesis, because it allows for a lot less ambiguity in the researchers expected results.
The researcher seeks to nullify, provide evidence against, or disprove the null before moving forward.

MO

Types of Hypothesis

Alternative hypotheses assume that two variables are related in a significant way. They're setup to establish a conclusion through testing.
Ex. Plants grow more quickly when fertilizer is used than when it's not used.

MO

Types of Hypothesis

Alternative hypotheses assume that two variables are related in a significant way. They're setup to establish a conclusion through testing.
Ex. Plants grow more quickly when fertilizer is used than when it's not used.
These hypotheses assume, after the null hypothesis is rejected, that there is some significant relationship between two variables.

MO

Testing hypotheses

How to test hypotheses

The point of testing is to gather evidence that can help you decide if your hypothesis is true.
And we test through experiments!
This step can get a bit tricky, so let’s first look at an example and then come up with some rules for good experiment making.

MO

Testing hypotheses

Here's our sample hypothesis:
Plants grow more quickly when fertilizer is used than when it's not used.
You can start to test your hypothesis by getting two, near identical plants and growing one with fertilizer and one without fertilizer, but you'll also have to make sure the test is reproducible and can provide the necessary data.

Testing hypotheses

MO

The first thing to consider is that the conditions the plants are growing in are identical (or at least as close as you can get), and that the plants themselves are of equal health. If one plant has more sun and fertilizer than the other, you won't know what caused your results. If one plant has a leaf eating parasite, then it might've been doomed regardless of fertilizer levels.

Testing hypotheses

MO

Secondly, if you use the same species of plant then your results will be limited to that species. To make the claim that the above hypothesis is correct (to apply your data to all plants), you'd have to show that the fertilizer influences a trait that is ubiquitous in all plants, like the Calvin Cycle.

MO

Testing hypotheses

Thirdly, since not all fertilizers contain the same ingredients in the same ratios, it'll be best to pinpoint an active ingredient in all plant fertilizers that you can suggest influences growth (as opposed to all the other ingredients). Testing multiple fertilizers would yield an even more significant result!

Then, of course, you're going to need some way to keep track of changes to your variables. There are two kinds of variables in most experiments, independent and dependent.

MO

Testing hypotheses

Thirdly, since not all fertilizers contain the same ingredients in the same ratios, it'll be best to pinpoint an active ingredient in all plant fertilizers that you can suggest influences growth (as opposed to all the other ingredients). Testing multiple fertilizers would yield an even more significant result!

Then, of course, you're going to need some way to keep track of changes to your variables. There are two kinds of variables in most experiments, independent and dependent.

Testing hypotheses

MO

Independent variables are factors a scientist modifies during an experiment (fertilizer, in this case), and dependent variables change because you've altered the independent variable (plant growth). They literally 'depend' on their independent half in order to change.

MO

Testing hypotheses

Decide on the unit you'll be using to track changes in your variables, and then plot the relationship between them.
If your data doesn't confirm your hypothesis or you make a mistake in testing, you must record it! Research isn't about getting everything right, it's about exploring. Only good things can come from a refuted hypothesis.

MO

Testing hypotheses

Based on this example, we can come up with some general features that are crucial to a good experiment.

1. You need something to compare your tests to. In science, this is called a control.
2. If there are multiple variables involved, and you're only comparing two of them, keep the others the same.
3. You need to be honest about the limitations of your experiment and your data
4. You need to keep track of your data and any errors in experimentation.

MO

Evaluating your results

The superstar term of evaluating results is statistical significance, which uses mathematics to assess how valid the results of an experiment are. If you perform an experiment multiple times and the data you collect shows roughly the same pattern, your results are more statistically significant than if multiple experiments have completely different patterns.

MO

Evaluating your results

In addition we can take a few steps back and answer the simple question:
does it work? Do your results match what's happening in the natural world? Is it effective in application? While you can't coast on this alone, good science should withstand nature's scrutiny.

MO

Evaluating your results

As any scientist will eagerly tell you, science relies on evidence (which we've collected in the testing phase) and reasoning (how we interpret the results of our test). But, what is reasoning? Loosely, it's thinking about things logically and rationally. But, those definitions only lead to more questions about what logic and rationality is, and who decides what it is. A tempting answer to these questions is: 'you'll know it when you see it', but a more effective way to explain reasoning is by exploring it's many forms.

MO

Reasoning method #1: Inductive

A lot of scientific research is based on this method! It's all about gathering evidence to support a likely conclusion. However, the conclusions a lot of research relies on aren't logical certainties, just extreme likelihoods. This method is based on overwhelming evidence. Present what you've found in your study, and then tell us what it could mean.

MO

Reasoning method #1: Inductive

This doesn't mean that it's impossible for science to come to conclusions about anything (you can do this mathematically, or by gathering observable things in nature), but most research relies on this method in the initial stages. That's not necessarily a liability, however, as evidence is crucial to arriving at honest answers. The most important thing about this method is that it's dynamic — constantly changing. New or contradictory evidence always has the potential to come along, and may cause your conclusions to change.

MO

Reasoning method #2: Deductive

Mathematicians rely heavily on this method to find out what is true in their fields, and scientists use it, too! This method of reasoning starts with assertions — statements that say something is true. Then, from those assertions, you can come to logical conclusions that are guaranteed true.

For example, if you assert that x = 10 and y = 20, then x + y = 30. Any other answer is illogical.

MO

Reasoning method #2: Deductive

Similarly, if you assert that all people named John wear blue pants, and you meet John Legend at one of his concerts, he has to be wearing blue pants. This example shows why it can be hard for some natural sciences to use this method. In nature, John Legend might not want to wear blue pants, so it’s hard to come up with assertions that would make deduction possible.

MO

Reasoning method #3: Abductive

This is a kind of reasoning science doesn't rely on too heavily. Instead, it's the process most of us use to come to conclusions in our everyday lives.
The problem, and the reason I'm including this method, is that the observations used in abductive reasoning are incomplete, while the conclusions are typically stated definitively.
But, this method isn't all bad!

MO

Reasoning method #3: Abductive

Medical diagnoses and judicial cases rely on this kind of reasoning, and thinking this way can throw imagination into the picture, which can be useful for scientists, too.

MO

Coming to conclusions

Conclusions usually begin with an equally pretentious and informative introduction, “The data suggest…”

Hypothesis

MO

Scientific hypothesis [haɪ'pɔθəsɪs] (learningapps.org)

MO

Stages in the development of a science

1 Definition of the science and identification of the phenomena that are to be subsumed under it.
2 Observational stage at which the relevant factors, variables or items are identified and labelled, and at which categories and taxonomies are developed.
3 Correlational research in which variables and parameters are related to one another and information is systematically integrated as theories begin to develop.

MO

Stages in the development of a science

4 The systematic and controlled manipulation of variables to see if experiments will produce expected results, thus moving from correlation to causality.

5 The firm establishment of a body of theory as the outcomes of the earlier stages are accumulated. Depending on the nature of the phenomena under scrutiny, laws may be formulated and systematized.

6 The use of the established body of theory in the resolution of problems or as a source of further hypotheses.

MO

An eight-stage model of the scientific method

Stage 1: Hypotheses, hunches and guesses
Stage 2: Experiment designed; samples taken; variables isolated
Stage 3: Correlations observed; patterns identified
Stage 4: Hypotheses formed to explain regularities
Stage 5: Explanations and predictions tested; falsifiability
Stage 6: Laws developed or disconfirmation (hypothesis rejected)
Stage 7: Generalizations made
Stage 8: New theories.

Typical Sections of an English Research Manuscript

For manuscripts that describe empirical studies, the following sections are typically included:

1. Title
2. Abstract (brief summary of the study)
3. Introduction (rationale and objectives for the study; hypotheses)
4. Method (description of research design, study sample, and research procedures)
5. Results (presentation of data, statistical analyses, and tests of hypotheses)
6. Discussion (major findings, interpretations of data, conclusions, limitations of study, and areas for future research).

Typical Sections of an English Research Manuscript

IMRAD Стандартная структура научной статьи / презентации по результатам КР	
Title (Название статьи)	Указывается тема исследования, автор, аффилиация. В студенческих сборниках также научный руководитель.
Annotation (Аннотация)	Конкретизирует содержание статьи и кратко отражает структуру IMRAD
Key Words (Ключевые слова)	Указываются ключевые термины и понятия исследования
Introduction **(Введение)**	Проблема, актуальность, новизна, объект и предмет; цели и задачи; Аналитический обзор литературы; ключевые понятия исследования.
Methods **(Методы)**	Методы, материал анализа, условия эксперимента, методики и средства проведения исследования
Results **(Результаты)**	Анализ, интерпретация и первичное обобщение полученных в результат исследования новых данных.
Discussion (Обсуждение)	Полученные ответы, их достоверность, значение,
Conclusion (Заключение)	Обобщение полученных результатов и выводов по ним; перспективы дальнейших исследований.
References (Литература)	Библиографические данные статей оформляются по требованиям издания (e.g. ГОСТ, APA etc.). Указываются все процитированные и проанализированные источники.

Test 03

Расставьте по порядку термины, характеризующие этапы исследования

Go to STRART PAGE

1	2	3	4	5	6
?	?	?	?	?	?

Conclusions	1	2	3	4	5	6
Hypothesis	1	2	3	4	5	6
Observation	1	2	3	4	5	6
Preliminary R	1	2	3	4	5	6
Research question	1	2	3	4	5	6
Testing hypothesis	1	2	3	4	5	6

WRONG!

Try again!

Test 01

Test 02

Test 03

1 2

3 4

RIGHT!

I II III

IV V VI

VII VIII IX

Go to the STRART PAGE

1 2

3 4

MORE TESTING FUN

WRONG!

I II III IV V VI VII VIII IX


Have a nice day!
Yours sincerely