Vinnytsia Mykhailo Kotsiubunskiy State
Pedagogical University

METHODOLOGY AND PRINCIPLES OF SCIENTIFIC RESEARCH

Textbook

Vinnytsia - 2020

Рекомендовано до друку на засіданні
кафедри педагогіки і професійної освіти Вінницького державного
педагогічного університету імені Михайла Коцюбинського
(протокол № 20 від 6 лютого 2020 року).

Схвалено до друку вченою радою
Навчально-наукового інститут педагогіки, психології,
підготовки фахівців вищої кваліфікації Вінницького державного
педагогічного університету імені Михайла Коцюбинського
(протокол № 7 від 12 лютого 2020 року).

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Методологія і методика наукових досліджень (Methodology and Principles of Scientific Research) / Укладачі А. М. Коломієць, Є. В. Громов – Вінниця : ВДПУ, 2020. – 188 с. (англійською мовою).

У посібнику розглядаються теоретичні і практичні питання методології та методики наукових досліджень, основні методи, способи, прийоми емпіричного й теоретичного рівнів пізнання, а також методика і технологія їх практичного застосування в науково-дослідній роботі студентів педагогічних закладів вищої освіти. Посібник розрахований на докторантів, аспірантів, студентів магістратури, наукових співробітників, а також усіх, хто цікавиться актуальними питаннями сучасної науки та методології наукового пізнання.

Підписано до друку 20.02.2020.
Формат 60x84/8. Папір офсетний. Друк цифровий.
Друк. арк. 23,50. Умов. друк. арк. 21,86.
Наклад 100 прим. Зам. № 1281/1.

Віддруковано з оригіналів замовника.
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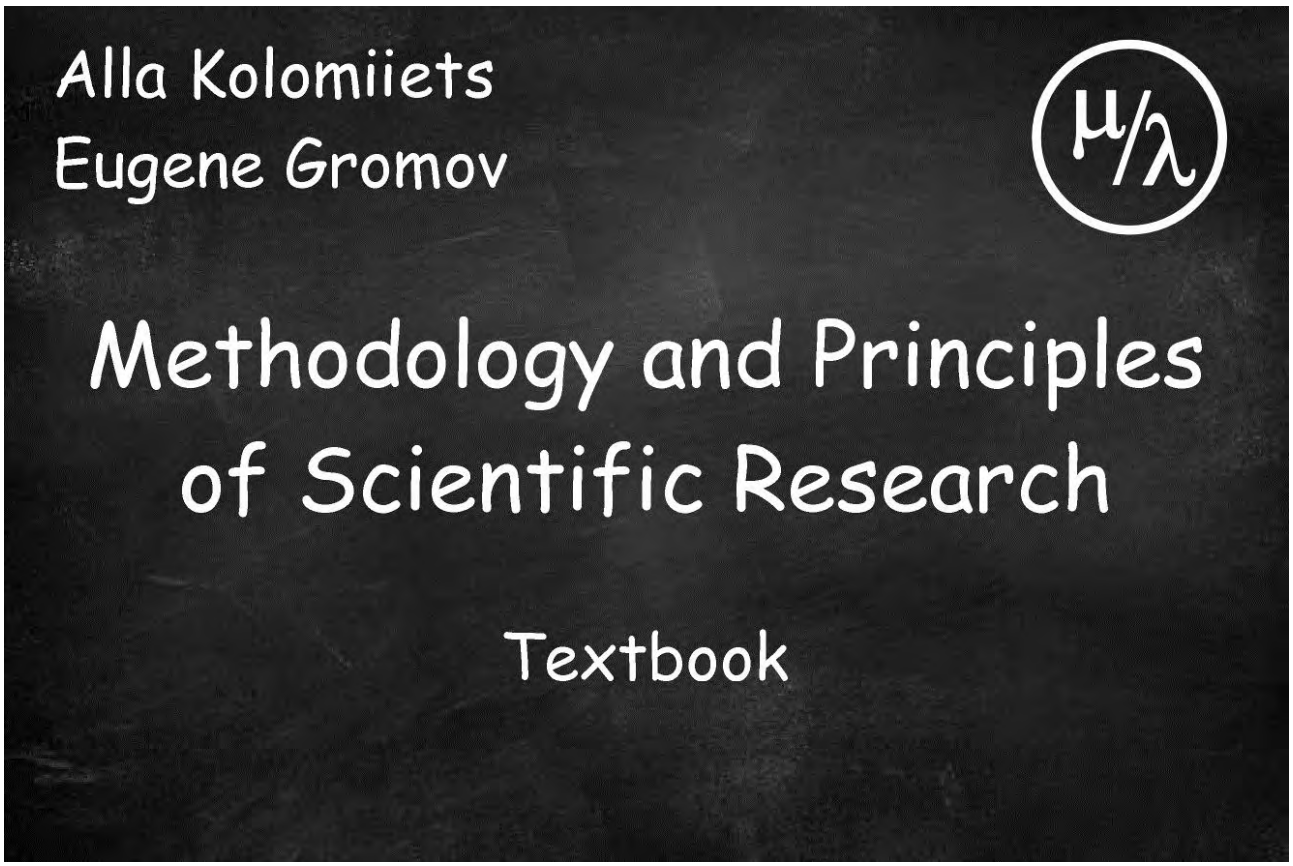
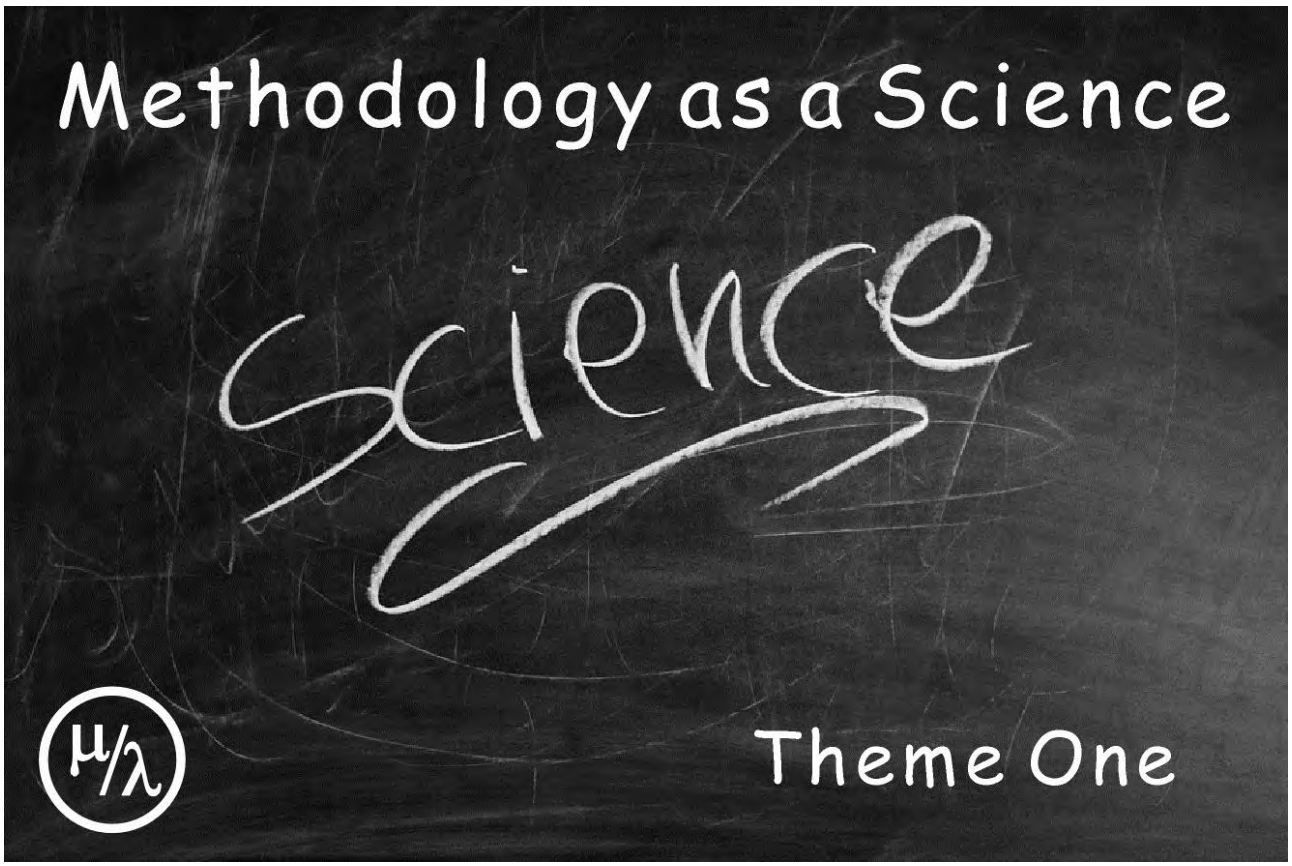


CONTENT



Glossary

English words (word combinations, phrases)	Translation into Ukrainian
to study (to learn, to investigate)	вивчати (вчити, досліджувати)
scientific research (investigation)	наукове дослідження
main (general) notions	основні (загальні) поняття
subject of research (investigation)	предмет дослідження
phenomenon (plural – phenomena)	явище (явища)
criterion (plural – criteria)	критерій (критерії)
doctrine (teaching)	вчення, доктрина
scientific research activity	науково-дослідна діяльність
research and development (R&D)	науково-дослідна робота (НДР)
stages of science development	етапи розвитку науки
cognition (cognitive)	пізнання (пізнавальний)
scientific approach	науковий підхід
theoretical grounding (basis)	теоретична база (теоретична основа)

concrete (certain) object	конкретний (певний) об’єкт
increase (decrease) of effectiveness	підвищувати (знижати) ефективність
to realize scientific supervision	реалізовувати науковий контроль
to supply (to provide, to secure)	забезпечувати
spheres of human activity	сфери людської діяльності
knowledge transfer	передавання знань
evidence	доказ
to determine (determination)	визначати (визначення)
to prove	доводити
research technique	метод дослідження
data (information) retrieval	пошук даних (пошук інформації)
to enrich (enrichment)	збагачувати (збагачення)
categorical apparatus of science	категорійний апарат науки
to fulfill functions	виконувати функції
certain branch of science	певна галузь науки
totality	сукупність, загальна кількість
procedure	процедура
to obtain reliable data	отримати надійні результати (дані)
empirical	емпіричний
initial data processing	початкова обробка даних
to conduct investigation	проводити дослідження
appropriate method of research	відповідний метод дослідження
to achieve (achievement)	досягати (досягнення)
to penetrate the essence of phenomenon	проникати в саму суть явища
external (internal) influence	зовнішній (внутрішній) вплив
elimination of casual factors	виключення випадкових факторів
to consider (consideration)	розглядати (розгляд)
to advance forward	просувати вперед

to streamline	спрямовувати у відповідному напрямку
interdisciplinary	міждисциплінарний
system (over-system, sub-system)	система (надсистема, підсистема)
self-developing system	система, що сама розвивається
comprehensive investigation program	всебічна програма дослідження
linearity (nonlinearity)	лінійність (нелінійність)
quantitative (qualitative) analysis	кількісний (якісний) аналіз
to come to (to make) certain conclusions	доходити певних висновків
to emphasize on something	наголошувати на чомусь
to underline something	підкреслювати щось
bifurcation (branch) point	точка біфуркації (розгалуження)
from the standpoint of practice (theory)	з практичної (теоретичної) точки зору
value attitude	ціннісне ставлення
to involve somebody in research	залучати когось до дослідження
to regard (to consider) a phenomenon as	розглядати явище як
great impact	потужний вплив
teacher's methodological competence	методологічна компетентність вчителя
managed (unmanaged) factors	керовані (некеровані) чинники
to contribute to general result	докладати до загального результату
to possess certain properties	мати певні якості
to serve as a tool for	слугувати засобом (інструментом) для
mutual reinforcement	взаємне підсилення
to comprise several elements	складатись з кількох елементів
new knowledge increase	приріст нового знання
science in the whole	наука в цілому
to post something on blog	розміщувати (публікувати) щось у блозі
number of blog subscribers	кількість людей, що підписані на блог
number of daily visits	кількість щоденних відвідувань

The word «methodology» derives from the Greek words «metodos» (way, method) and «logos» (teaching, doctrine, science) therefore the term «methodology» means «teaching about methods».

μεθοδοσ + λογοσ

⇓

μεθοδολογια

Main Notions of the Discipline

μ/λ

Methodology — teaching about methods, ways and strategies of subject research

Science — dynamic system of knowledge which reveals new phenomena in nature and society for their further application to practical activity

Research — searching for new knowledge or systematic investigation for the purpose of facts determination

⇒ Methodology of scientific research — doctrine of methods, principles, forms and techniques of scientific research activity

Stages of Methodology Development

μ/λ

Aristotelian formal logic (aka gnoseology) ⟹ regulates forms of logical thinking (How to think? What is right? How to come to correct conclusions?)

Cognitive methodology ⟹ regulates cognition process (offers theories, approaches and principles of investigation; provides theoretical groundings for practical activity)

Constructive methodology ⟹ doctrine of project-constructive activity (explains processes of modeling and projecting of the concrete object)

Types of Scientific Activity

μ/λ

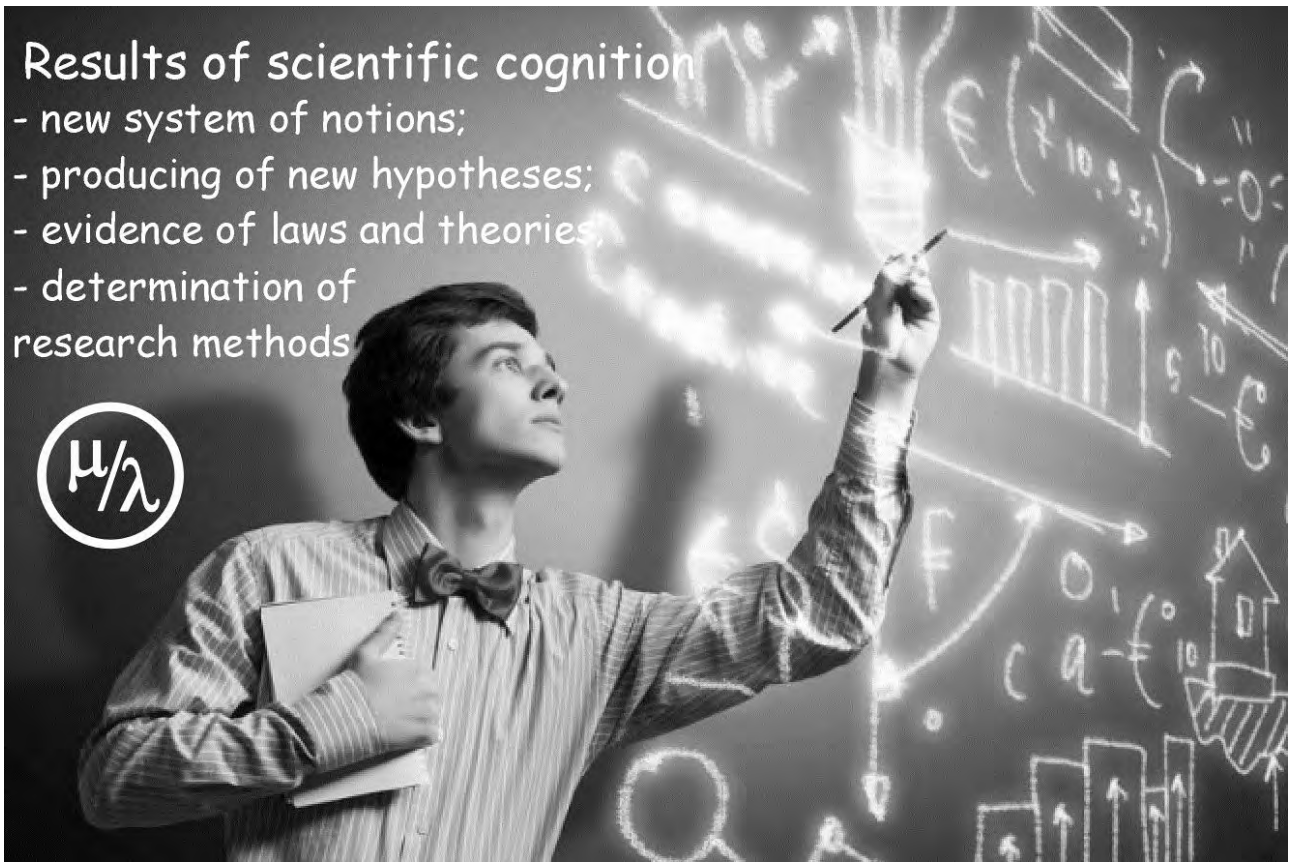
scientific-research activity (theoretical and experimental) ⟹ new knowledge increase

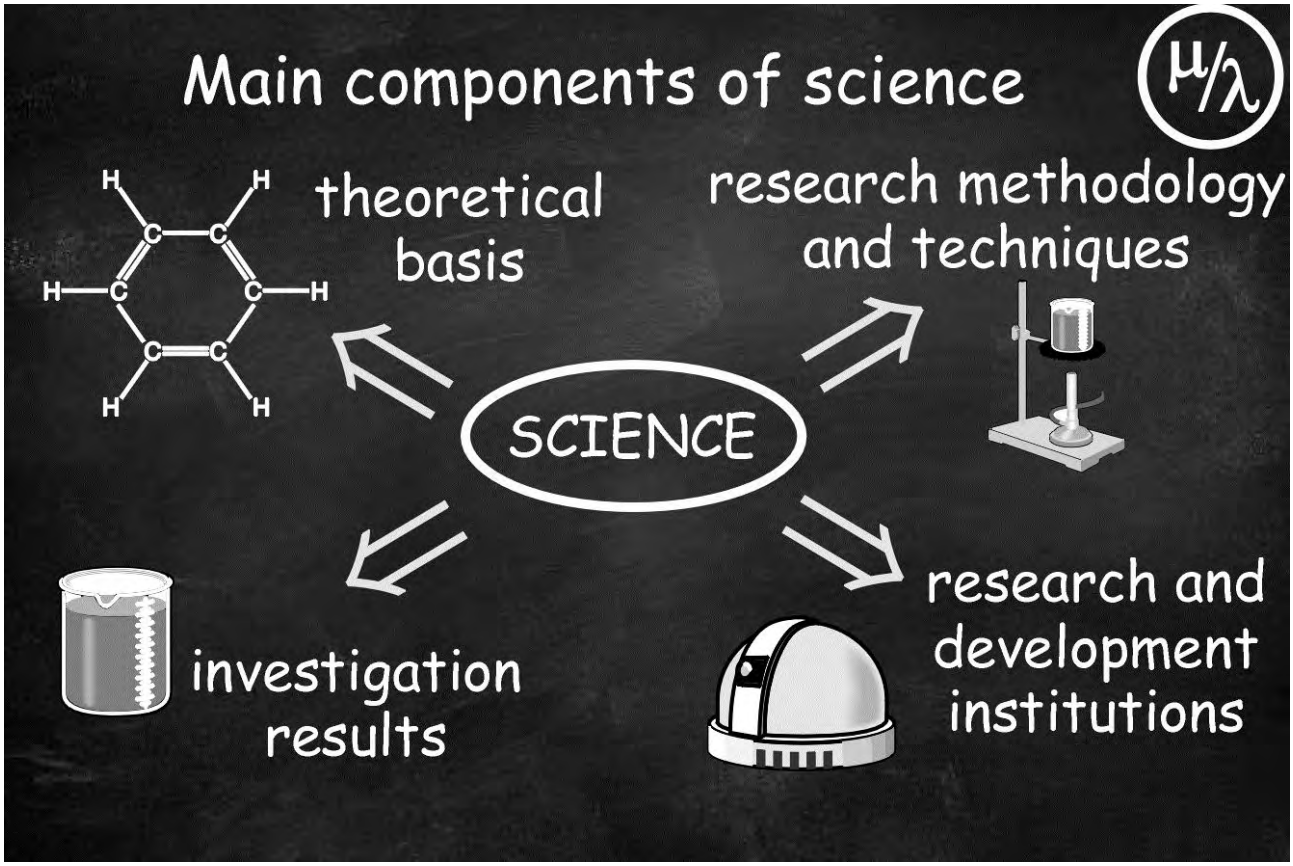
scientific-organizational ⟹ realizes science supervision and control

scientific-informational ⟹ secures information supply of other activity types

scientific-auxiliary ⟹ provides the rest of supply functions but informational

scientific-pedagogical ⟹ secures knowledge transfer from science to other spheres of human activity


Results of scientific cognition
- new system of notions;
- producing of new hypotheses;
- evidence of laws and theories;
- determination of
research methods
μ/λ


Main components of science
μ/λ
theoretical basis
research methodology and techniques
SCIENCE
investigation results
research and development institutions

Main functions of methodology

- determines the ways of obtaining new knowledge and methods of scientific research;
- determines the ways of reaching research goals;
- secures multi-channel resources of necessary information retrieval;
- helps with creation and systematization of new information;
- provides concretization, enrichment, systematization of scientific terms and notions

Types of methodological cognition

Philosophical (fundamental) methodology - totality of general cognition principles and categorical apparatus of science in the whole. Here methodological function is fulfilled by the total system of philosophical cognition categories, laws, rules and approaches

General-scientific methodology - based on general scientific methodological approaches (historical, logical, system etc) and studies the algorithms of scientific investigation

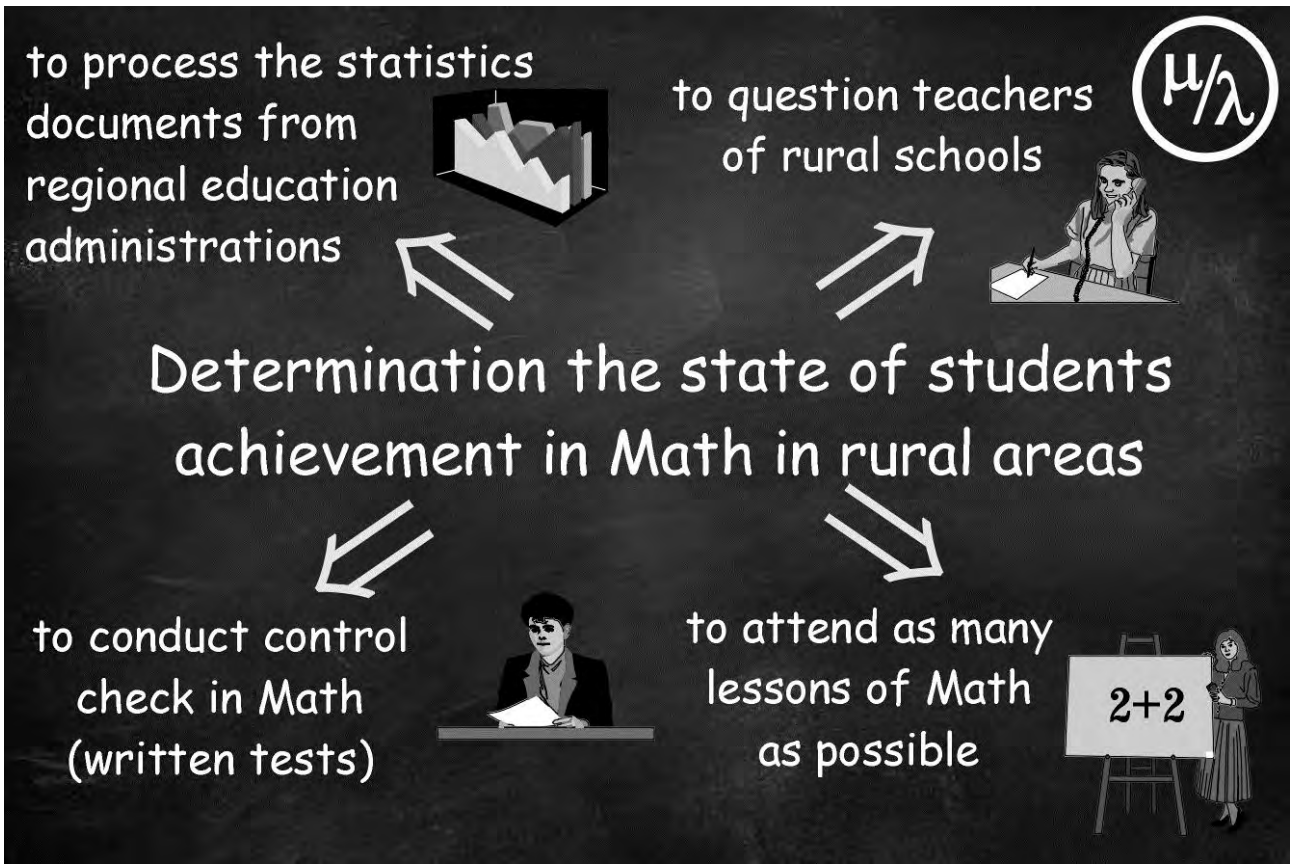
Types of methodological cognition

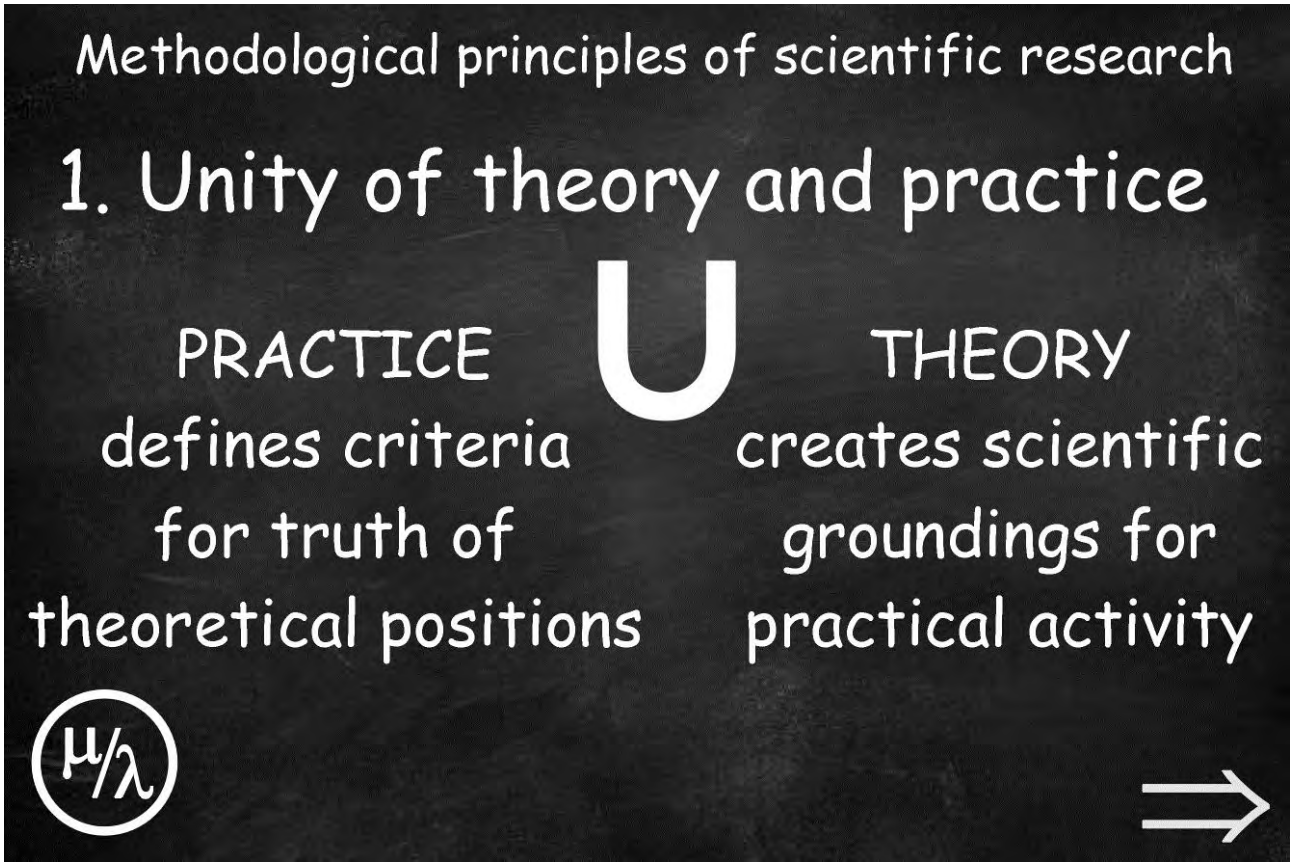
Specific-scientific methodology - totality of specific methods of every certain branch of science which comprise the basis for investigation problem solutions

Technological methodology - totality of specific procedures which secure obtaining reliable empirical material and its initial processing.
Here methodological cognition has normative character

Methodological cognition ⟺ Principles of research

rule system of usage methods, techniques and ways for conducting a definite investigation.
Using general-scientific, specific-scientific and technological methodologies a scientist can develop his own research methodology which is based on appropriately chosen methods of scientific investigation


to process the statistics documents from regional education administrations
to question teachers of rural schools
Determination the state of students achievement in Math in rural areas
to conduct control check in Math (written tests)
to attend as many lessons of Math as possible
2+2


Methodological principles of scientific research
1. Unity of theory and practice
PRACTICE defines criteria for truth of theoretical positions
U
THEORY creates scientific groundings for practical activity

Methodological principles of scientific research

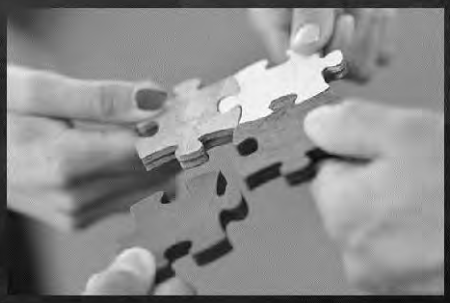
2. Principle of objectivity

The researcher has to find ways and means for penetrating the essence of the phenomenon, into its inner world, without making anything external and subjective

Methodological principles of scientific research

3. Principle of universality

Complex approach to investigation of processes and phenomena; definition of all relationships of the investigated phenomenon, taking into account all external actions; elimination of casual factors and usage of various methods of investigation



Methodological principles of scientific research

4. Unity of historical and logical

Logic of cognition the phenomenon reproduces the logic of its development (its history) so every research should be aimed at advancement of science forward

⇒

Methodological principles of scientific research

5. Principle of systemicity

- consideration of the study object as a system;
- identification certain set of the object's elements;
- definition, classification and streamlining of the links between the object's elements;
- allocation of the system-driven connections;
- taking into account external influence of the super-system and internal interactions of the sub-systems

Modern methodological innovations

- increasing the role of interdisciplinary comprehensive programs in the study of complex human-measurable self-developing systems;

- awareness of the need for convergence of Eastern and Western countries, rational and irrational thinking;

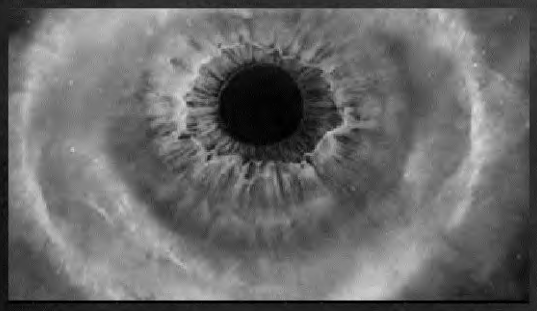
Modern methodological innovations

- introduction of synergetic ideas and methods (study of processes of self-organization in systems of different natures);

- putting forward the concepts of uncertainty, probability, chaos, nonlinearity, bifurcations and fluctuations;

Modern methodological innovations

- combination and comparison of macro and microcosms

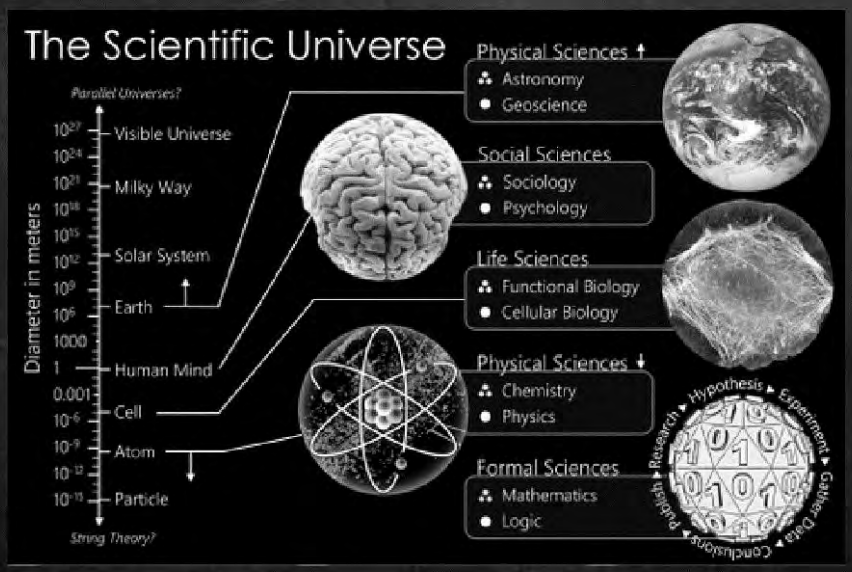


nebula "snail"

human's eye

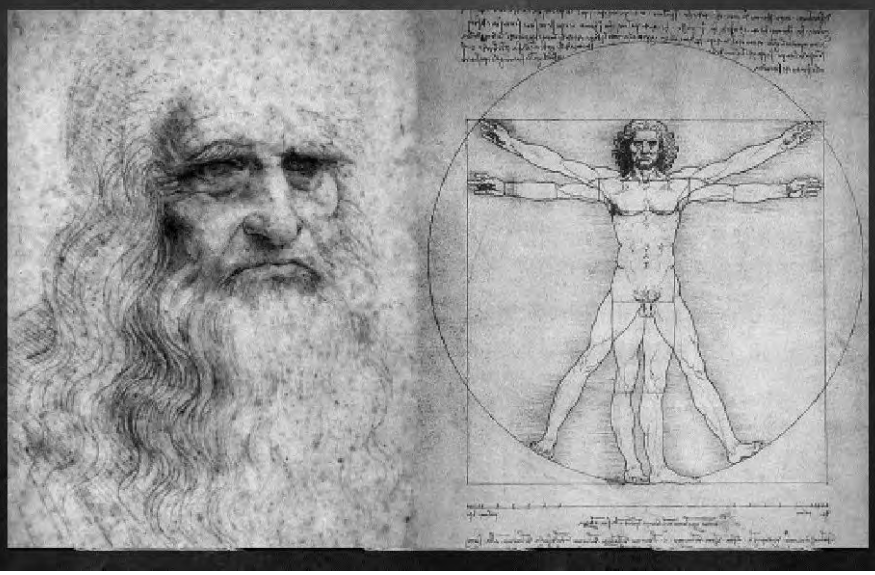
Modern methodological innovations

- synthesis of natural and social sciences



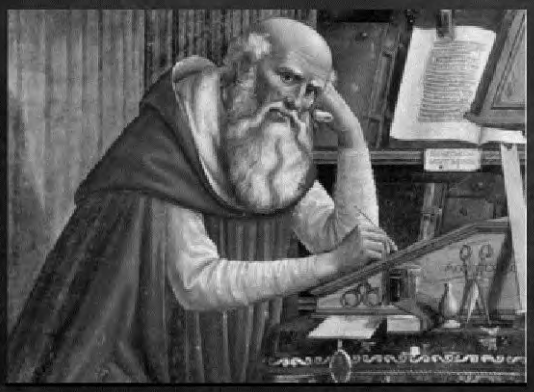
Modern methodological innovations

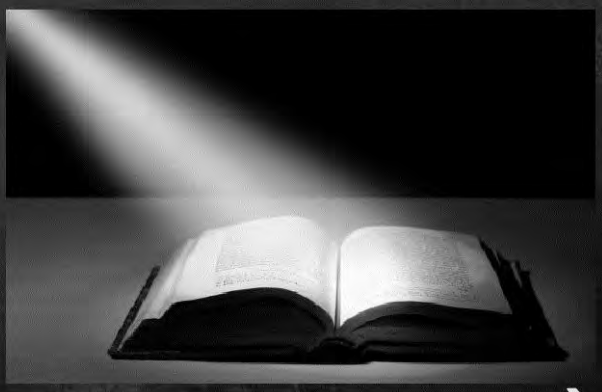
- enhancement of anthropocentric approach in various sciences



Modern methodological innovations

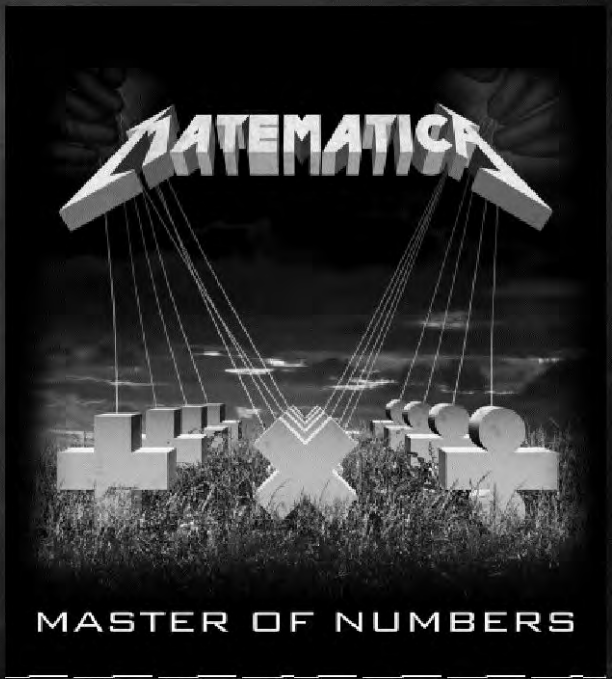
- increase of hermeneutics significance as well as value and information approaches





Modern methodological innovations

- use of concepts and methods of mathematics in other fields of knowledge for the quantitative analysis of phenomena under study

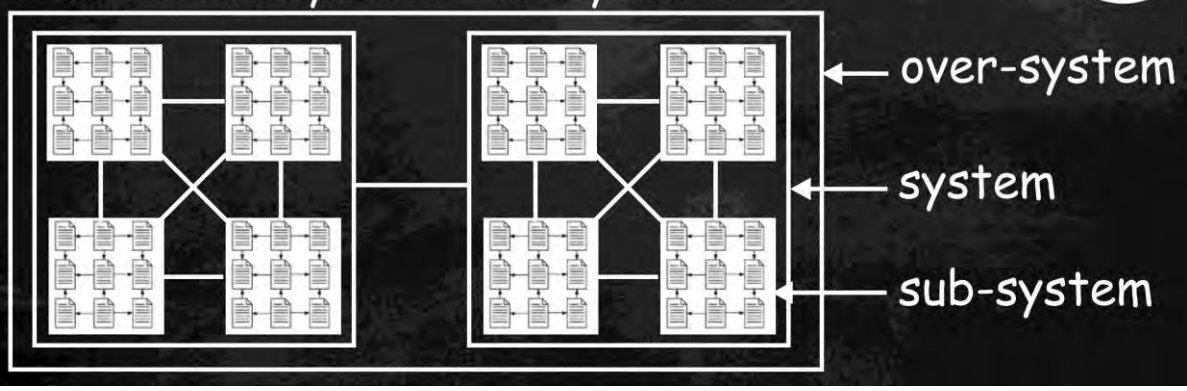


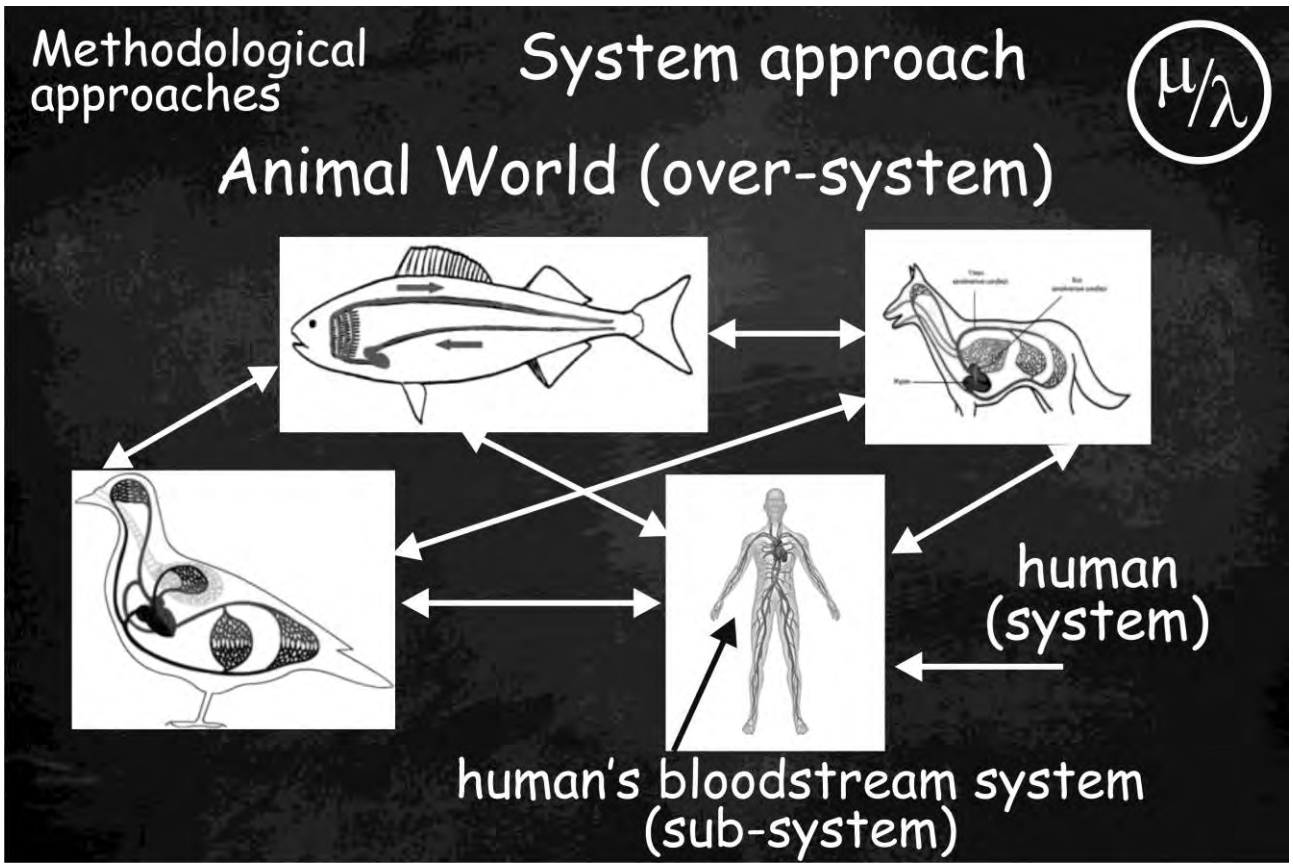
Methodological approaches

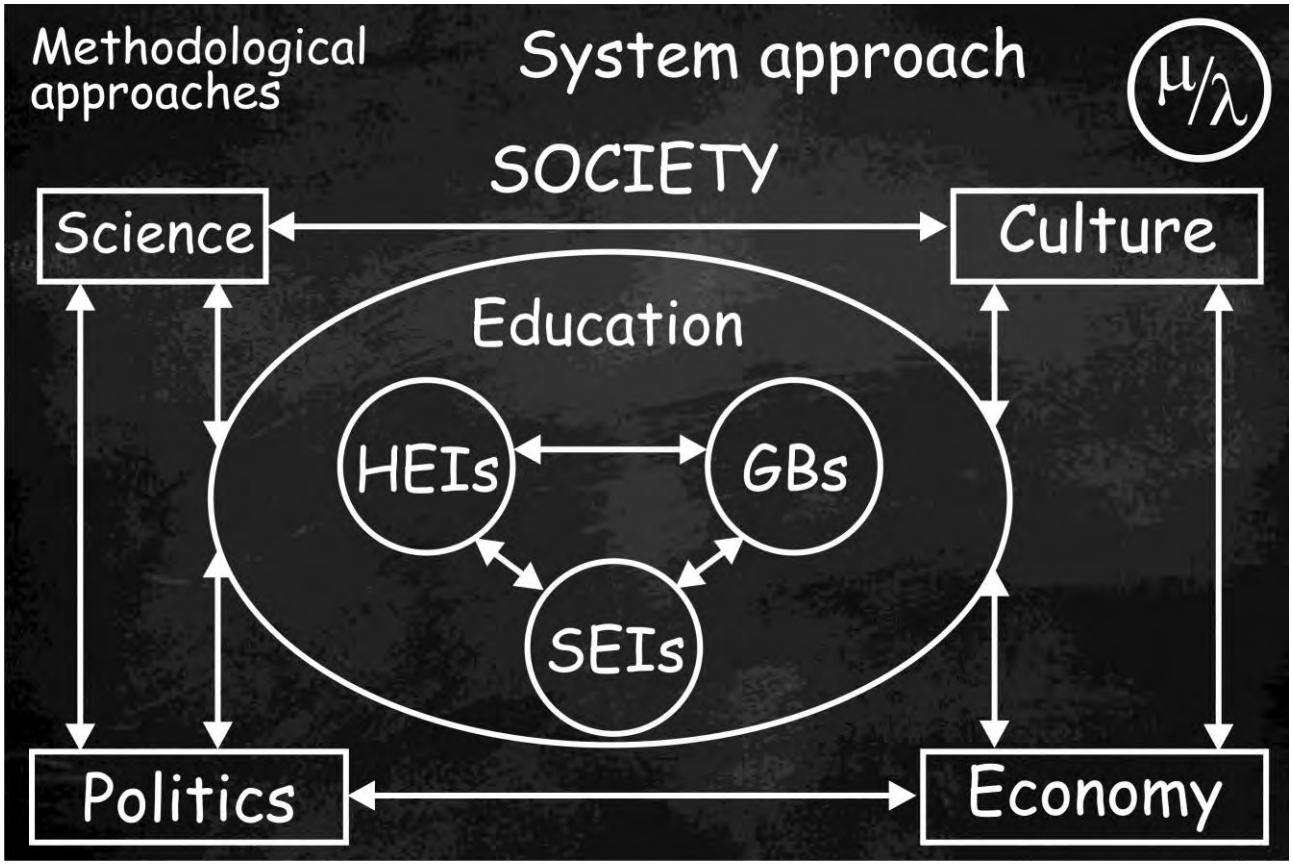
System approach - study of a complex object as an integral system

System is a structure which comprises several inter-connected elements and has the following features:

- multi-component structure of an object (n > 1 elements);
- mutual dependence of the elements;
- hierarchal structure - each system is dependent on a wider over-system and includes components which are also systems - subsystems




Methodological approaches
System approach
μ/λ
Animal World (over-system)
human (system)
human's bloodstream system (sub-system)


Methodological approaches
System approach
μ/λ
SOCIETY
Science
Culture
Education
HEIs
GBs
SEIs
Politics
Economy

Methodological approaches

System approach

μ/λ

System approach main functions

- detects casual relations and hidden dependencies both within the system and between other objects of the over-system;
- serves as a tool for analysis of objects and situations;
- enables organizing information and making conclusions;
- may be used for investigation of any branch of science including Pedagogics

Methodological approaches

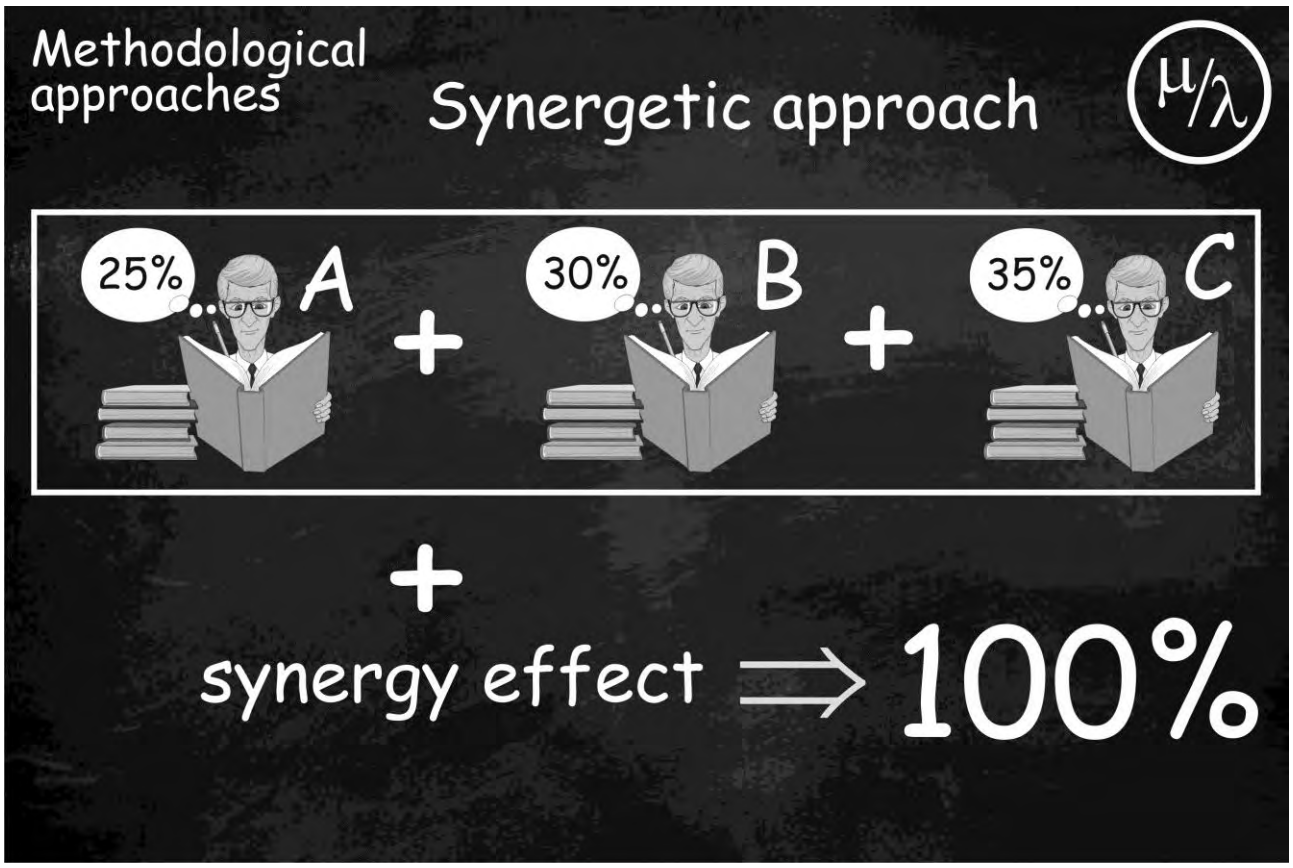
Synergetic approach

μ/λ

Synergetics (joint action) - theory of self-organization in the open systems of diverse nature. It deals with phenomena and processes which may produce properties which don't possess any of its parts.

Synergy effect (synergism) - increase of effectiveness through the use interconnection and mutual reinforcement of various activities. This effect isn't additive in relation to the individual effects of the elements comprising the whole system.

Synergy effect $\boxed{2 + 2 = 5}$

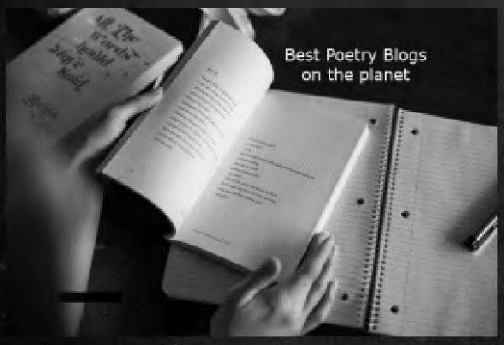

Methodological approaches
Synergetic approach
25%
A
+
30%
B
+
35%
C
+
synergy effect ⇒ 100%


Methodological approaches
Synergetic approach
A poet - wrote 10 lyrical pieces of poetry and posted the texts on his blog
A composer - composed 10 pieces of music and posted the recordings on his blog
A singer - performed 10 old well-known somebody's hits and posted the videos on his blog

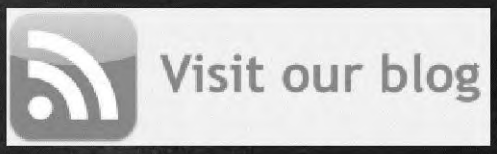
Methodological approaches

Synergetic approach

The poet's blog statistics



Number of subscribers = 15



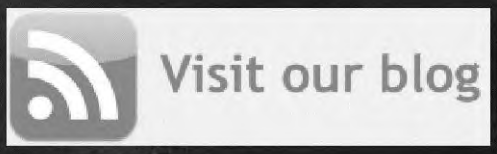
Number of daily visits = 30

Methodological approaches

Synergetic approach

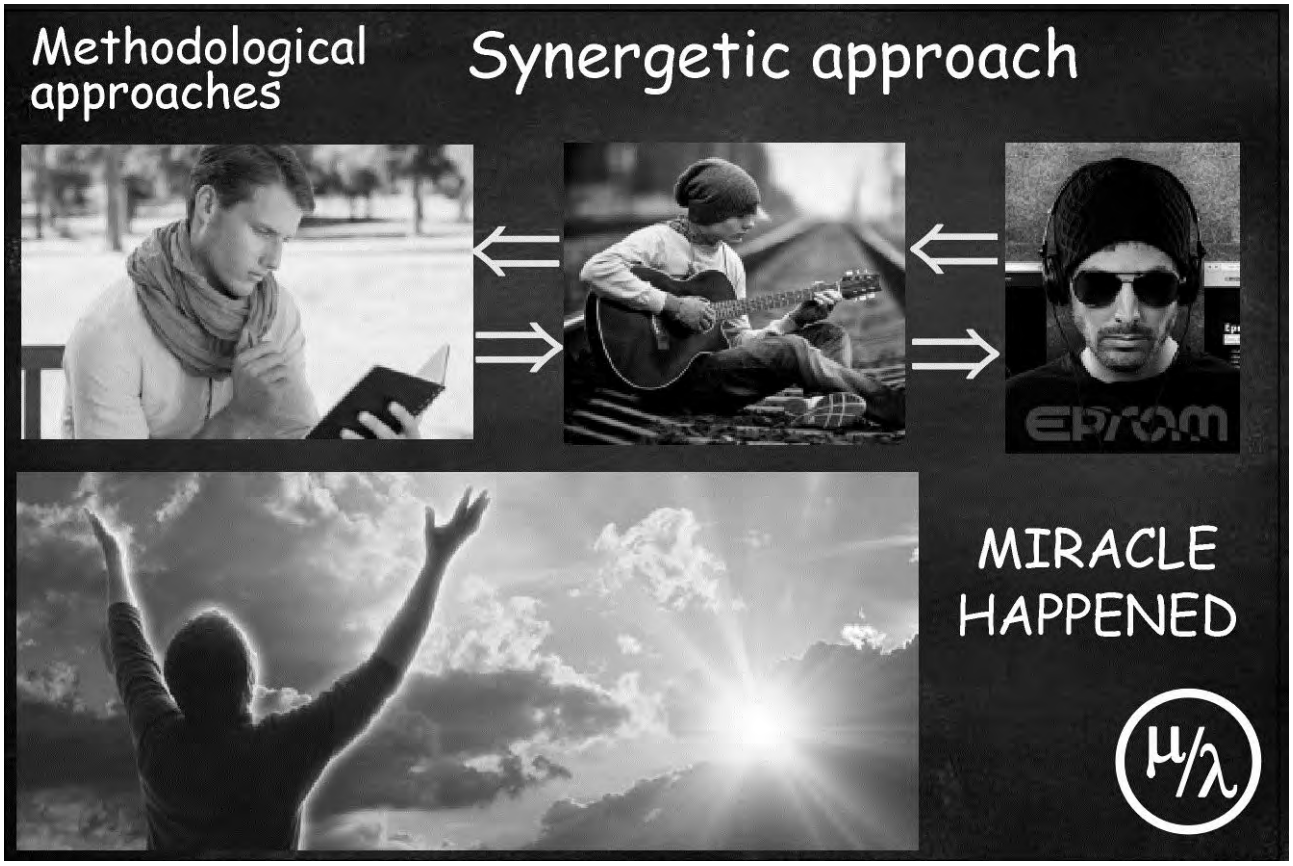
The composer's blog statistics

Number of subscribers = 20



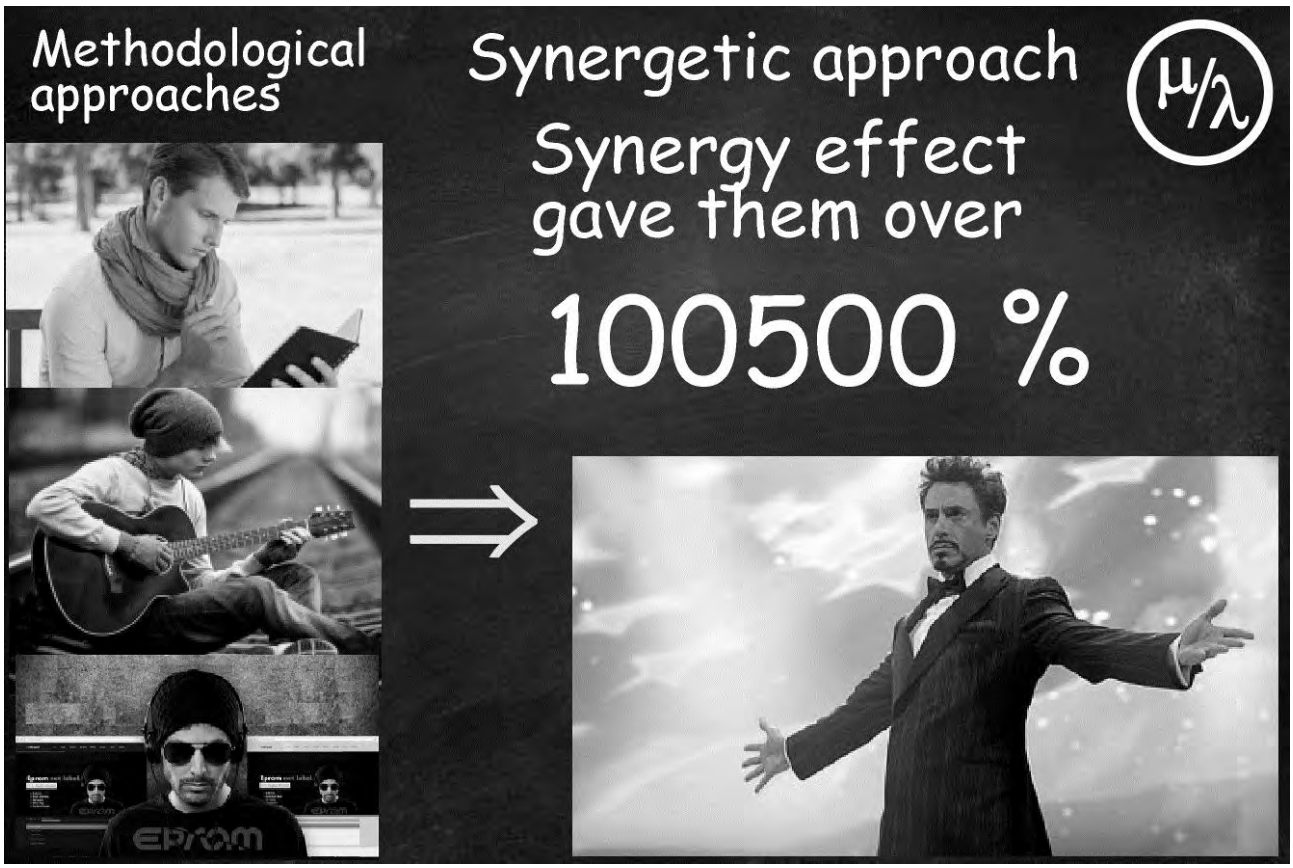
Number of daily visits = 40

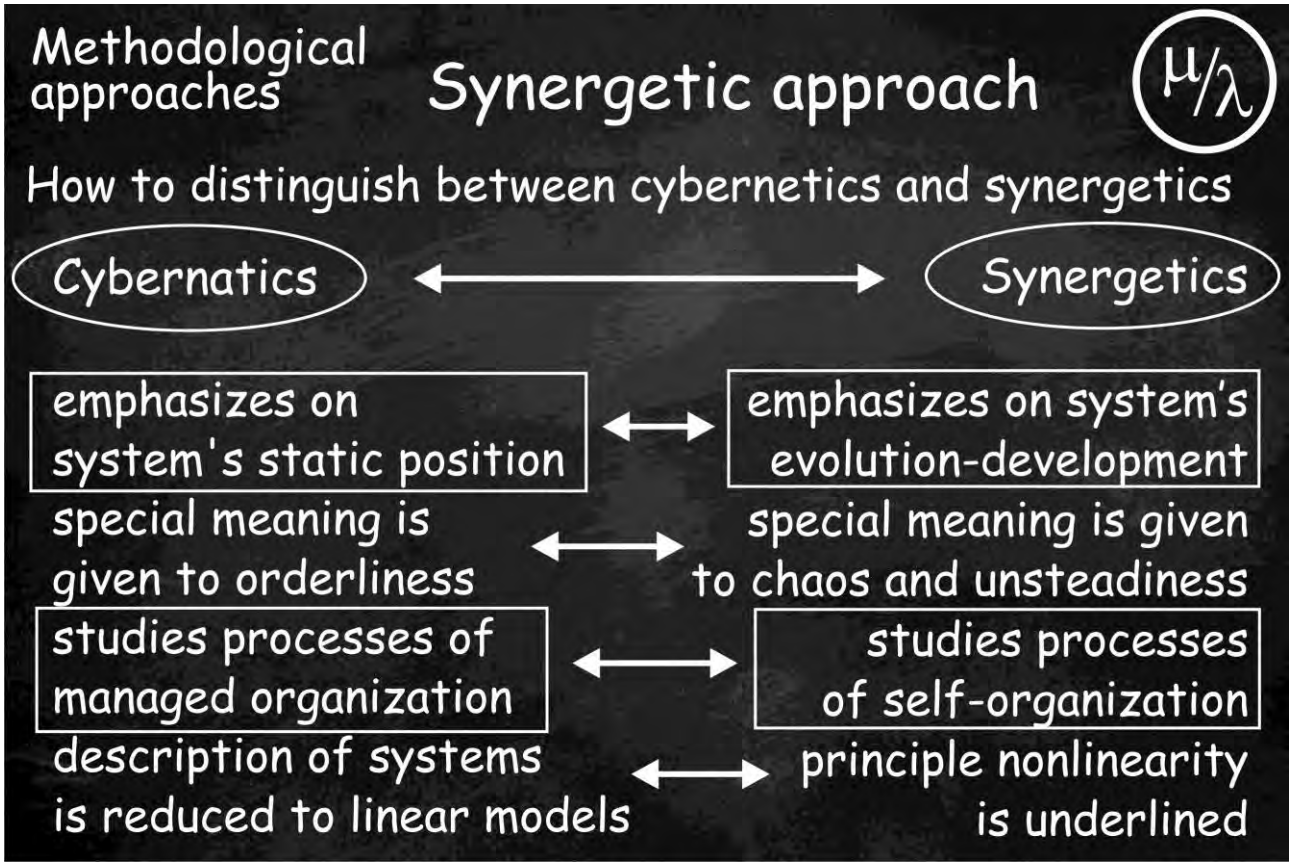

Methodological approaches
Synergetic approach
The singer's blog statistics
SUBSCRIBE
Number of subscribers = 30
Visit our blog
YouTube
Number of daily visits = 60

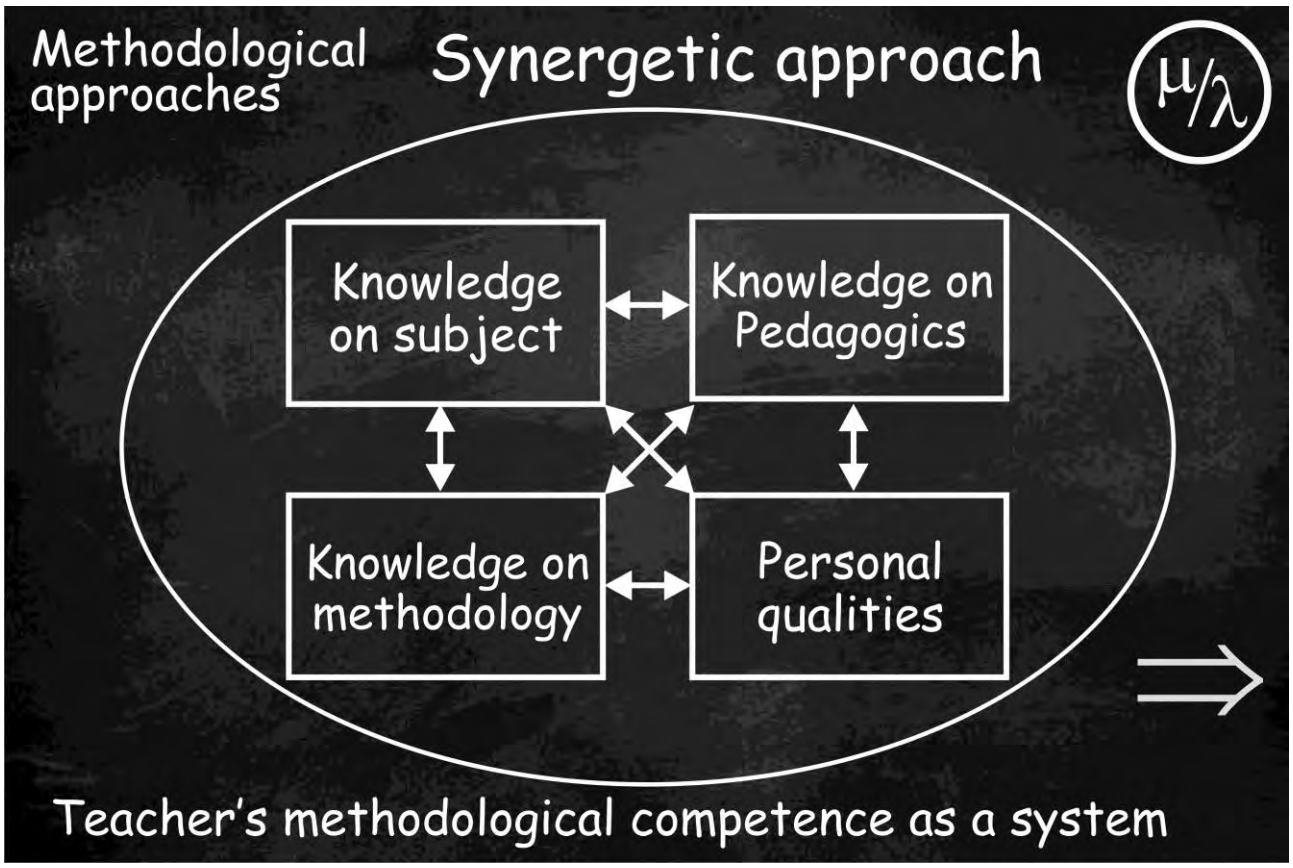

Methodological approaches
Synergetic approach
MIRACLE HAPPENED

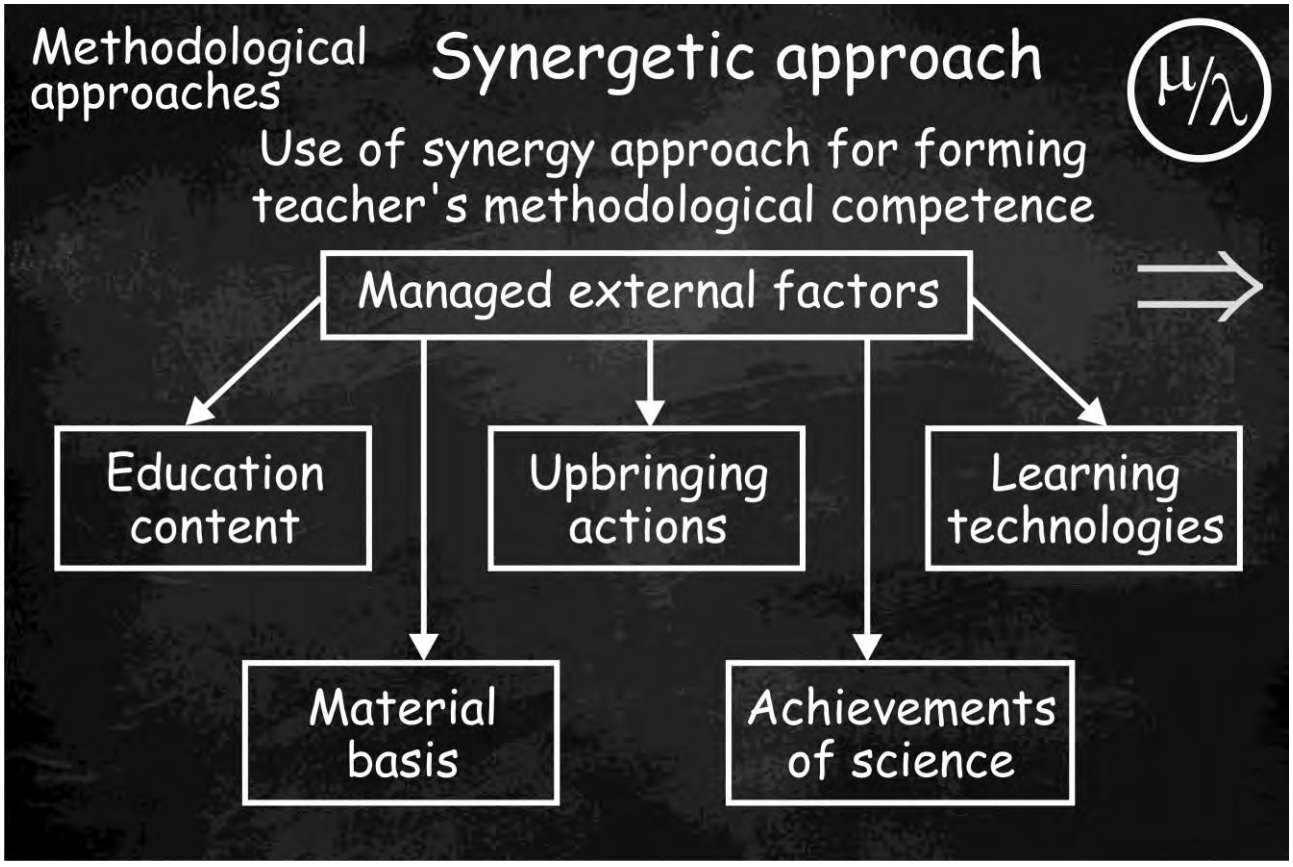

Methodological approaches
Synergetic approach
ESTIMATED
common blog statistics
SUBSCRIBE
Number of subscribers
15 + 20 + 30 = 65
Visit our blog
Number of daily visits
30 + 40+ 60 = 130
YouTube
LINEAR

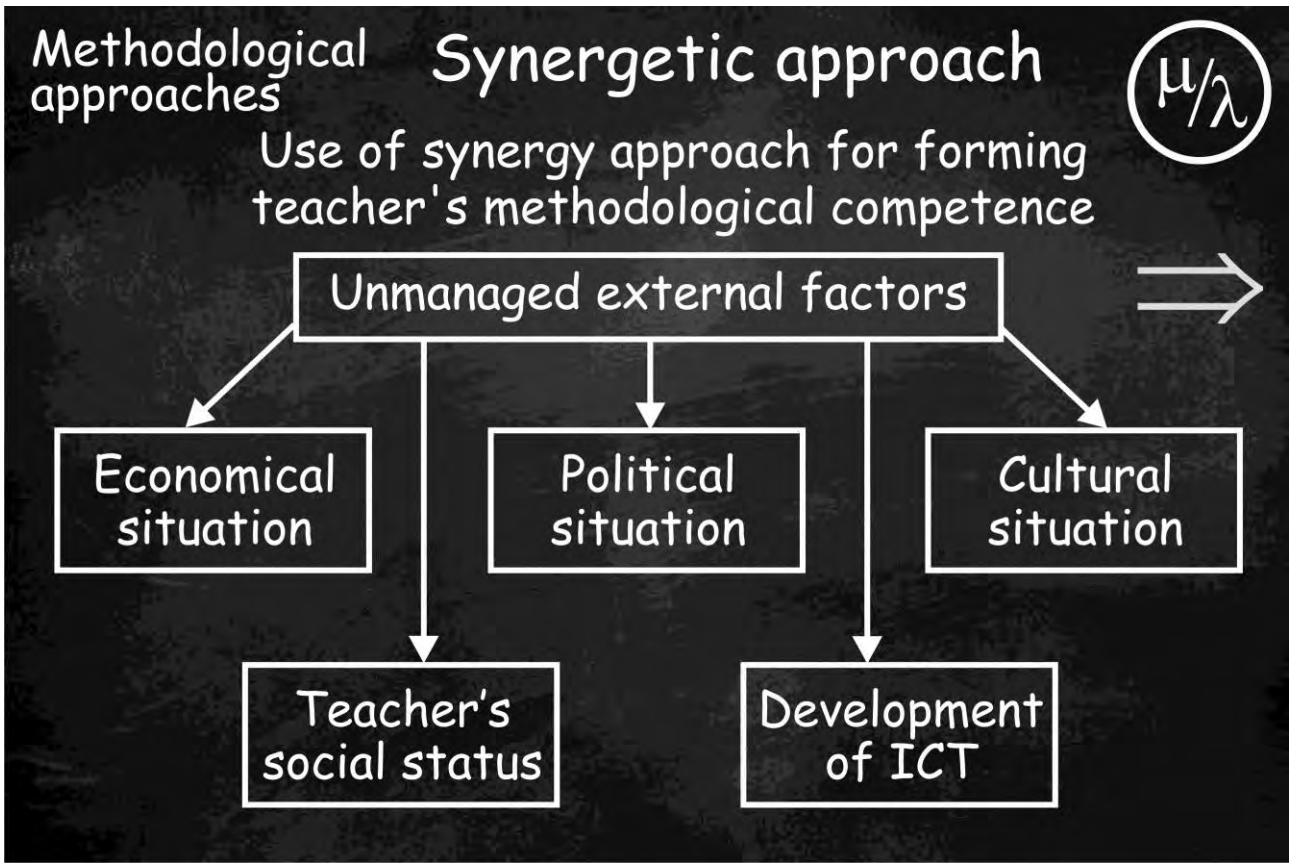

Methodological approaches
Synergetic approach
REAL
common blog statistics
SUBSCRIBE
Number of subscribers =
539726 (increase every min)
Visit our blog
Number of daily visits =
69463 (increase every sec)
YouTube
NON - LINEAR

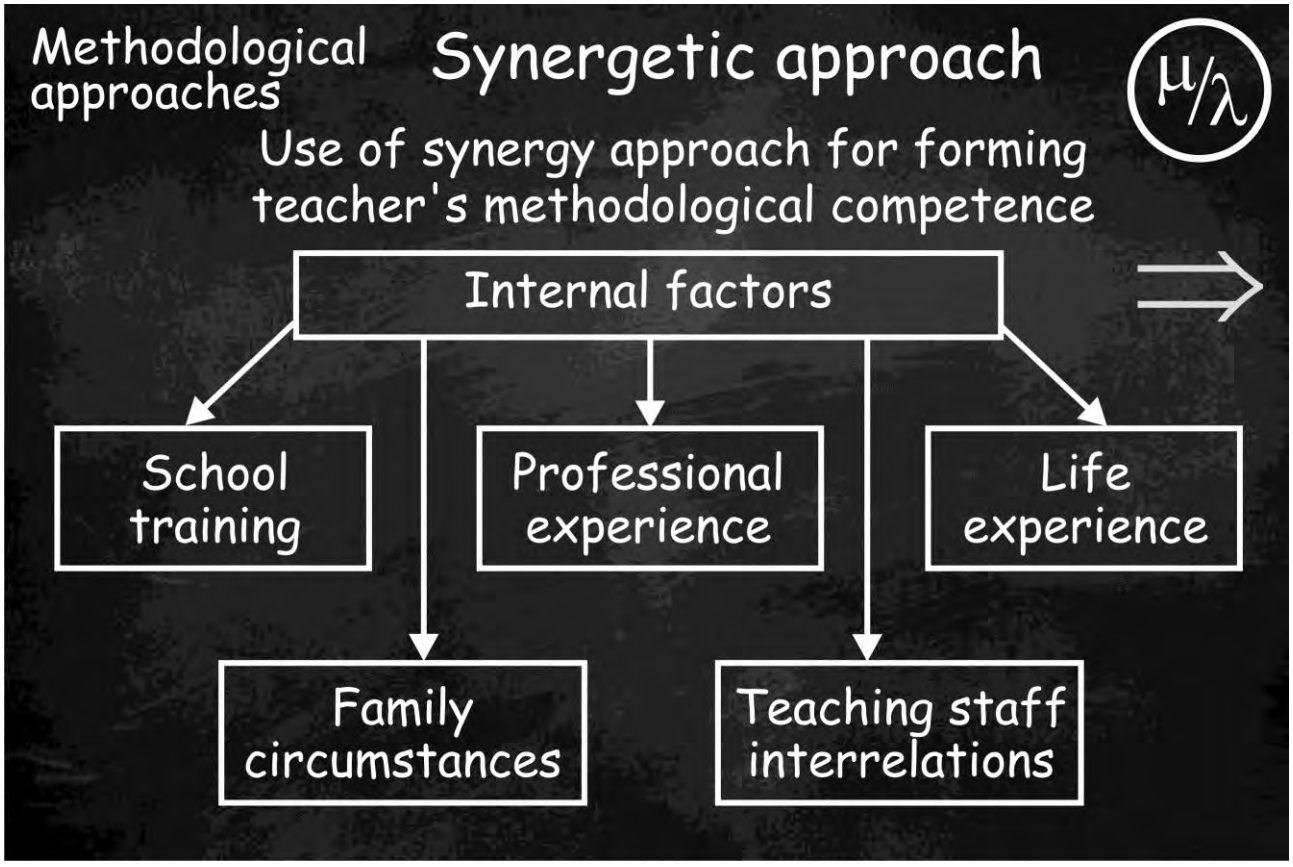

Methodological approaches
Synergetic approach
μ/λ
Synergy effect gave them over
100500 %


Methodological approaches
Synergetic approach
μ/λ
How to distinguish between cybernetics and synergetics
Cybernatics
Synergetics
emphasizes on system's static position
emphasizes on system's evolution-development
special meaning is given to orderliness
special meaning is given to chaos and unsteadiness
studies processes of managed organization
studies processes of self-organization
description of systems is reduced to linear models
principle nonlinearity is underlined


Methodological approaches
Synergetic approach
μ/λ
Knowledge on subject
Knowledge on Pedagogics
Knowledge on methodology
Personal qualities
Teacher's methodological competence as a system


Methodological approaches
Synergetic approach
μ/λ
Use of synergy approach for forming teacher's methodological competence
Managed external factors
Education content
Upbringing actions
Learning technologies
Material basis
Achievements of science


Methodological approaches
Synergetic approach
μ/λ
Use of synergy approach for forming teacher's methodological competence
Unmanaged external factors
Economical situation
Political situation
Cultural situation
Teacher's social status
Development of ICT


Methodological approaches
Synergetic approach
μ/λ
Use of synergy approach for forming teacher's methodological competence
Internal factors
School training
Professional experience
Life experience
Family circumstances
Teaching staff interrelations

Methodological approaches

Synergetic approach

Use of synergy approach for forming teacher's methodological competence

Managed external factors

Unmanaged external factors

Methodological competence as a system

Internal factors

Teacher's methodological system must be open

Greatest impact is realized in bifurcation points

Methodological approaches

Synergetic approach

Bifurcation point - is a branch point on possible directions of development

There are some more methodological approaches used in pedagogical research

Civilization approach

regards phenomenon as a characteristic feature of modern civilization

Methodological approaches

Cultural approach

characterizes the development of a certain quality from the standpoint of new understanding of culture in society

VS

Methodological approaches

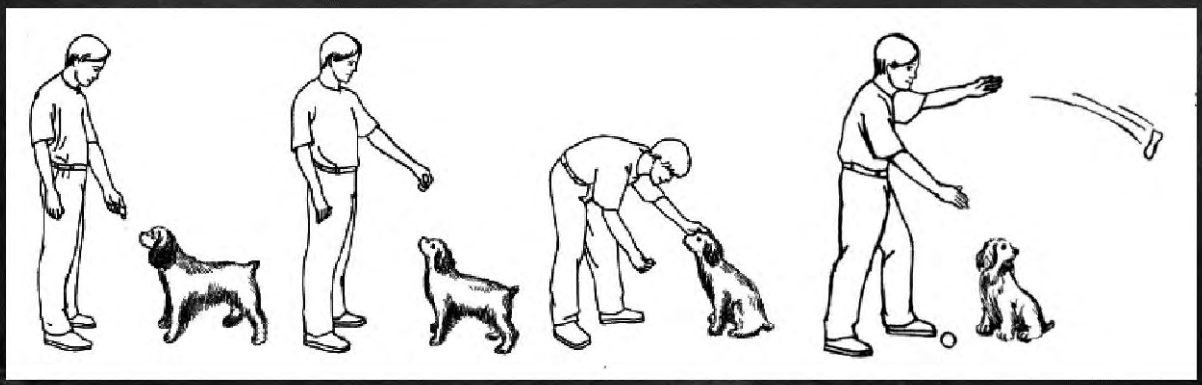
Axiological approach

analyzes the personality formation process on the basis of determination of its value attitude to a certain phenomenon

Methodological approaches

Activity approach

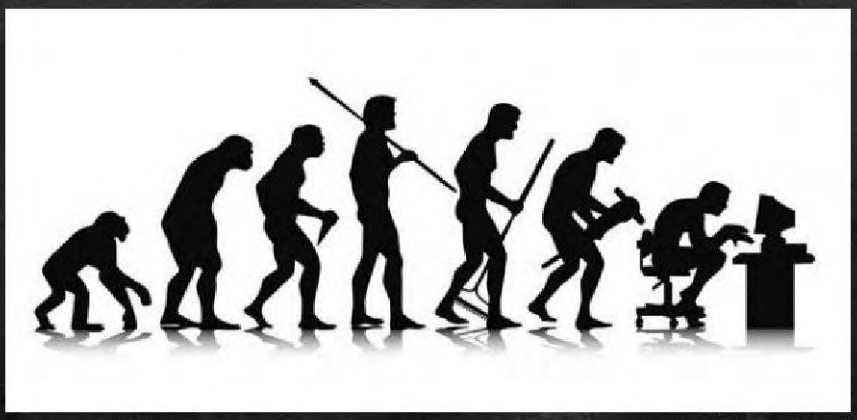
foresees the involvement of research subjects in certain activities



Methodological approaches

Personal approach

determines the educational process orientation to the personality development



Methodological approaches

Acmeological approach

enables determination the influence of various factors and means on the professionalism development

Methodological approaches

Integrative approach

takes into account over-objectivity and interdisciplinary relations

Methodological approaches

Competency approach

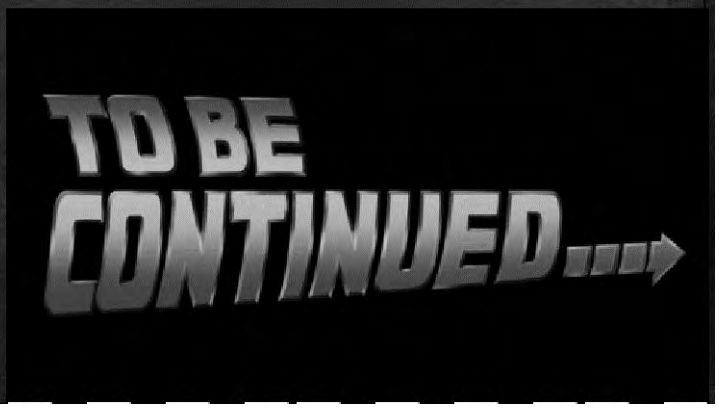
formation of necessary competencies which are manifestations of knowledge, skills, abilities, values, personal qualities and experiences

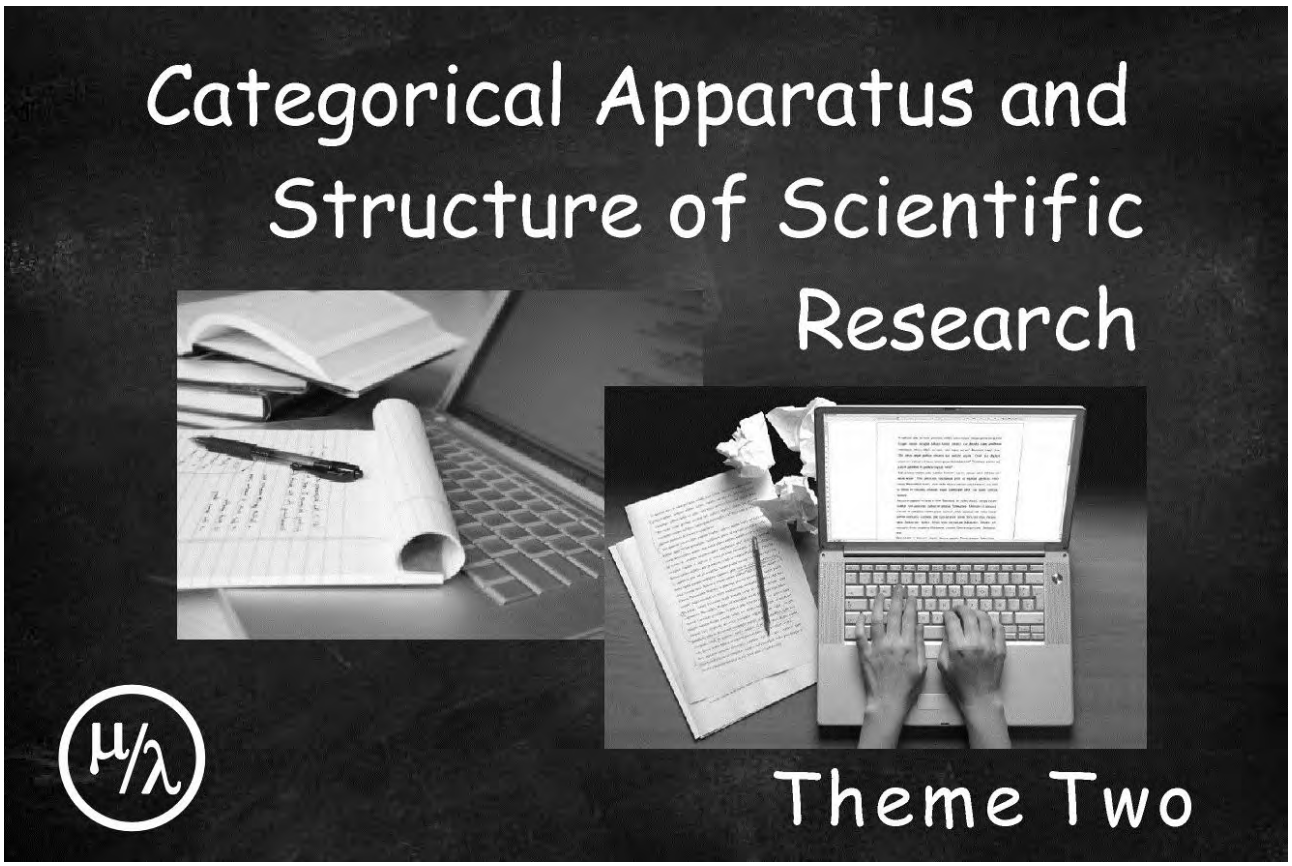
Methodological approaches

Transnational approach

foresees the study of events and phenomena occurring in different countries as well as their interrelations

THE END OF THEME ONE





Glossary

Words (word combinations, phrases)	Translation
categorical apparatus	категорійний апарат
research requirements	вимоги до дослідження
stages of research conduction	етапи проведення дослідження
availability	наявність
familiarization	ознайомлення
adjoining branches of science	сусідні галузі науки
concrete definition	чітке визначення
substantiation of expediency	обґрунтування доцільності
direct execution of the research	безпосереднє виконання дослідження
appendix	додаток
scientific (practical) significance	наукове (практичне) значення
to reflect existing contradictions	відображати існуючі (наявні) протиріччя
the practice witnesses	як свідчить практика

fruitful (fruitless) cooperation	плідна (безплідна) співпраця
introductory part	вступна частина
references	перелік посилань
in the following sequence	у наступній послідовності
author’s personal contribution	особистий внесок автора
constituent part	складова частина
in-depth study	поглиблене вивчення
attained to the present point	досягнуто на теперішній час
identified shortcomings	виявлені недоліки
with better quality than previously	кращої якості аніж попередні
aesthetic upbringing (breeding)	естетичне виховання (вихованість)
assumption	припущення
to appear gradually	поступово з’являтися
to play the decisive role	відігравати вирішальну роль
structural-time components	структурно-часові компоненти
structural-logic components	структурно-логічні компоненти
comprehensive study	всебічне вивчення
to evaluate (to assess) the effectiveness	оцінювати ефективність
the level of transformation	рівень перетворення
the supplementary level	рівень доповнення
the level of concretization	рівень уточнення
to undergo fundamental changes	зазнавати принципових змін
provability of conclusions	доказовість висновків
relevant institution (specialist)	відповідний заклад (фахівець)
to present for public discussion	представляти для публічного обговорення
qualitative indicator	якісний показник
quantitative indicator	кількісний показник
personal citation index	персональний показник цитування
for which practical purpose	з якою практичною ціллю
to be addressed directly to	бути безпосередньо спрямованим

Scientific research is a form of cognition process which is aimed at systematic objects investigation via scientific methods and tools. It usually ends with formulation of new knowledge about research object

Scientific research requirements

- actuality and topicality of the investigated problem;
- correctness of specific definition of the research strategy, goal, tasks and subject;
- organization and stages of the research conduction;
- availability of conclusions and recommendations for their use in practical activity

Main stages of any scientific research

1. Problem definition.
2. Theme formulation.
3. Familiarization with the present investigations on the chosen theme in the certain science and adjoining branches.
4. Collecting facts, their understanding, systematization and generalization.
5. Concrete definition of the research theme, goal and tasks.
6. Substantiation of the theme's topicality and expediency.

Main stages of any scientific research

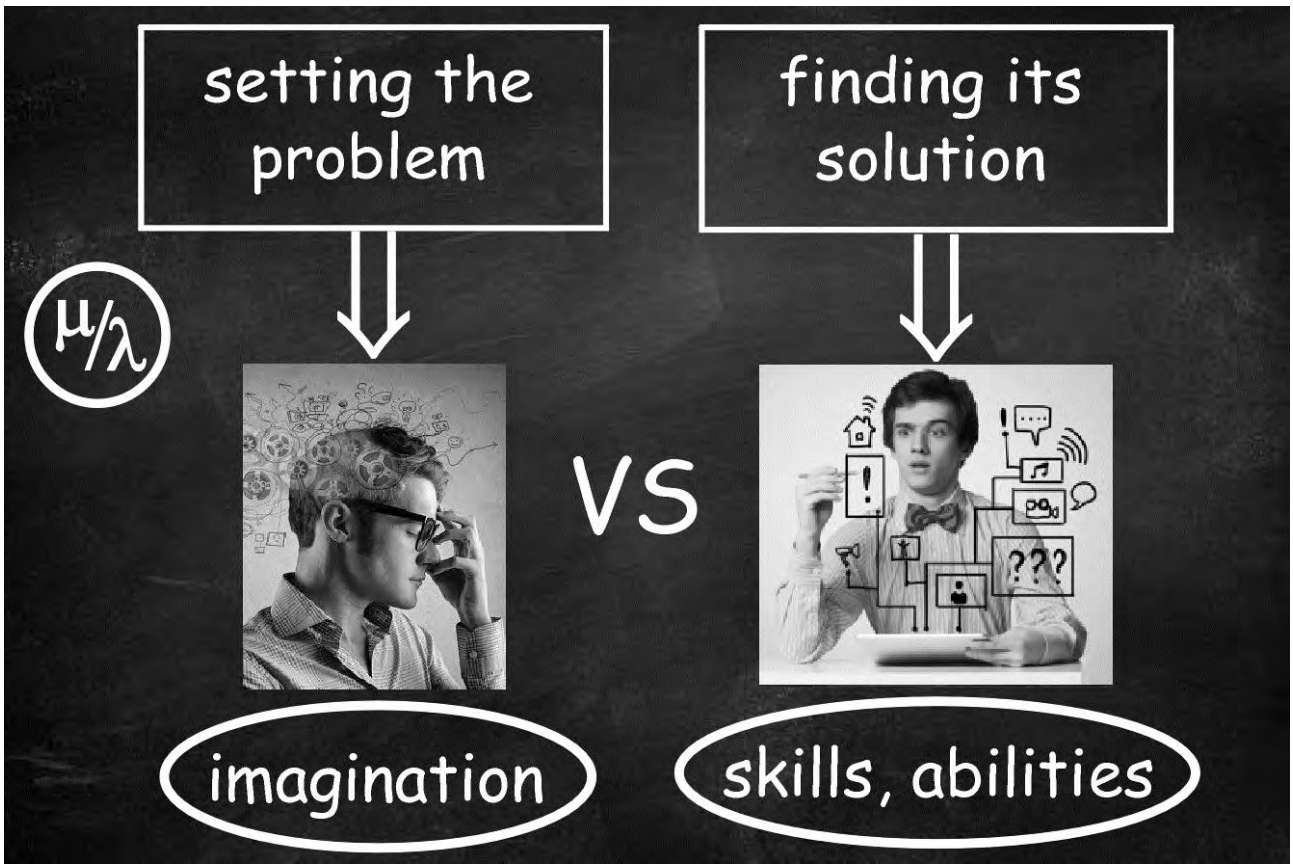
7. Choosing the research methods which are the tools for obtaining of factual material.
8. Direct execution of the research by means of general-scientific and specific research methods.
9. Approbation of the research results (carried out through speeches at scientific conferences, publishing articles, introduction theoretical results into practice).
10. Completion of the research paper text, list of used sources and appendixes.
11. Public defending of the research results.

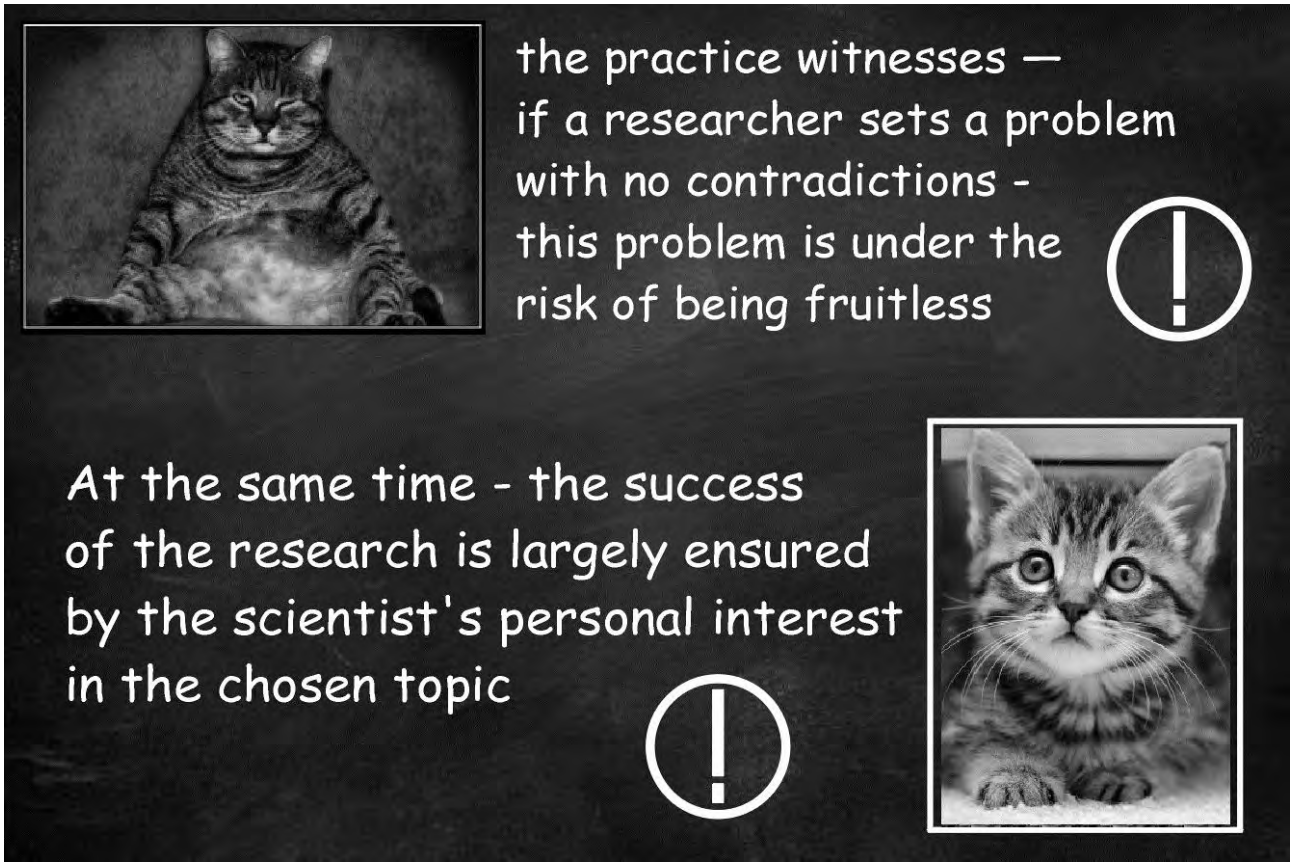
Main characteristics of scientific research

- problem
- theme
- actuality
- object
- subject
- goal
- tasks
- hypothesis
- main theses
- scientific novelty
- scientific significance
- practical significance
- approbation of results

Research theme - reflects definite direction of the research and secures the integrity of the whole investigation

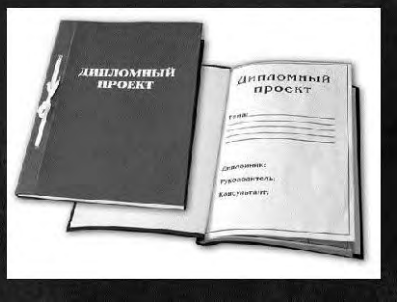
Research problem is a question or (set of questions) reflecting existing contradictions in the interpretation (understanding) the essence of the phenomenon. Solving of these contradictions must have practical, theoretical and educational interest.
The research problem shows the movement from the existing achievements of science to new approaches to solving certain issues


setting the problem
finding its solution
μ/λ
VS
imagination
skills, abilities


the practice witnesses —
if a researcher sets a problem
with no contradictions -
this problem is under the
risk of being fruitless
At the same time - the success
of the research is largely ensured
by the scientist's personal interest
in the chosen topic

Structure of the research paper

- title page
- content
- list of abbreviations (if necessary)
- introductory part
- paper's «main body» sections (2-3 chapters)
- conclusions
- references (list of used sources)
- appendixes (if necessary)



Structure of the research paper

Introductory part - general characteristics of work in the following sequence:

- actuality (topicality) of the theme
- research connections with scientific programs, plans
- research goal, tasks, object and subject
- methods used for execution of the research
- scientific novelty of the obtained results
- practical significance of the obtained results
- author's personal contribution (if done with co-authors)
- approbation of the obtained results (conferences)
- list of publications

Substantiation of actuality

- references to official state documents reflecting the importance of the chosen problem solution;
- definition of practical needs for improving certain constituent parts of the investigated phenomenon;
- characteristics of scientific knowledge the enrichment and completion of which the investigation is aimed:

WHAT aspects have already been investigated?
WHAT aspects are being under investigation now?
WHAT aspects require additional research?

Substantiation of actuality

Lack of theoretical positions + Urgent practical needs

Setting the problem

⇓

Formulating the research theme

Substantiation of actuality

Any scientific problem does not arise spontaneously. It is the result of in-depth study of theory and practice in one or another field of science, inspection of scientific literature, bibliographic references, as well as the status of the research institutions where the work is planned. While setting the problem the researcher shows that the level of knowledge attained to the present point, is insufficient against the background of:

- new factors and connections,
- identified shortcomings in existing concepts,
- the emergence of new practical needs.

Goal of the scientific research

Goal of the research denotes what the researcher wants to achieve. Goal is formulated in the light of theme and characterizes the estimated result.
The result must be constructive i.e. able to produce any socially useful product with better quality than previously. Formulation of the research goal is aimed at the final result, which should be obtained by the researcher in scientific work. Thus, the goal is the author's strategy in obtaining new knowledge about the object and subject of investigation.

Theme and Goal of the research

Theme of the research

- WHAT PROBLEM is under investigation
- FOR WHAT REASON this problem is under investigation

Goal of the research

- WHAT PROBLEM is under investigation
- FOR WHAT REASON this problem is under investigation
- HOW THE INVESTIGATION of this problem is conducted

EXAMPLE

Let us suppose that we study the problem of influence of television, broadcasting, printed sources and the Internet resources on the formation of aesthetic world-view and behavior of the University students

THEME - «influence of mass-media means on the students' aesthetic breeding»

GOAL - «theoretical substantiation and experimental verification of pedagogical conditions of mass-media's effective influence on the aesthetic breeding of student youth»

Research Goal and Hypothesis

Reaching the goal always demands understanding the author's standpoint which essence is introduced in the hypothesis. The research hypothesis means the assumption that is proposed to explain some phenomenon, the true meaning of which is still uncertain. Analyzing the research problem state, the scientist reflects on the need to find out, first of all, the most urgent issues, to formulate preliminary notions of relationships that may exist between known facts.

On this basis an idea of the hypothesis may gradually appear.

GOAL

⇓

HYPOTHESIS

Problem of influence of television, broadcasting, printed sources and the Internet resources on the formation of aesthetic world-view and behavior of the University students

EXAMPLE

HYPOTHESIS should be formulated as the assumption that «mass-media means play the decisive role in formation of the student youth aesthetic breeding»

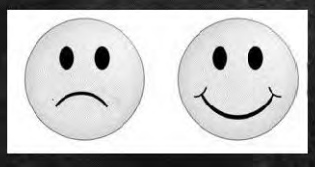
For reaching the research's goal and proving the hypothesis the scientist should set the list of definite research tasks ⇒

Scientific research tasks

Research tasks list is a specification of its general goal (what to do, how to do, sequence of actions). The tasks are usually formulated in one of two possible variants:

in the form of structural-time components that reflect its stages

non-optimal



structural-logic components of the research act as specific tasks

optimal

Scientific research tasks

There are several possible aspects:
- definition of the research stages;
- identification of the most significant features;
- determination the object's internal structure;
- substantiation of the means necessary for solution;
- comprehensive study of history and practice of solving the similar problems by other scientists;
- definition the causes, shortcomings and difficulties in the existing solutions;
- experimental verification of the used means necessary for solving the problem;
- elaboration of recommendations for practical use of the research's results.

Scientific research tasks

EXAMPLE

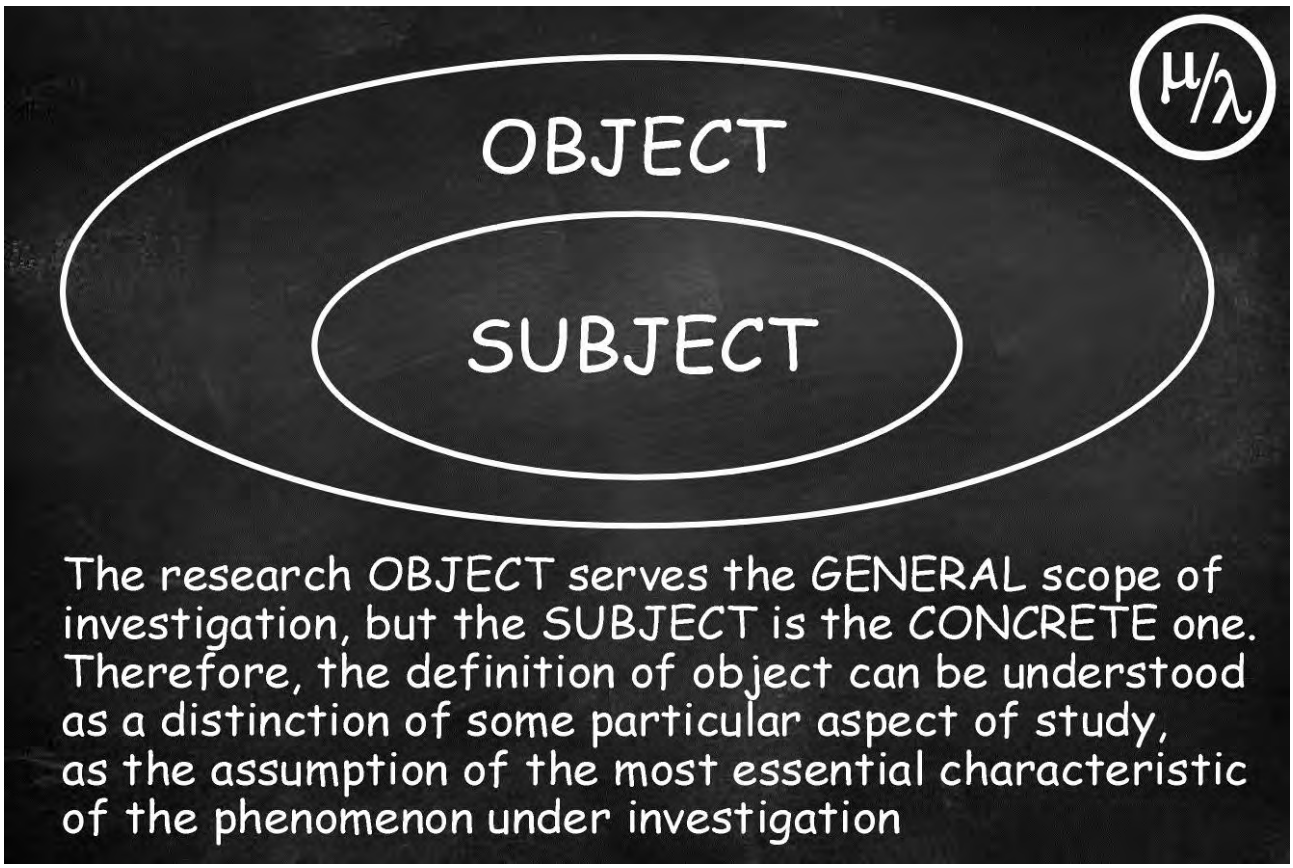
- to substantiate theoretical principles of the students' aesthetic breeding via mass-media means;
- to define the means of influence on the students' aesthetic breeding;
- to find out the role of mass-media in formation of the students' aesthetic breeding;
- to determine the criteria and indicators of the level of formation the students' aesthetic qualities via mass-media means;
- to elaborate, substantiate and experimentally verify the effectiveness of the pedagogical technology of students' aesthetic upbringing via mass-media means;
- to develop methodological recommendations for higher school teachers on aesthetic upbringing of students via mass-media means.

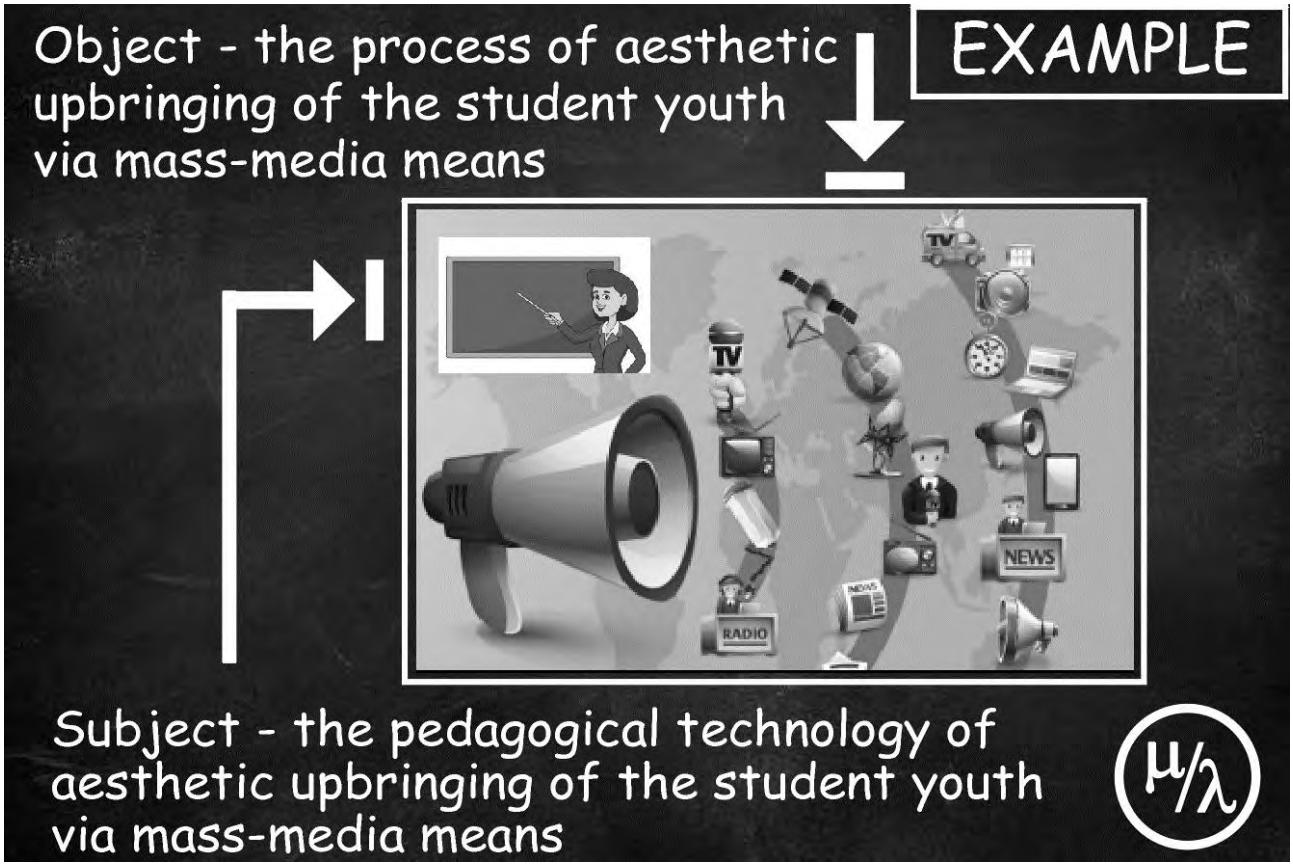
Object and Subject of the research

Research OBJECT is a part of practice or scientific knowledge which the researcher deals with. It may be both a process and a phenomenon that generates the investigated problem situation.

Research SUBJECT is always within the object. Object and subject correlate as something general and something particular.

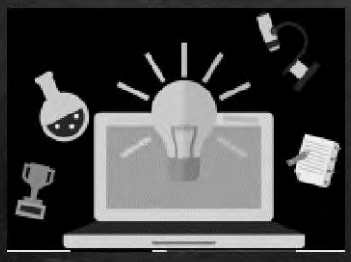
Within the object one can define a certain part which may be regarded as subject. One and the same object may be the subject of various investigations. Object and subject should be new for science or at least one of them must be new.


OBJECT
SUBJECT
The research OBJECT serves the GENERAL scope of investigation, but the SUBJECT is the CONCRETE one. Therefore, the definition of object can be understood as a distinction of some particular aspect of study, as the assumption of the most essential characteristic of the phenomenon under investigation

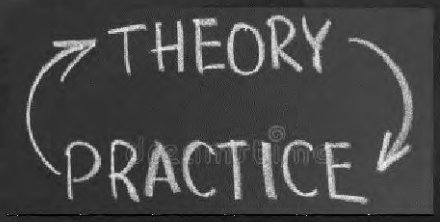

Object - the process of aesthetic upbringing of the student youth via mass-media means
EXAMPLE
TV
RADIO
NEWS
Subject - the pedagogical technology of aesthetic upbringing of the student youth via mass-media means

Main parameters for evaluating the results of scientific research

scientific novelty



theoretical and practical significance



readiness of the results for implementation

Levels of scientific novelty

The level of TRANSFORMATION is characterized by introduction of fundamentally new knowledge for a certain field of science which is independent and having great scientific value.

In the paper this level is introduced as following: «for the first time it has been obtained (defined, proven, received …)»

Levels of scientific novelty

At the SUPPLEMENTARY level the research results bring the new elements into theoretical and practical knowledge without changing its essence.

In the paper this level is usually introduced as «it has been specified that … »

Levels of scientific novelty

At the level of CONCRETIZATION the research results detail certain positions and regulations of the early elaborated postulates and well known principles.

In the paper this level is usually introduced as «it has got further development … »

Theoretical significance

Theoretical significance shows what problems, conceptions, fields of knowledge have undergone fundamental changes that are aimed at the general science enrichment and development.

Main criteria for theoretical significance:
- the essence and laws of processes and phenomena which are directly related to the scientific novelty;
- degree of the theoretical positions formation;
- provability of the conclusions;
- perspectives of the research results for processing the matters of applied nature.

Practical significance

Practical significance includes substantiation of new results, recommendations and propositions for their implementation in practical activity. It characterizes actual shifts which have already been obtained or may be obtained in future through the implementation the research results into practice.

Ways of practical implementation

Direct - the results are addressed directly to the relevant institutions and specialists for further use

SCIENCE →  → PRACTICE

Indirect - the results are included in general theory and then (as a part of theory) can influence practice

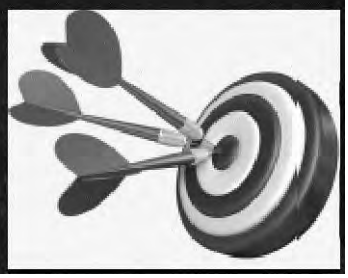
THEORY

SCIENCE →  → PRACTICE

Determination of practical significance

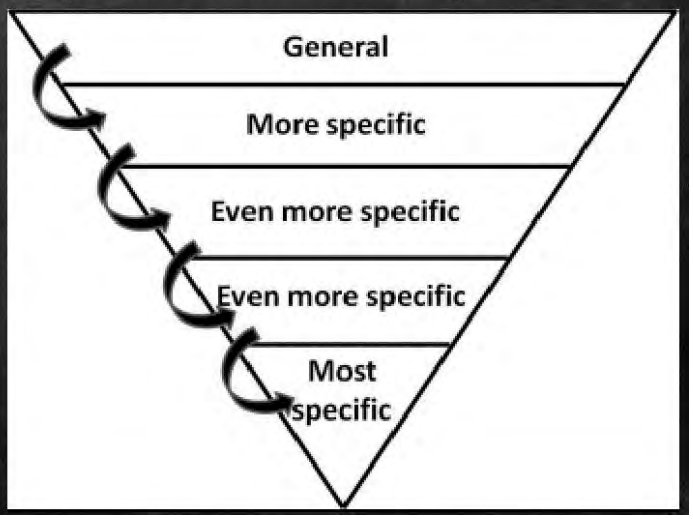
It is usually shown:

- how, where and for what purpose the research results and conclusions may be used;
- in what form the results are presented (methodical recommendations, rules, programs);
- what economical, social, psychological or pedagogical effect is expected from the results implementation;
- why and for which practical purposes it is necessary to use precisely these results obtained in precisely this not in any other research.



Definition of practical significance

Understanding of the possibilities of applying the new knowledge gained should be specific. Thus it should be clearly explained where a specific research result will help to correct a certain deficiency in practical activity.



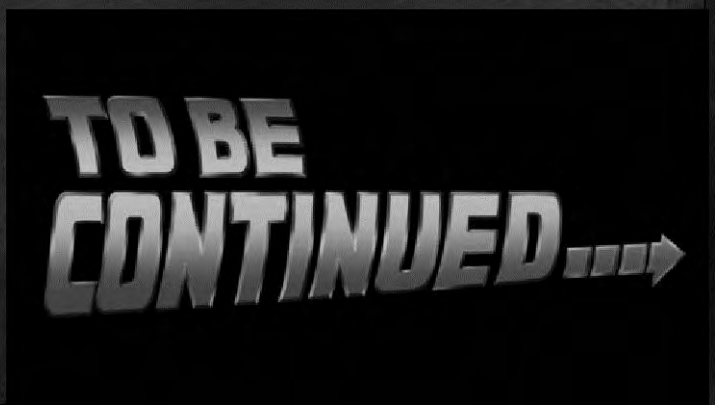
Results Approbation

Approbation of the research results is usually carried out at various scientific congresses, symposiums, conferences, seminars, meetings where they are presented for public discussion

Results Publication

One of the most important quantitative indicators of the researcher's work is his publication activity and personal citation index. It shows the number of the researcher's published works reflecting the main results of the study

THE END OF THEME TWO

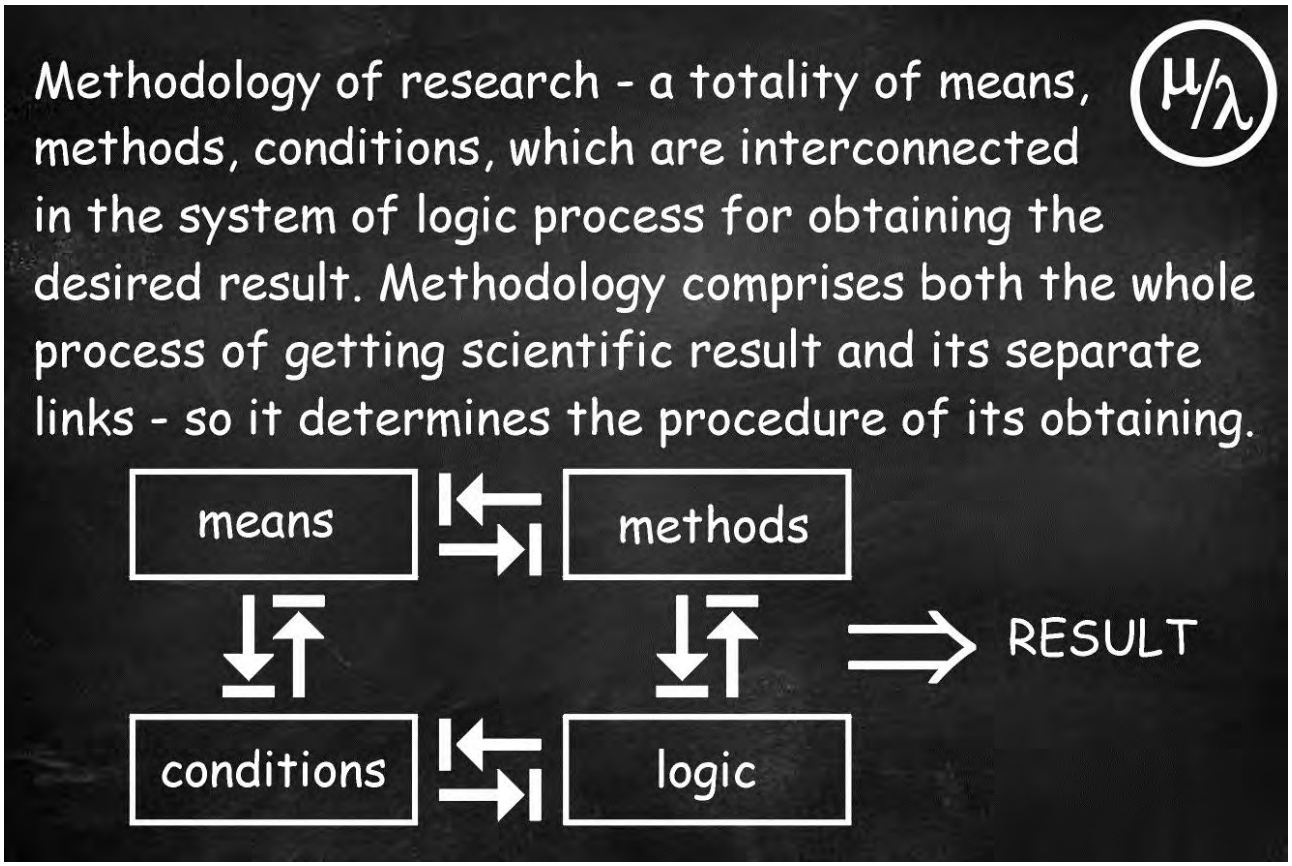


Glossary

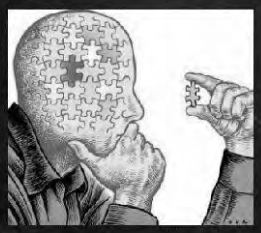
Words (word combinations, phrases)	Translation
totality of means	сукупність засобів
desired (wishful) result	бажаний результат
to complement	доповнювати
to reinforce	підсилювати
unpredictable factors	непередбачувані чинники
observation	спостереження
comparison	порівняння
measurement	вимірювання
generalization	узагальнення
purposeful	навмисний
cause-effect relations	причинно-наслідкові зв’язки
prerequisite	передумова
sufficient qualification	достатня кваліфікація

verification	перевірка
to eliminate side-effects	усувати побічні ефекти
simultaneously	одночасно
to interfere with	втручатись
similarity (dissimilarity)	подібність (несхожість)
homogeneous	однорідний
periodicity	періодичність
intermolecular gravity force	сили міжмолекулярного тяжіння
simplification	спрощення
unambiguous	чіткий, конкретний, однозначний
prediction	передбачення
speculation	міркування
solitary judgment	одиночне судження
probability	ймовірність
dissemination	розповсюдження
commensurate	відповідний, підходящий за розміром
to decompose	розбирати на складові частини
inherent	притаманний
less accessible	менш досяжний
semiotics	семіотика (наука про знаки, символи)
to streamline	спрямовувати, раціоналізувати
wardrobe	одежна шафа
wormwood	полин (рослина)
intrinsic heterogeneity	внутрішня неоднорідність
labyrinthine	дуже заплутаний
stirring-up	активізація, стимуляція
likely outcome	вірогідний результат
brainstorming	«мозковий штурм»

incompatibility	несумісність
habitual	звичний, банальний
pasteboard box	картонна коробка
clearly articulate	чітко висловлювати
footsteps of success	«сходинки успіху»
previously gained experience	попередньо здобутий досвід
persistent	наполегливий
to postpone for later	відкладати на потім
failure	невдача, провал, поразка
to take responsibility	брати відповідальність
inadequate	невідповідний, неадекватний
to mix up private and public	змішувати приватне та суспільне
self-confidence	впевненість у собі
excessive self-assurance	надмірна самовпевненість



Method of research is a totality of techniques and operations of both practical and theoretical character plus the understanding of what, how and in what sequence one should realize various actions for solving the definite tasks. In other words, it is the tool-kit to help the researcher provide solving of main tasks, obtaining the goal of investigation. As a rule one should use the complex of research methods



theoretical

+

empirical

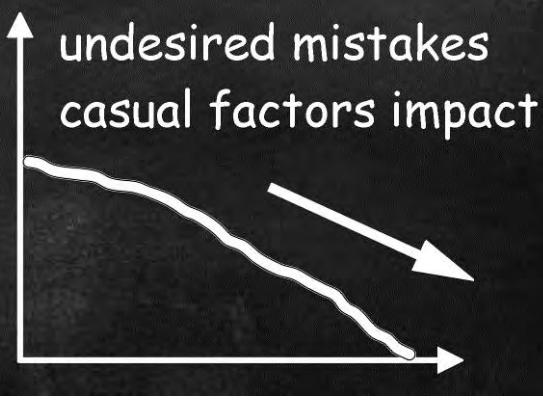
+

statistic

Methods of research

For obtaining the optimal result it is worth using several methods complementing and reinforcing each other

method 1 + method 2 + … + method N



General-scientific methods of research

There are plenty of general-scientific methods which may be applied to any science but every concrete branch has its own specific methods of investigation. General-scientific methods are conditionally divided into three main types:

- Empirical
- Universal
- Theoretical

General-scientific methods of research

Empirical methods are applied on the stage of initial collecting of facts (direct investigation of really existing objects)

- observation
- comparison
- experiment
- measurement
- calculation

General-scientific methods of research

Theoretical methods are applied
on the stage of knowledge generalization
(disclosure of rules and laws, offering hypotheses)

abstraction ⇄ idealization

⇅ induction-deduction ⇅

formalization ⇄ extrapolation

μ/λ

General-scientific methods of research

Universal methods may be applied
on both empirical and theoretical levels

modeling

analysis

synthesis

⇒

classification

analogy

logical method

historical method

μ/λ

Empirical methods of research

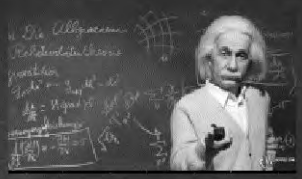
The basis of empirical methods of research is EXPERIMENT (from Latin - try, experience). This is a purposeful object study for identifying previously known properties (qualities) or checking the correctness of theoretical postulates. Any experiment has a particular research idea and a clear purpose.

Experiment enables the researcher to:

- identify cause-effect relations between different phenomena
- find out the dynamics of processes and their essence
- prove or disprove the existing theoretical positions
- can become a prerequisite for a new theory or hypothesis to be tested by new experiments

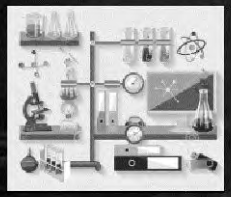
Empirical methods of research

setting clear goal



existent theoretical positions

Experiment requirements



appropriate technical support

sufficient experimenter's qualification

Empirical methods of research

Experimental research advantages:
- verification of the theoretical positions correctness;
- ability to avoid or eliminate side-effects;
- possibility of creating favorable artificial conditions;
- detection of previously unknown properties;
- possibility of multiple repetition in different conditions.

Experimental research disadvantages:
- difficulty in considering all possible factors of influence;
- difficulty in finding out which factors have the greatest impact;
- difficulty in predicting how the process will proceed if all parameters are changed simultaneously.

Empirical methods of research

Laboratory experiments are carried out using facilities, modeling devices, special equipment, which allow studying the influence of some characteristics in the variation of others.

However, laboratory experiments do not always allow simulating real phenomena or processes, therefore, there is a need for production experiments.

Empirical methods of research

Production experiments are carried out at enterprises in real conditions, taking into account the influence of the production environment factors. Field experiments are also used in production experiments. They are widely used in archeology, biology, ecology, hydrology.

Both laboratory and production experiments provide extensive use of observation, comparison, measurement and calculation.

Empirical methods of research

Observation - systematic purposeful perception of an object's individual aspects or the object as a whole. The researcher must not interfere with the object's behavior, but only captures its qualities, features, characteristics, etc.

Depending on the duration they are divided:

- long-term
- short-term
- continuous
- discrete

Empirical methods of research

Peculiarities of scientific observations

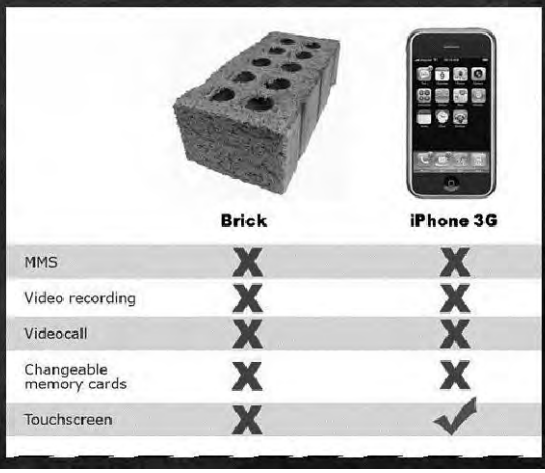
- purposefulness
- objectivity
- planned character
- authenticity
- activity
- absence of influence

The effectiveness of scientific observations is reinforced via using specialized tools: telescopes, microscopes, photo, audio, video, night-vision equipment

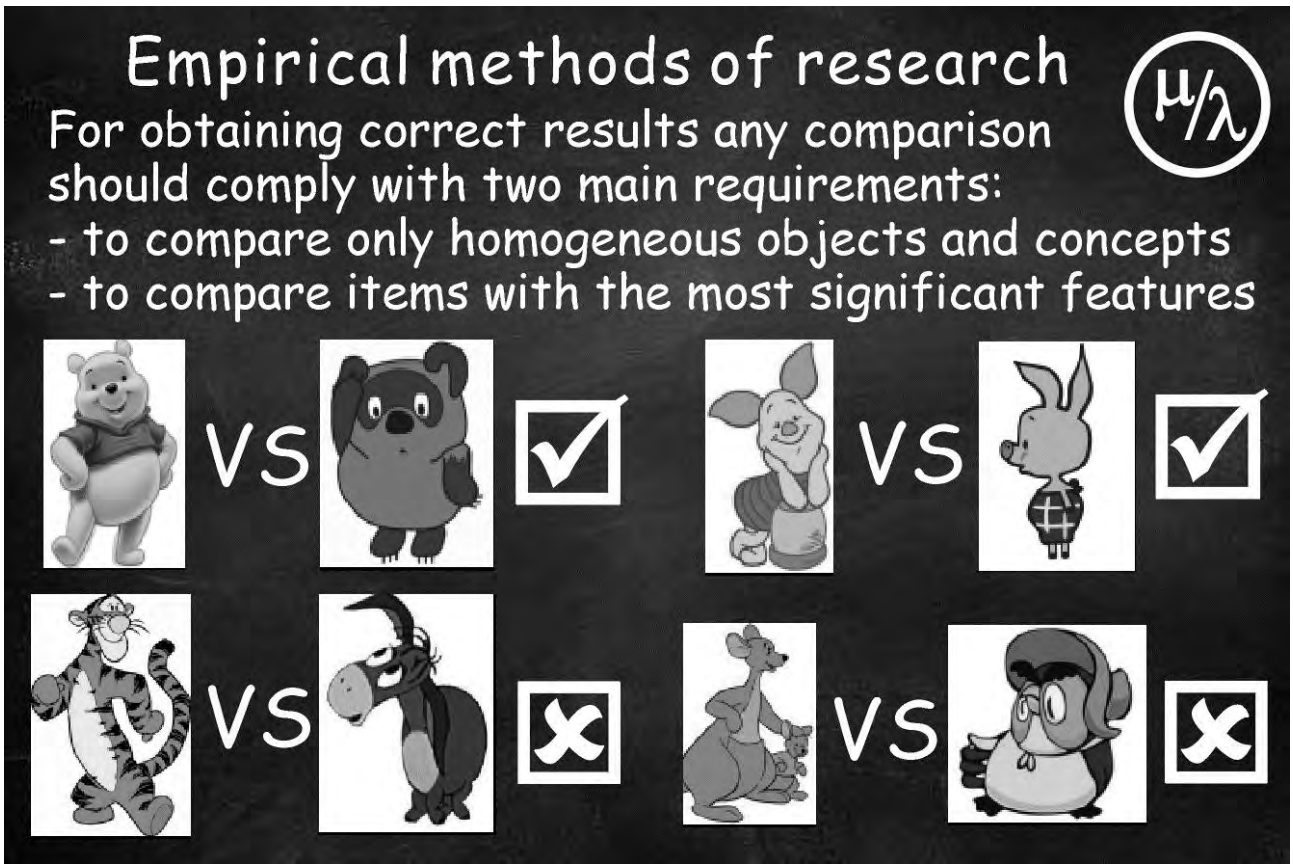
Empirical methods of research

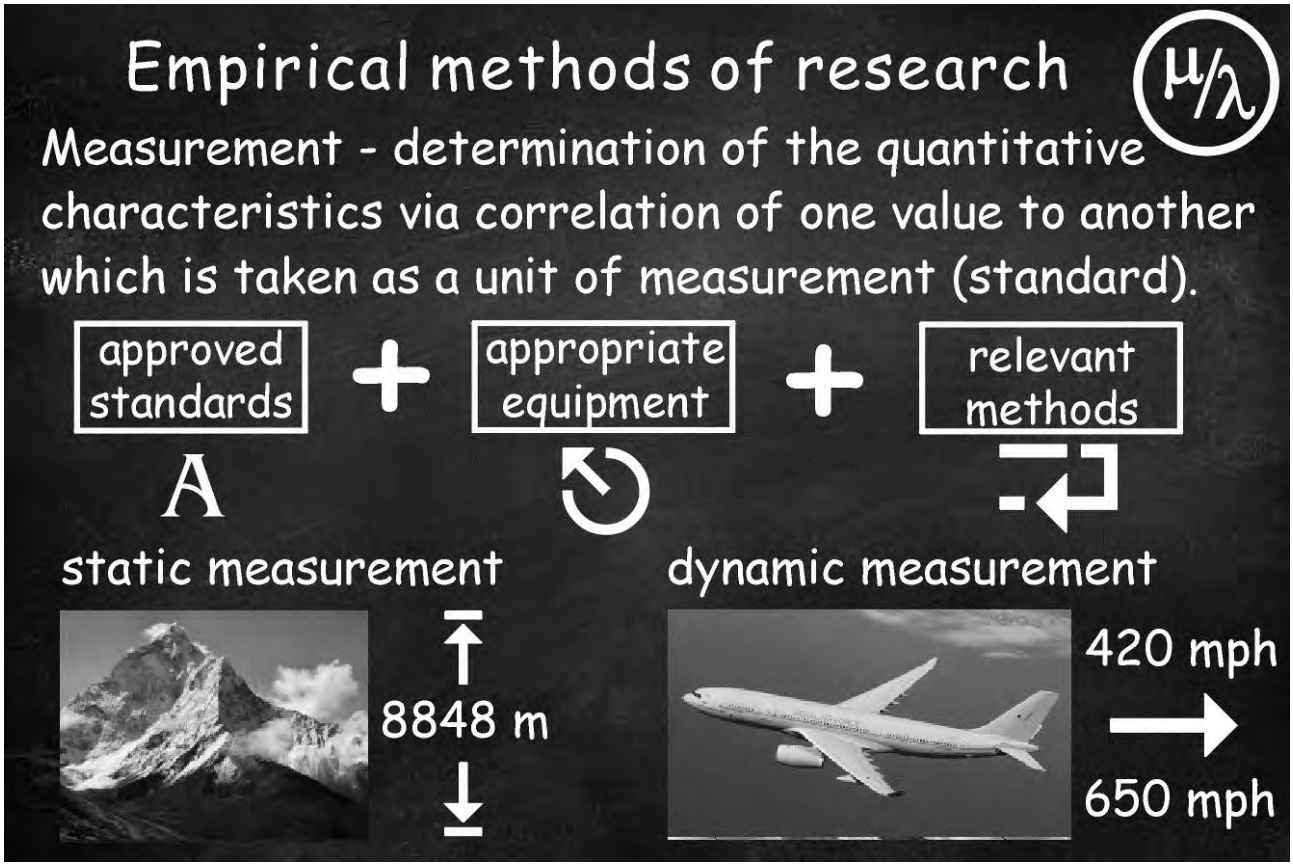
Comparison - determination of similarity or dissimilarity of two or more objects (phenomena). It may be direct or indirect (through intermediate objects). Comparison is carried out for the most significant common features.

Here is a well-known humorous example of incorrect comparison the first model of I-phone with a usual silicate brick. According to this comparison the first I-phone differs from a silicate brick only with … a presence of a touch-screen)))

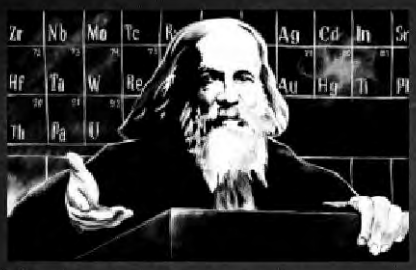


	Brick	iPhone 3G
MMS	X	X
Video recording	X	X
Videocall	X	X
Changeable memory cards	X	X
Touchscreen	X	✓


Empirical methods of research
For obtaining correct results any comparison should comply with two main requirements:
- to compare only homogeneous objects and concepts
- to compare items with the most significant features
VS
VS
VS
VS


Empirical methods of research
Measurement - determination of the quantitative characteristics via correlation of one value to another which is taken as a unit of measurement (standard).
approved standards
appropriate equipment
relevant methods
A
static measurement
dynamic measurement
8848 m
420 mph
650 mph

Empirical methods of research



«The science arises where measurement begins»
(Dmytro Mendeleyev)

Main measurement units:
- length (meter)
- mass (kilogram)
- time (second)
- current strength (ampere)
- temperature (kelvin)
- matter amount (molar)
- light intensity (candela)

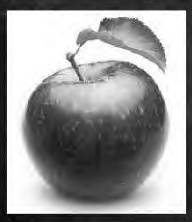
In Pedagogics (Psychology):
- level of knowledge
- readiness for activity
- development of skills
- level of socialization
- ability for learning
- assimilated values
- features of character

Empirical methods of research

Calculation - is the process of obtaining a result via mathematical operations over digits and numbers

Theoretical methods of research

Abstraction - imaginary isolation of the common or the most essential properties and characteristics of the investigated phenomenon (object).



APPLE (known) is red, round-shaped, sweet, aromatic, with green leaves, eatable

On the basis of a particular investigated phenomenon (object), an abstract conclusion is made that the same results can be obtained for other similar objects.

PEACH (unknown) is red, round-shaped, sweet, aromatic, with green leaves, also eatable

Theoretical methods of research

Abstraction as "potential ability"

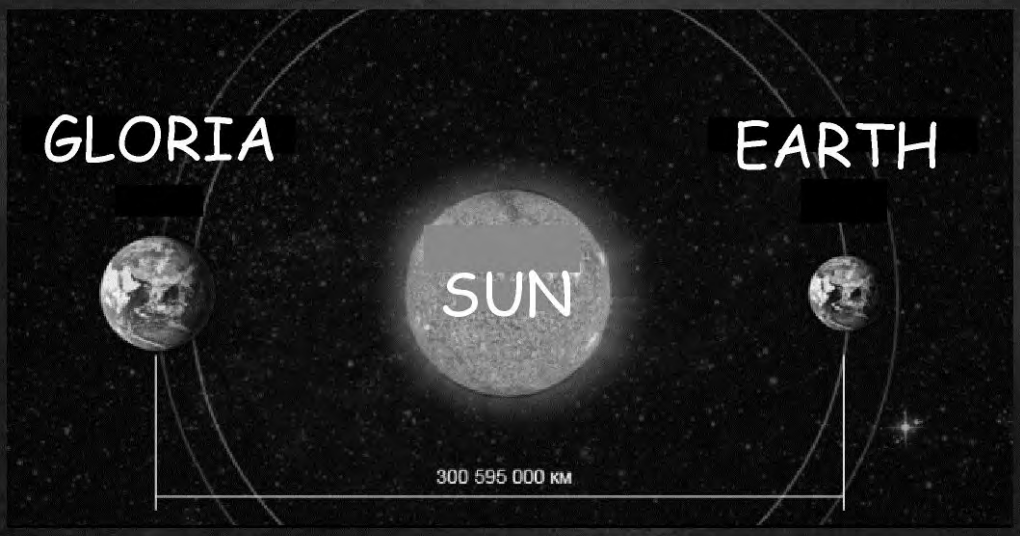
DOLLY-sheep
was successfully cloned
(investigated phenomenon
and proven fact)

$\Rightarrow$

HUMAN
also can be
successfully
cloned

Theoretical methods of research

Abstraction as constructivization



Law of the planets symmetry (proved by Butusov)

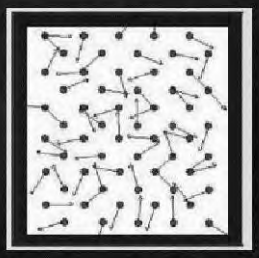
Theoretical methods of research

Idealization is used for super-complex objects.
The object of investigation is considered as possessing only certain features which are under investigation.
Other features are ignored (simplification).

RESULT - simplified theoretical model of the object

Ideal gas in Physics:

- intermolecular gravity forces are absent;
- molecules interaction occurs only during collisions, the molecules are elastic;
- molecules have no volume, so they are regarded as material points.



Theoretical methods of research

Formalization is the use of a sign form of artificial languages. Formulas and symbols in Mathematics, Physics, Chemistry, Biology, and other sciences are used to study real events.

$$A = A_0 \cdot e^{kt}$$

Exponential law can be used for describing many processes not only in Physics, but also in Economics, Biology, Radiology, Sociology.

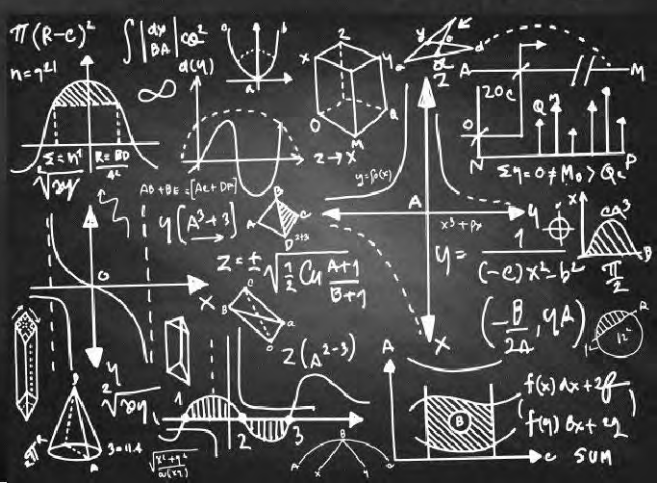
According to this law (for example):

- population of animals in a particular area increases;
- information is distributed in the society;
- currency amount grows in the bank account.

Theoretical methods of research

Advantages of formalization method:

- high degree of generalization (one formula describes many different processes);
- bravity and clarity of the obtained knowledge fixation;
- clear and unambiguous results of the research;
- possibility of theoretical prediction the result which hasn't been yet obtained in practice.



Theoretical methods of research

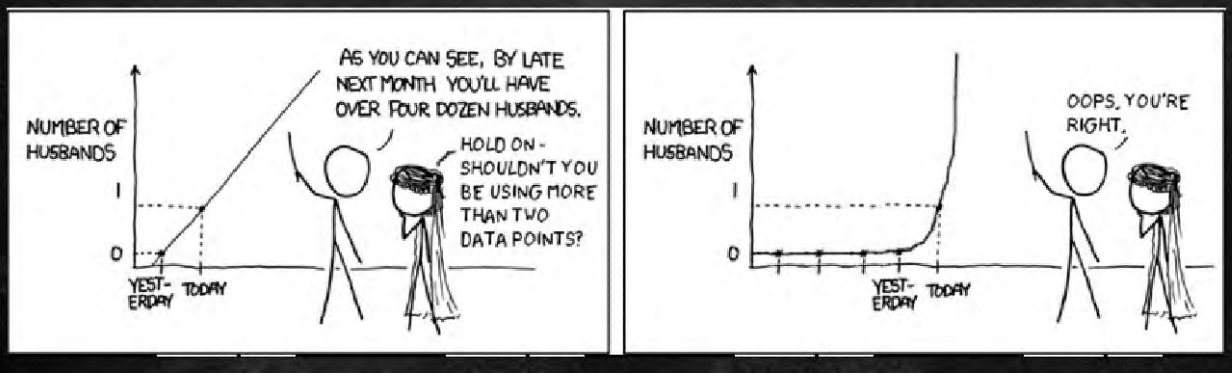
Deduction is derived via speculation from «general» to «specific». The deductive method is based on scientific positions and postulates that require no experimental confirmation but are perceived as axioms. The deductive method is used after collecting the necessary information on the research problem, on the basis of which individual conclusions and judgments are made from the general conclusions. Thus the famous detective Sherlock Holmes NEVER used the deductive method (A.C.Doyle was wrong!)

Theoretical methods of research

Induction - the logic of knowledge unfolds from «specific» to «general», from «known» to «unknown». The general position is derived logically from solitary judgments. The inductive method is used after collecting separate judgments on the research problem, on the basis of which the general conclusion is made. Inductive knowledge is probable because it always expresses the assumption of a certain regularity, the probability of which is checked by experimental research. So Sherlock Holmes used inductive — not deductive — method of investigation.

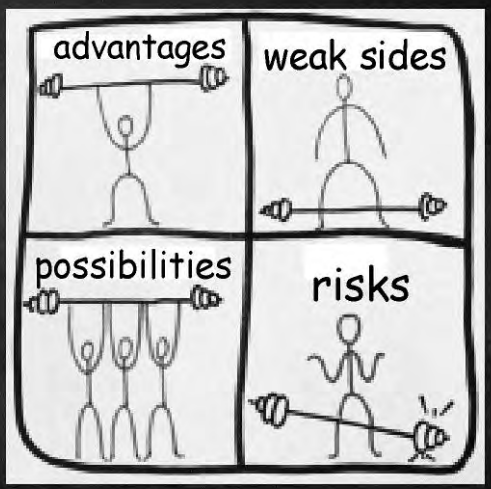
Theoretical methods of research

Extrapolation - dissemination of conclusions obtained for one part of a system to other parts of the same system.
But the size of the extrapolated part must be commensurate with the size of entire system.



Universal methods of research

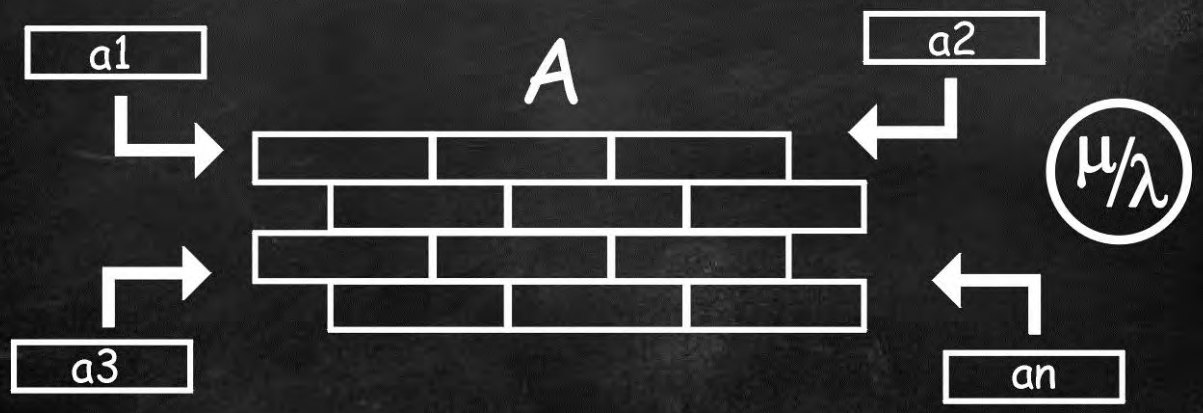
Analysis is a method of scientific research where a particular phenomenon is decomposed into constituent parts.



Analysis gives opportunity to:
- study object's structure
- clear up inherent contradictions
- separate essential features from inessential
- reveal the various ties of the object under consideration with other objects of reality

Universal methods of research

Synthesis - study of the phenomenon as a whole, on the basis of the uniting related elements into a single whole. Synthesis allows generalizing concepts, laws and theories.



Universal methods of research

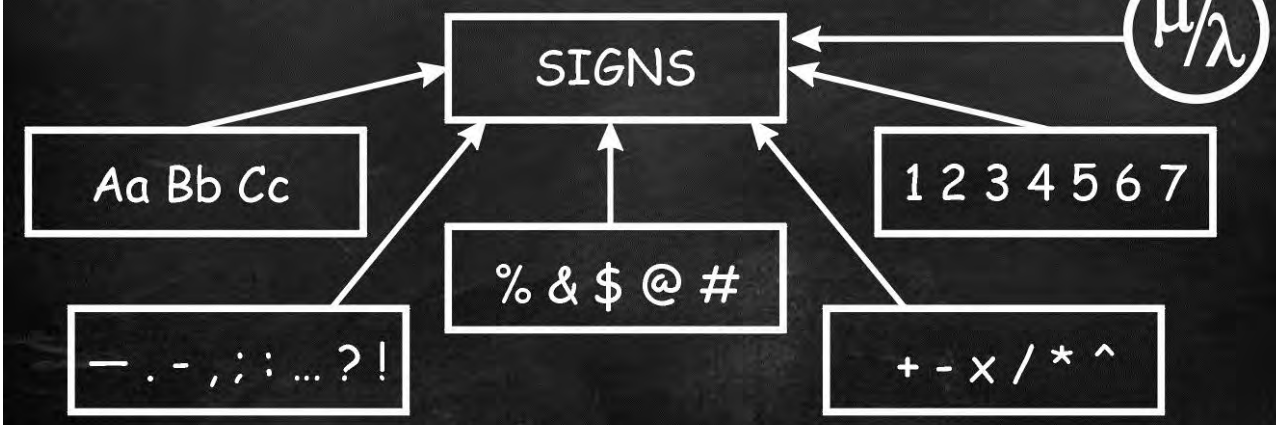
Analogy is a similarity of generally different objects (phenomena) in certain properties, signs or relations.

dominant
recessive
characters
green peas

Using analogy the researcher takes the knowledge acquired during study of an available object (model) and transfers it to another (less accessible, less researchable, less visible) object.
Therefore this knowledge is always hypothetical.

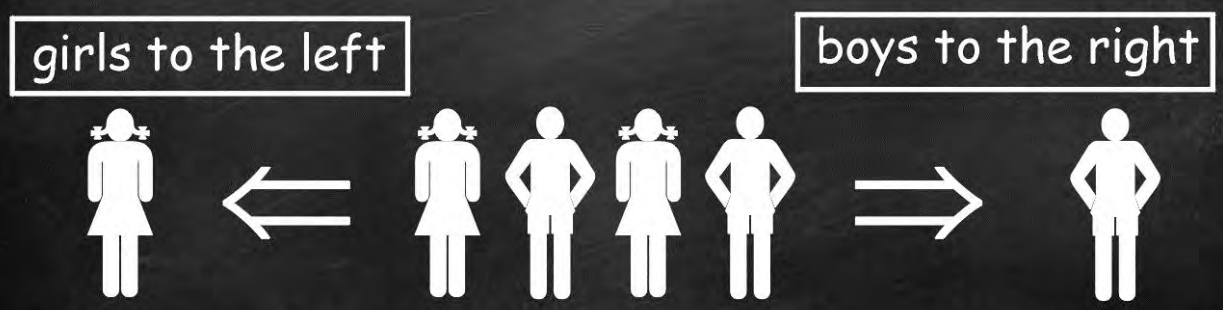
Universal methods of research

Generalization - the logical process of transition from «individual» to «general». It's the form of common features reflection. Generalization is carried out by abstracting from specific features and identifying common features inherent in certain objects.



Universal methods of research

Classification (categorization) - division of objects or phenomena into different groups according to previously determined signs.

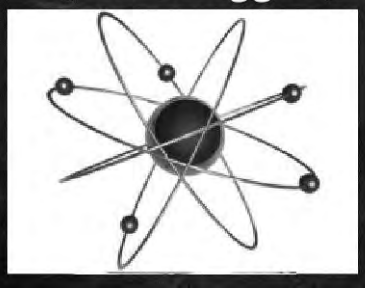


Classification is used at the initial stages of study and provides opportunity to streamline and classify phenomena based on their homogeneity.

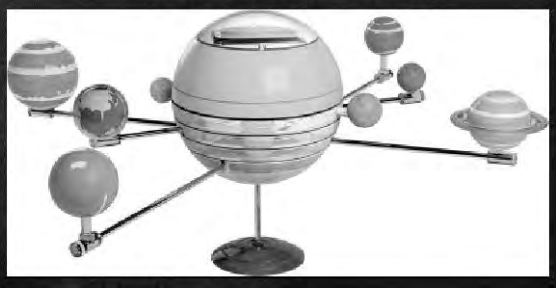
Universal methods of research

Modeling is the studying the cognition object's model on the basis of abstract-logical thinking, principles of visibility and objectivity. The model is an object that replaces the original in the research process, the results of which are distributed to the original.

atom's structure model (much bigger)

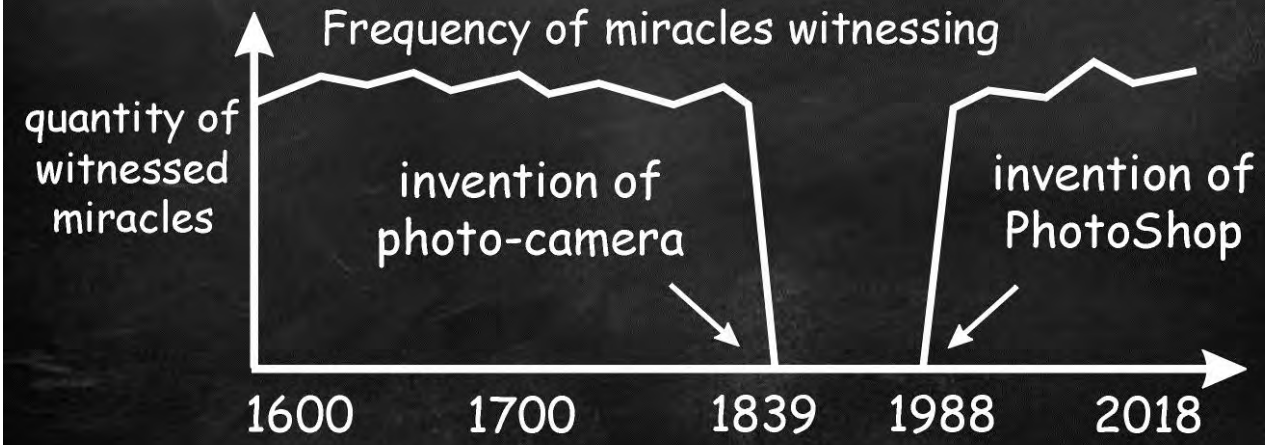


the Solar system model (much smaller)



Universal methods of research

Historical method - comprehensive study of phenomena and events in chronological sequence in order to discover their internal connections and patterns of development.



Universal methods of research

Applying logical method, the researcher develops available theoretical representations or proposes new theoretical assumptions on the basis of his own elaboration, critical analysis and formulation of his proposals.

Statement

«if you buy a wardrobe
you must gather some wormwood»

Logical explanation

⇒

you buy a wardrobe - you keep there you clothes - your clothes is made of wool - moth appears in your wardrobe - moth eats wool - moth can spoil your clothes - wormwood drives the moth out - so you must gather some wormwood

Statistic methods of research

Methods of analysis statistic data are used when it is necessary to obtain and substantiate judgments about a group of objects with some intrinsic heterogeneity.

Methods of applied statistics are divided into 3 groups:

- methods of general purpose (regardless the application field's specifics);
- methods of statistical analysis of real phenomena and processes according to the needs of a certain field of activity;
- methods of statistical analysis of specific data

Heuristic methods of research

Heuristics (from Greek heuristiko - find, open) is a science that studies creative activity and methods used in the discovery of something new. Heuristics purpose is to build a new model of solution.

There are 3 types of such models:
- «blind search» model (method of tries and errors);
- «labyrinthine» model (search process is similar to passage of labyrinth);
- structural-semantic model (reflects semantic relations between objects making up the problem area).

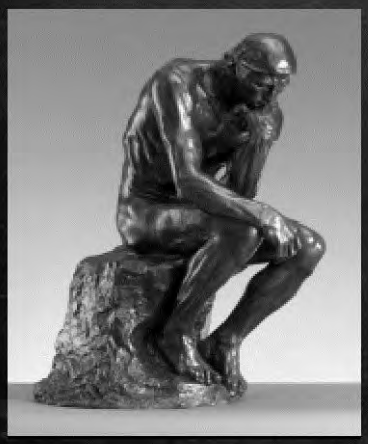
Creative methods of research

Creativity covers a certain set of mental qualities that determine the ability to creative activity, in particular, the ability of divergent thinking.

Creativity is determined by an integral indicator which is characterized by combination of:
+ intellectual factors
+ motivational factors
+ procedural components of thinking
+ personal components of thinking

Methods of research's stirring-up

Method of «tries and errors» - certain research actions are conducted «blindly», without foreseeing any likely outcome.



idea 1 → No → Yes

idea 2 → No → Yes

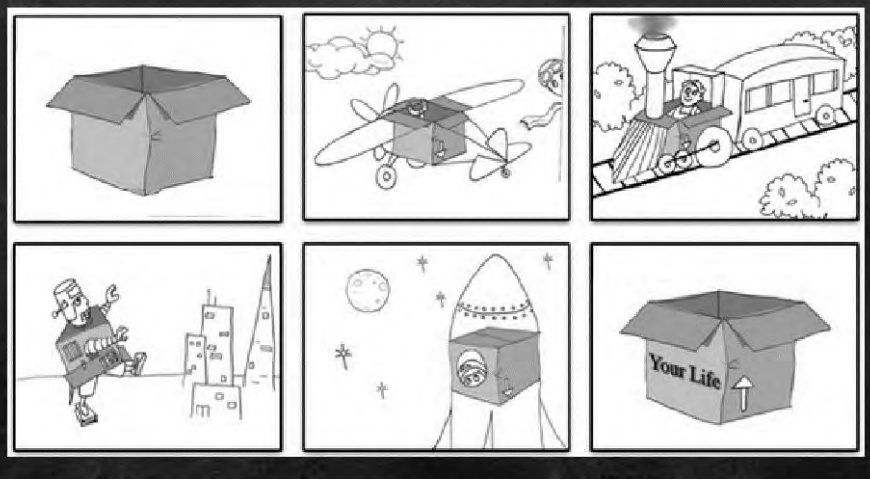
idea 3 → No → Yes →

Methods of research's stirring-up

«Brainstorming» method - discussion of the problem by a group of researchers (5-12 people) when everybody is allowed to express any of his (even crazy) ideas. Creative atmosphere is absolutely necessary here.

Methods of research's stirring-up

Method of synectics - looking at a problem from an unexpected point of view, combination of incompatible, at first glance, things. Method's motto is «to make the unusual - habitual, to make the usual - extraordinary»



Methods of research's stirring-up

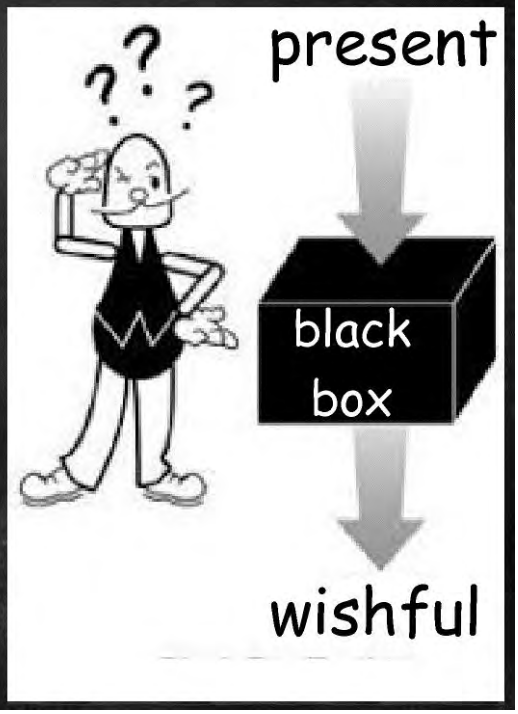
Organizational method - making the list of clearly formulated questions, which need to be answered.

Individual qualities required for purposeful planning:

+ ability to see and clearly articulate the task
+ ability to quickly generate a sufficient number of ideas for a limited time
+ ability to find original ways of thinking
+ ability to quickly come up with the most incredible solutions

Methods of research's stirring-up

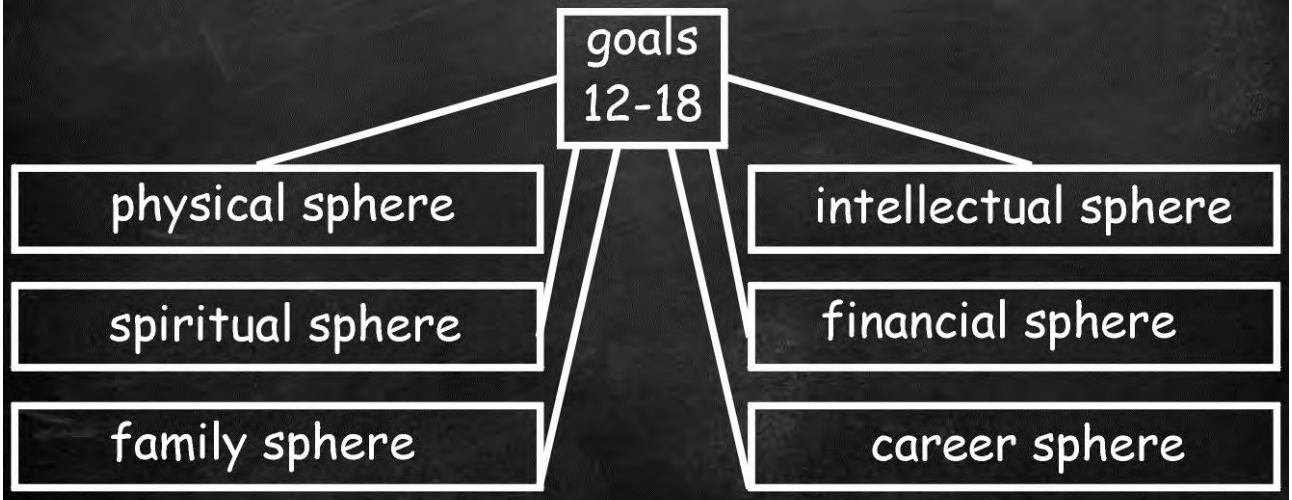
«Black box» method - looking for the necessary transformative research activities for obtaining the wishful result from the present materials (facts, phenomena, properties).



Methods of research's stirring-up

Method of «short-term and long-term goals»

Short-term goals (terms of realization - up to 90 days)



Methods of research's stirring-up ⇒

Long-term (strategic) goals (terms of realization 2-3 years)

Brian Tracy's "footsteps of success"

6. Define the goal dead-lines
5. Define your initial position
4. List of the achieved goal benefits
3. Define the very essence of your goal
2. Believe in the need to succeed
1. Wake up your desire to achieve success

μ/λ

Methods of research's stirring-up ⇒

Long-term (strategic) goals (terms of realization 2-3 years)

Brian Tracy's "footsteps of success"

12. Make decision not to give up
11. Imagine yourself successful
10. Make your clear plan of actions
9. List of the people who can help you
8. Find out future necessary resources
7. List of existing barriers to overcome

μ/λ

Methods of research's stirring-up

Long-term (strategic) goals (terms of realization 2-3 years)

Brian Tracy's "footsteps of success"

!!! SUCCESS !!! SUCCESS !!!

n. Action N

- - - - - - - - - - -

15. Action 2

14. Action 1

13. Direct all efforts toward reaching goal

Main features of a human with «the intellect of success»

1. Can provide motivation for himself

Main features of a human with «the intellect of success»

2. Able to control own impulses

Main features of a human with «the intellect of success»

3. At the decision-making level, in familiar situations can act quickly, basing on previously gained experience

Main features of a human with «the intellect of success»

4. In non-standard cases, the consideration of the problem takes him enough time

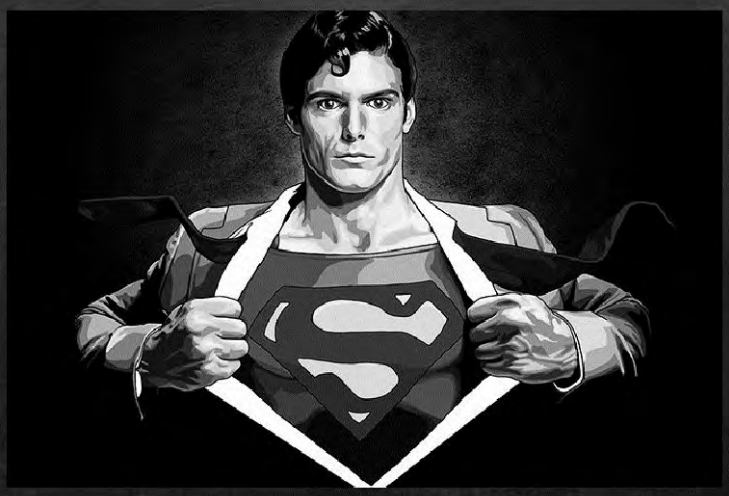
Main features of a human with «the intellect of success»

5. Knows when it's necessary to be persistent in achieving the goal, does not throw the matter before a certain time and timely stops if the problem can't be currently solved

«After all … tomorrow is another day»
(Scarlet O'Hara)

Main features of a human with «the intellect of success»

6. Is aware of own strong sides and is able to make use of them for own benefit

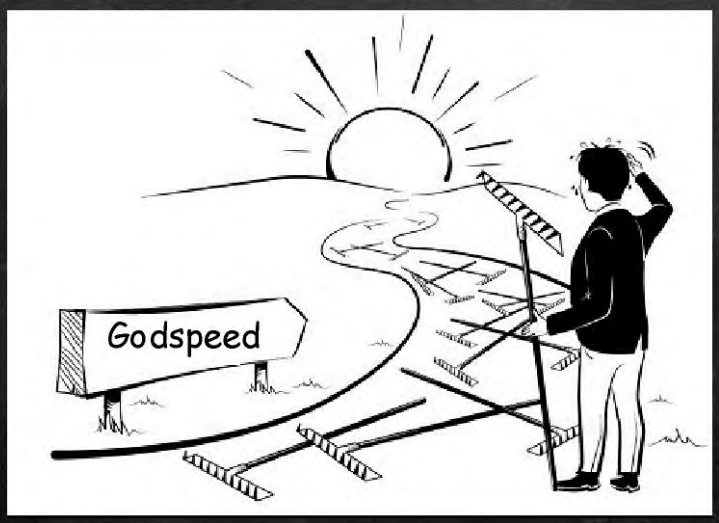


Main features of a human with «the intellect of success»

7. Directs thoughts into practical channel, is able to realize own decisions, is guided by the result and qualitative final product, always completes the task and reaches the goal

Main features of a human with «the intellect of success»

7. Is not afraid of failures, does not repeat the same mistakes twice, corrects mistakes and learns on them



Oh, no, we will go another way...

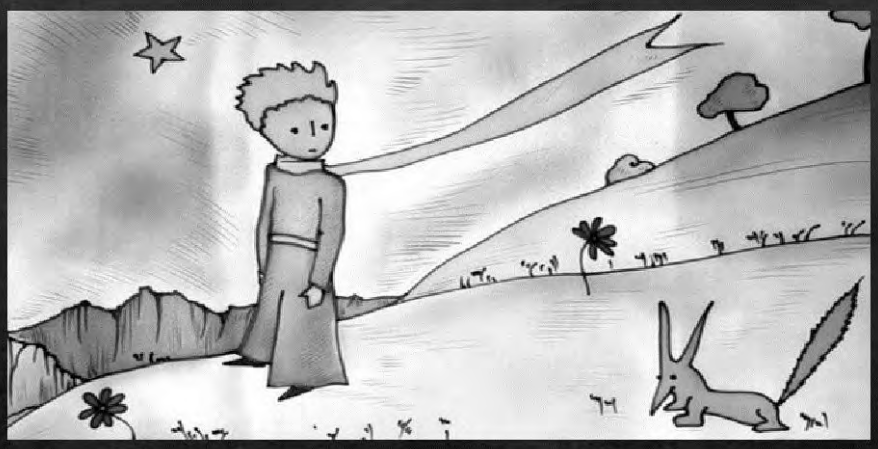
Main features of a human with «the intellect of success»

8. Does not postpone the case «for later», can plan schedule in such way that important things could be done timely and excellently

Road entitled «later» leads to the country entitled «nowhere»

Main features of a human with «the intellect of success»

9. Easily takes responsibility and objectively admits own guilt, does not have the habit of inadequate complaining on others



Main features of a human with «the intellect of success»

10. Never complains about unfavorable circumstances, knows that it can not be the basis for justifying own imperfection

Sometimes a «black stripe» can become a «runway»

Main features of a human with «the intellect of success»

11. Practices independence, relying mostly on own strength

FREEDOM !!!

FREEDOM !!!

FREEDOM !!!

Main features of a human with «the intellect of success»

12. Never mixes up private life with professional relationships

Main features of a human with «the intellect of success»

13. Does not produce either excessive scale or unnecessary coverage of tasks, is fully aware of what is doing at every moment

Long live - New Vasuky !!!

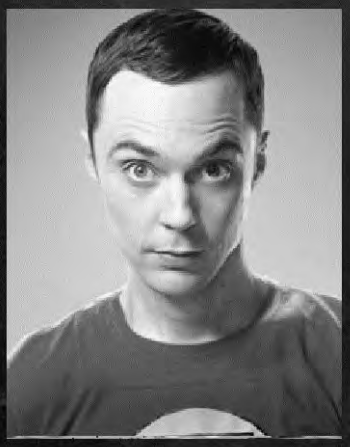
FC Chelsea - Champion !!!

Main features of a human with «the intellect of success»

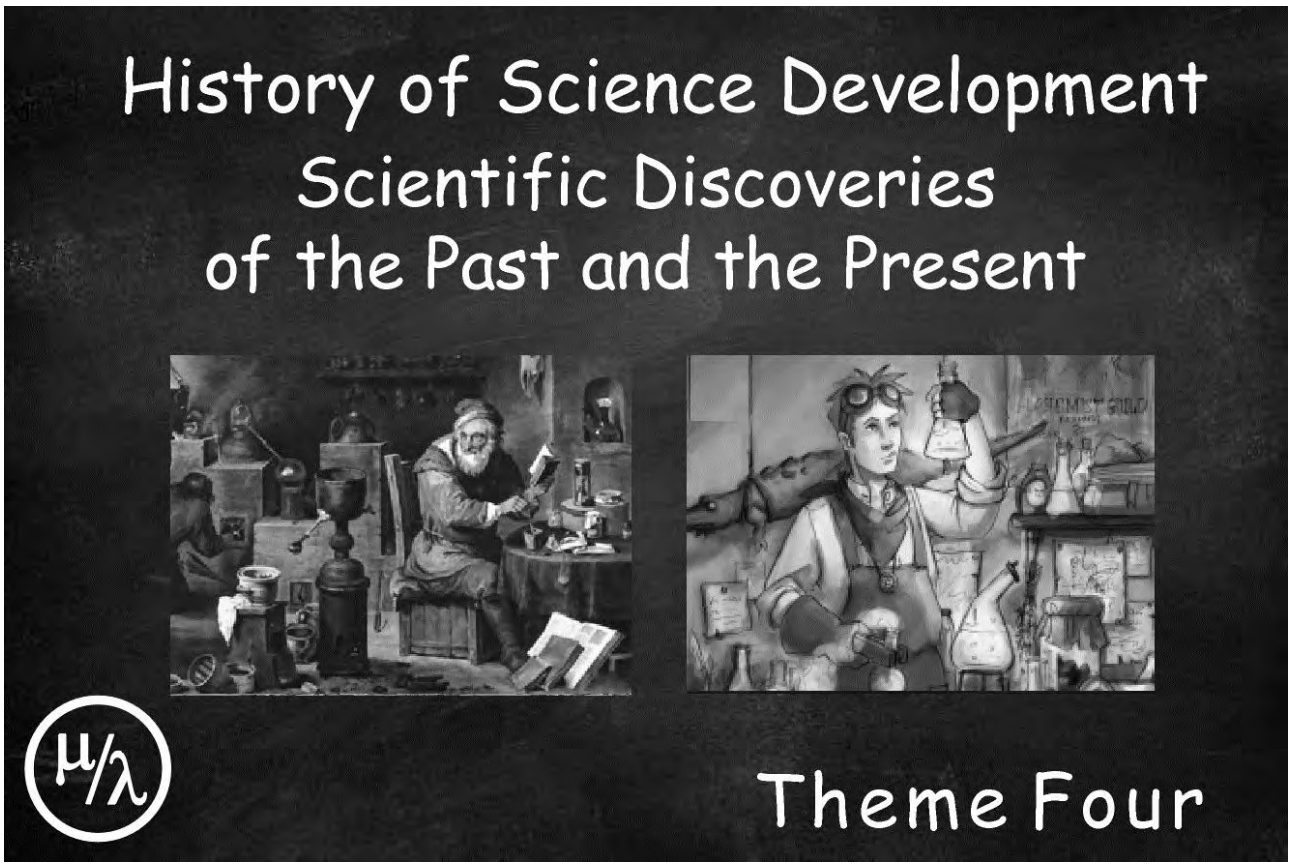
14. Has self-confidence and faith in own abilities to complete any task but does not have the excessive self-assurance

Main features of a human with «the intellect of success»

15. Has an adequate balance of analytical, practical and creative thinking, knows how and in what context the knowledge and skills can be applied



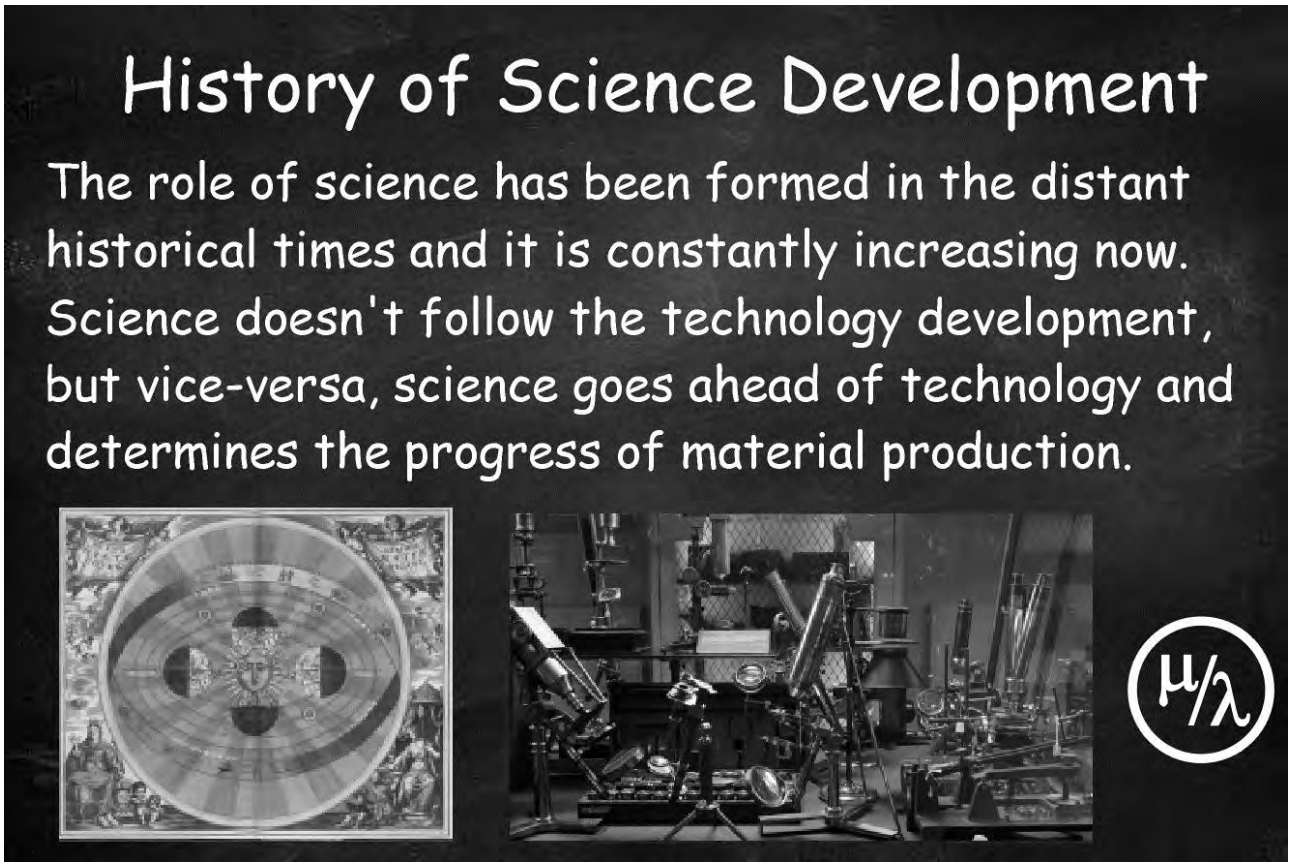
THE END OF THEME THREE



Glossary

Words (word combinations, phrases)	Translation
causes of science emergence	причини виникнення науки
comprehensive development	всебічний розвиток
human cognitive activity	пізнавальна діяльність людини
to undergo profound changes	зазнавати глибоких змін
overall process	загальний процес
prerequisites of science emergence	передумови виникнення науки
Ancient Epoch	античні часи
the Medieval Ages	епоха Середньовіччя
the Renaissance	епоха Відродження
accumulation of factual material	накопичення фактичного матеріалу
adoption of materialistic ideas	прийняття матеріалістичних ідей
differential calculus	диференціальне обчислення
principle of matter preservation	принцип збереження матерії
pre-Euclid geometry	доевклідова геометрія

scientific treatise	науковий трактат
the principle of determinism	принцип об’єктивної зумовленості
Einstein's theory of Relativity	теорія відносності Ейнштейна
Heisenberg's Uncertainty principle	принцип невизначеності Гейзенберга
the Big Bang theory	теорія Великого Вибуху
Mandelbrot’s fractal geometry	фрактальна геометрія Мандельброта
«scientific explosion»	«науковий вибух»
refuted theory	спростована теорія
Ptolemy’s geocentric doctrine	геоцентрична система Птоломея
Medieval scholasticism	Середньовічна схоластика
ideas of Nature immutability	ідеї незмінності природи
concept of atomic indivisibility	концепція неподільності атому
world perception system	система світосприйняття
feudal socio-economic formation	феодальна суспільна формація
artificial intelligence	штучний інтелект
cellular theory	клітинна теорія



Causes of science emergence

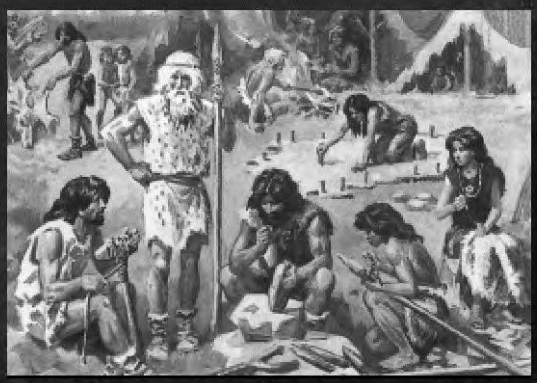
Science - totality of empirical, theoretical and practical knowledge about the surrounding world. Knowledge was gained by the scientific community. Modern scientific knowledge touches upon all spheres of social life, focusing primarily on human's:

intelligence
creative abilities
comprehensive development
features of personality

Causes of science emergence

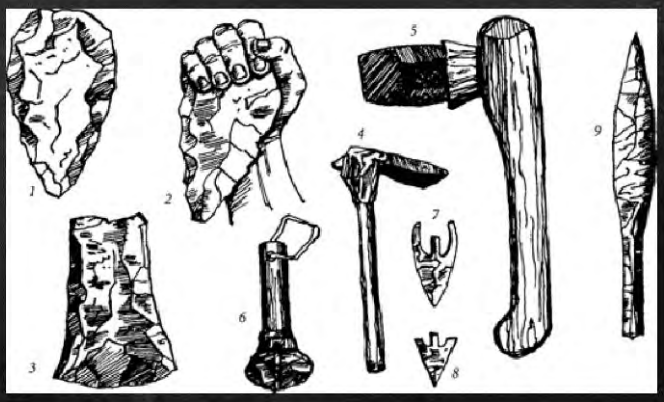
The initial reason for science emergence was the formation of subject-object relations between human and the environment (mankind's transition to production economy).

$\Rightarrow$



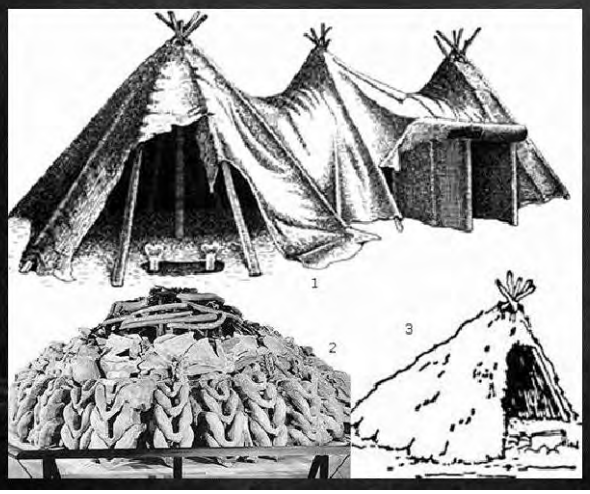
Causes of science emergence

The Age of Paleolith - making the first tools of stone and bone (axe, scraper, spear, bow, arrows), getting control over fire



Causes of science emergence

The Mesolithic Era - making boats, mastering wood-carving process, inventing a variety of more complex tools, building primitive housing

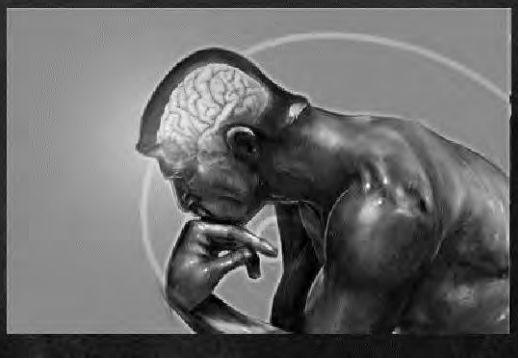


Causes of science emergence

The Neolithic period (3000 BC) - development of pottery, cultivating agriculture, manufacturing clay items, using sickles, spindles, melting metals, using animals as drag force, invention of wheel-set and sail

Causes of science emergence

The second reason for science emergence was the rapid increase of human cognitive activity. Due to the complication of subject-practical and transformative activities, the humanity had undergone profound changes in the mentality structure, brain structure and body morphology.



Prerequisites of science emergence

Thus, the emergence of science is a constituent part of the overall process of human intellectual development and the human civilization formation.
It is impossible to study the development of science in isolation from the processes that are prerequisites for the science emergence.

formation of  spoken language

formation of  written language

Prerequisites of science emergence

development of  calculation systems

emergence of  Fine Art

formation of  world outlook

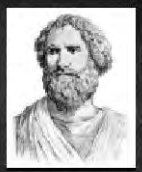
emergence of  Philosophy

Interesting facts from the history of science

- Terms «scientist» and «science» came into use only in the XVIII century. Before that «naturalists» called their activity «natural philosophy»;
- Scientific method (elaborated in the Medieval Ages) became the basis for modern science, so some modern scientists consider the works which had been done before its application, so to say - «prescientific»;
- Modern science (how it looks now) was born only in the period of Western-European industrial revolution (XVI-XVIII centuries)

Historical stages of the world science development

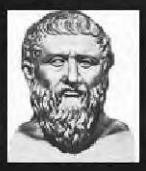
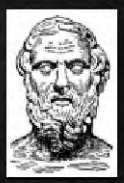
Ancient Epoch ⇒

First systematic theoretical knowledge in the fields of geometry, mechanics, astronomy (Euclid, Archimedes, Ptolemy, Thales);


natural-philosophical concept of atomism (Democritus, Epicurus);

division of science into physics (nature), ethics (society) and logic (thinking) (Aristotle, Plato, Herodotus)

Historical stages of the world science development

Medieval Ages ⇒

In Central Asia - scientific ideas in the field of mathematics, astronomy, physics, medicine, history (Avicenna, Ibn Rushd, Biruni).
In Western Europe - accumulation of factual material in biology; development of the first experimental science elements (Roger Bacon, Albert the Great)





Historical stages of the world science development

The Renaissance ⇒

Scientists break with theology, contributing to adoption of materialistic ideas (J.Bruno, Leonardo da Vinci, Francis Bacon).
Rise of the experimental nature study. Real revolution in astronomy (M. Copernicus, Galileo Galilei)





Historical stages of the world science development

XVII-XVIII centuries ⟹

Classical mechanics, differential and integral calculus, analytic geometry, chemical atomistics, classification of plants and animals, principle of preservation of matter and motion (Newton, Leibniz, Descartes, Linnaeus, Lomonosov). Rise of science as a social institution; creation of the first European academies, scientific societies; publication of first scientific periodical literature





Historical stages of the world science development

Middle of XIX century ⟹

Emergence of new physical disciplines (thermodynamics, electrodynamics), Evolutionary theory and Cell theory in biology, the Law of energy preservation and transformation, development of new concepts in astronomy and mathematics (Maxwell, Faraday, Lamarck, Mendel, Darwin)





Historical stages of the world science development

XIX-XX centuries ⇒




Discoveries in Physics (electron, X-ray radiation, radioactivity). Emergence of new science branches: radio engineering, electronics, cybernetics, genetics (Rontgen, Curie, Becquerel, Weisman, Morgan, Wiener)


Periodization of science development

«Pre-science» - rise of science in the Ancient East civilizations, emergence of astrology, pre-Euclid geometry, grammar, numerology



⇒

Periodization of science development

Ancient (pre-classic) science - formation of the first scientific theories (atomism).
Compilation of the first scientific treatises:
Ptolemaic Astronomy,
Theophrastus Botany,
Euclidean Geometry,
Aristotlean Physics.
Emergence of the first proto-scientific communities (academies)

Periodization of science development

Medieval «magic» science - formation of the first experimental science (Jabir ibn Hyan's alchemistry)

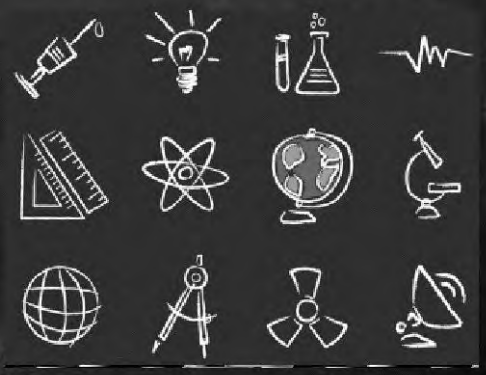
Periodization of science development

Classical science - formation of science in the modern sense (works of Galilei, Newton, Linnaeus)

scientific planning of experiments

introducing the principle of determinism

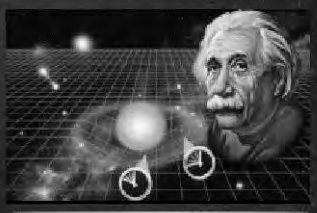
increasing the significance of science

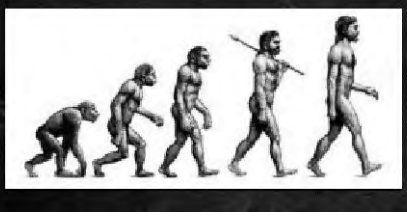


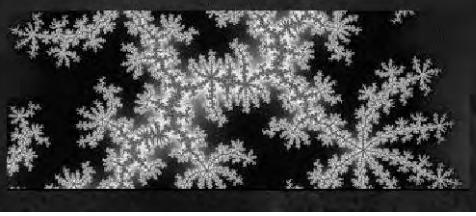
Periodization of science development

Neoclassical science - crisis of classical rationality:

Darwin's theory of Evolution
Einstein's theory of Relativity
Heisenberg's Uncertainty principle
the Big Bang theory
Renee's theory of Catastrophes
Mandelbrot's fractal geometry







Periodization of science development

Post-neoclassical science - emergence of synergetics, expansion the subject field of knowledge, science goes beyond its scope and penetrates into other fields

Scientific Revolutions

Development of science as a whole (as well as its specified directions) is uneven. Sooner or later, the stages of gradual development come to end and so called «scientific explosion» happens. At the same time, the «previous» theories (which for some time were considered correct) are refuted by the accumulated practical and theoretical facts. As a result, the new «next» theories emerge to explain accumulated facts

«previous» theories

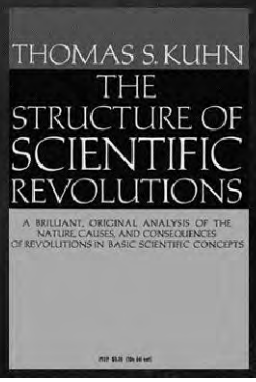
scientific explosion

«next» theories

Scientific Revolutions

The concept of reconstruction and development of scientific cognition was presented in the work by the US scientist Thomas Kohn «The Structure of Scientific Revolutions». Let's have a look at some postulates of this concept. We'll consider both the theories which were refuted and the theories which emerged as the results of every revolution.

scientific revolution



Scientific Revolutions

Main scientific revolutions (by Thomas Kuhn)

XV-XVIII centuries

Aristotlean system and Ptolemy's geocentric doctrine were disclaimed, Medieval scholasticism was overcome

Scientific principles of mathematics, astronomy, medicine, and mechanics were created. The feudal socio-economic formation was replaced by capitalism, which is characterized by the productive forces development and the industrial relations complication

Scientific Revolutions

Main scientific revolutions (by Thomas Kuhn)

Beginning and Middle of the XIX century

Metaphysical ideas of Nature immutability had been ruined

Dialectical ideas of the Nature general development arose on the basis of:

- astronomical theory;
- periodic law in chemistry;
- doctrine of energy preservation and transformation in physics;
- cellular and evolutionary theories in biology

Scientific Revolutions

Main scientific revolutions (by Thomas Kuhn)

End of the XIX century

The concept of atomic indivisibility was destroyed

The scientists developed the quantum-mechanical system of world perception which was characterized by quantitative physical properties of microsystems. Since that time science has a decisive influence on the production development and production relations

Scientific Revolutions

Main scientific revolutions (by Thomas Kuhn)

End of the XX century — present time

Information revolution:
«Those who own information - own the world»

Artificial intelligence, informatization of society, world globalization in science and technology. Complication of scientific research methods and forms, the usage of complex equipment (nuclear reactors, colliders, machine complexes, etc.)

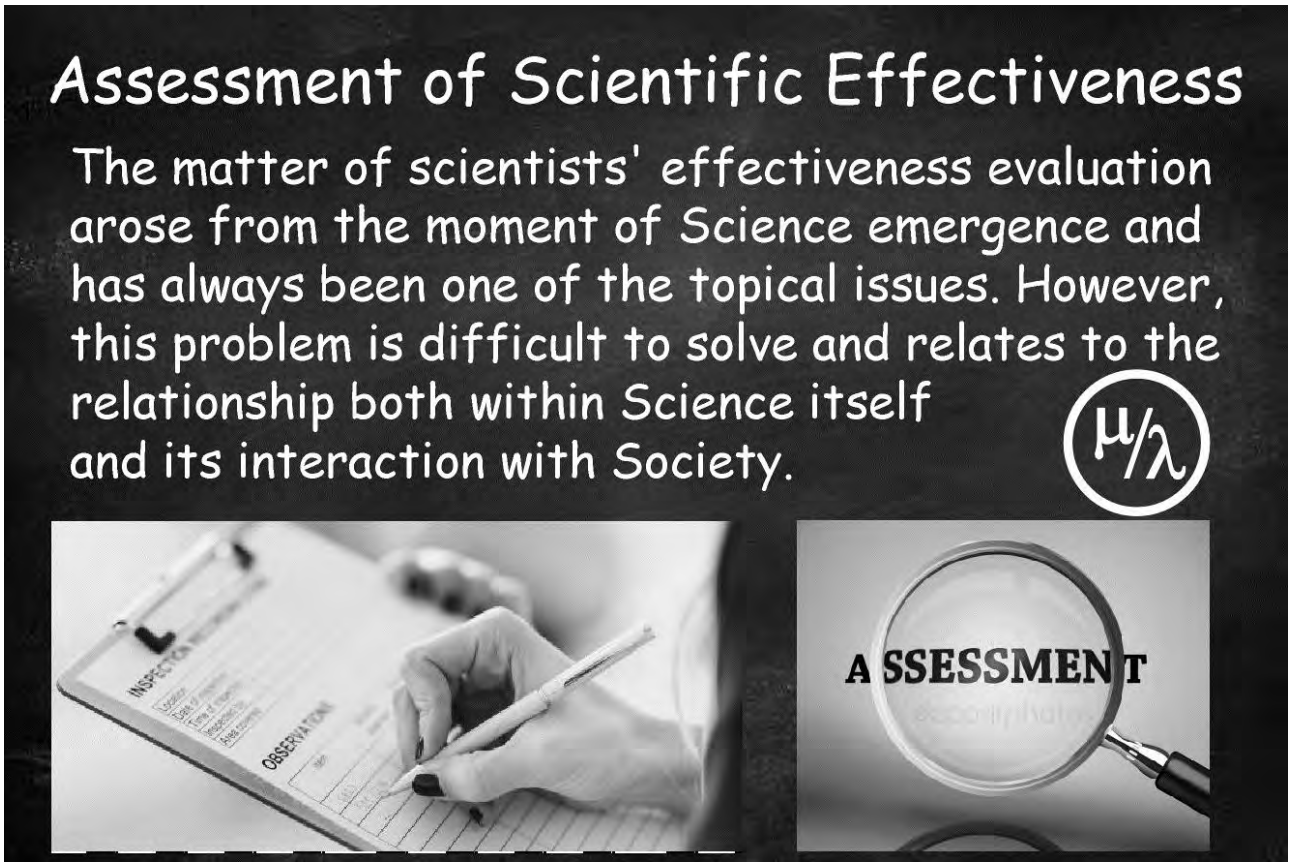
THE END OF THEME FOUR

TO BE CONTINUED...

Glossary

Words (word combinations, phrases)	Translation
assessments (evaluation) of effectiveness	оцінювання (оцінка) ефективності
expended efforts	витрачені зусилля
personal contribution to science	особистий внесок у науку
insistent requirement of time	нагальна вимога часу
different kinds of encouragement	різні види заохочення
annual / five-year / overall amount	щорічний / за 5 років / загальний обсяг
quote (quotation, citation)	цитування
reference list	перелік посилань
bibliometric database	бібліометрична база даних
thematic coverage	тематичне покриття (тематика)
peer-reviewed scientific edition	рецензоване наукове видання
«blind» peer-reviewing	«сліпе» (анонімне) рецензування
drawback, shortcoming	недолік (менший за помилку)
journal / magazine	науковий / розважальний журнал

to submit a manuscript to a journal	подавати рукопис статті до журналу
journal's target audience	цільова аудиторія журналу
to reassure yourself	заспокоїти себе
submission / processing charge	платня за подання / опрацювання
preferable journals / editions	найкращі журнали / видання
«predatory» journals / editions	«хижацькі» журнали / видання
open access policy	політика відкритого доступу
to profess the practice of unfair publishing	займатися не доброчесною практикою
not squeamish	неперебірливий
to show the signs of plagiarism	мати ознаки плагіату
pseudo-scientific character	псевдонауковий характер
non-transparent pricing policy	непрозора цінова політика
excessively wide scope of interests	занадто широкий спектр інтересів
International Standard Serial Number (ISSN)	ідентифікатор серійного видання
Digital Object Identifier (DOI)	цифровий ідентифікатор об'єкту
hand-crafted Web-site	кустарний (непрофесійний) Web-сайт

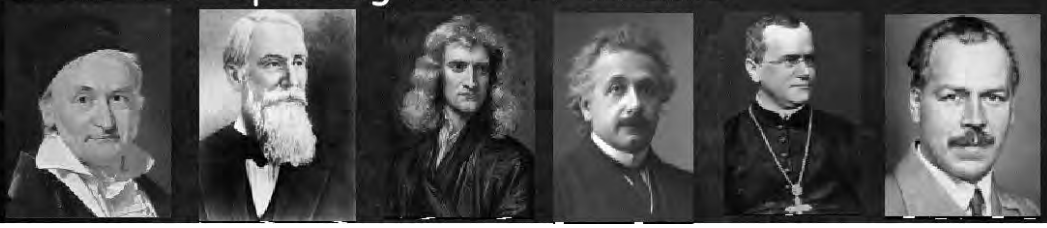


Assessment of Scientific Effectiveness

Many variants of assessment are possible in all spheres of creative activity - and in Science too - but the most objective is to assess the final result, neither the procedure for its achievement nor the expended efforts

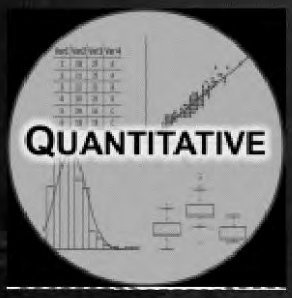
Assessment of Scientific Effectiveness

Until the beginning of the 20th century, when a small number of people were engaged in Science, the contribution of a scientist was actually evaluated only by meaningful qualitative criteria. The mechanism for such assessment remained unknown and not quantified, but everyone intuitively admitted that the personal contribution of Gauss and Chebyshev to Mathematics, Newton and Einstein to Physics, Mendel and Vavilov into Biology was so significant that it exceeds the contribution of other researchers in the corresponding fields of Science.



Assessment of Scientific Effectiveness

When Science became a quite massive activity, the existing qualitative criteria for evaluating were not sufficient, therefore, the ever more insistent requirement of time was the need for assessment using quantitative parameters.



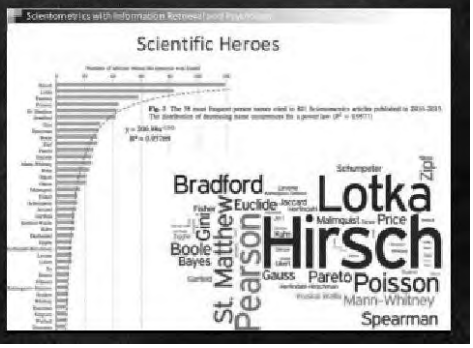
Assessment of Scientific Effectiveness

Such objective assessment gains the particular importance when it comes to different kinds of encouragement for both researching teams and individual scientists (budget funding and grants for carrying out research, various promotions in the form of awarding honors, medals, titles etc.)

Assessment of Scientific Effectiveness

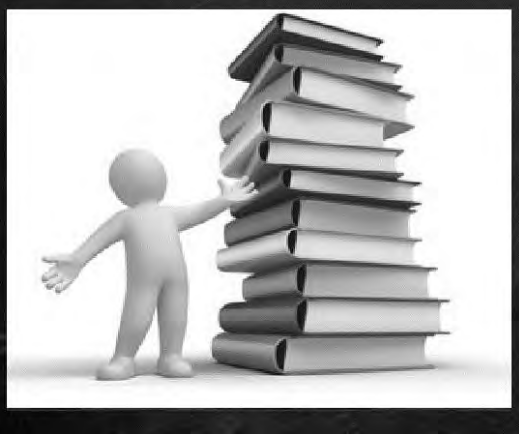
Generally, there are no objective quantitative criteria for assessing the quality of a particular researcher or a research team. Thus the new branch of science - Scientometrics - has recently emerged.

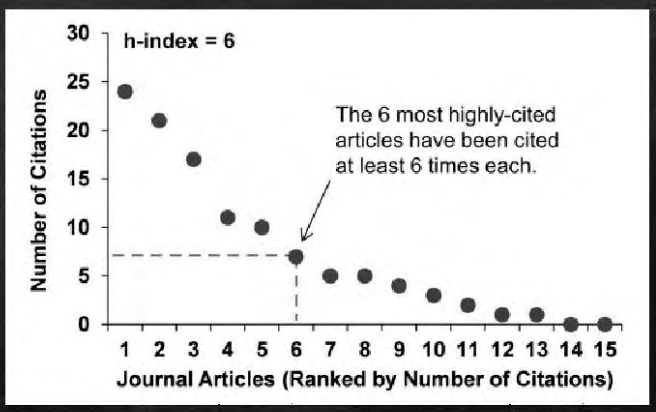
The main indexes of Scientometrics are different statistical indicators of scientific activity, dynamics and productivity of a researcher or a research team (organization).



Assessment of Scientific Effectiveness

One of the most important indicators of scientific effectiveness is the researcher's publication activity





Assessment of Scientific Effectiveness

Main parameters of publication activity:
- number of scientific articles (annual, 5-year, overall)
- number of quotes (annual, five-year, overall)
- the Hirsh-index (aka h-index) indicating that a scientist has at least «h» works, which have equal or more than «h» references
- i-10-index - number of works for which there are more than 10 links
- total number of scientific articles in foreign and domestic journals, which are included into international databases, in particular Scopus, (Elsevier) and Web of Science (Clarivate).

Assessment of Scientific Effectiveness

Such indicators are automatically determined in the researcher profiles (in Google Scholar, Scopus, Web of Science databases) and give a generalized visual representation of his (her) contribution to Science. These bibliometric profiles are regarded as portfolios of scientists and teams that contain ordered lists of their works, citation charts, citation indexes, etc.

Assessment of Scientific Effectiveness

The most popular and accessible is a free international Google Scholar database having the most significant regional, thematic, linguistic, visual coverage. It allows generating the scientists' so called «bibliometric portraits» via indexing the full-text scientific publications of all formats and disciplines. The scientists themselves are responsible for reliability and accuracy of the information provided in their personal profiles.

Assessment of Scientific Effectiveness

Albert Einstein's Google Scholar profile

Albert Einstein

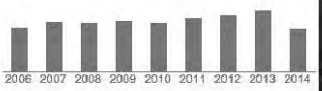
Institute of Advanced Studies, Princeton
Physics
No verified email

Follow

Title 1–20	Cited by	Year
Can quantum-mechanical description of physical reality be considered complete? A Einstein, B Podolsky, N Rosen Physical review 47 (10), 777	12721	1935
Uber einen die Erzeugung und Verwandlung des Lichtes betreffenden heurischen Gesichtpunkt A Einstein Ann. Phys. 17, 132-148	7091 *	1905
On the movement of small particles suspended in stationary liquids required by the molecular-kinetic theory of heat A Einstein Annalen der Physik 17, 549-560	~~5633~~ *	1905
Zur Elektrodynamik bewegter Körper A Einstein	3761 *	

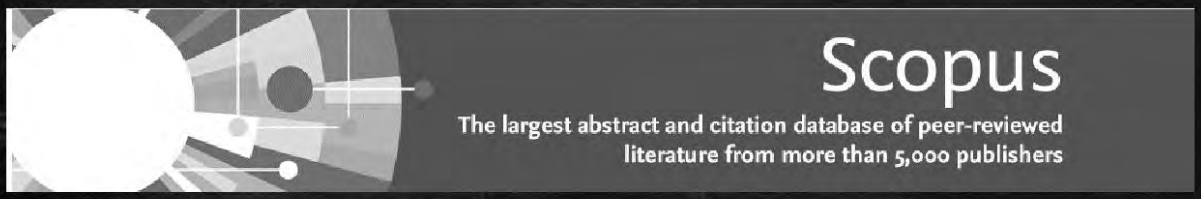
Google Scholar

Citation indices	All	Since 2009
Citations	86302	28107
h-index	103	62
i10-index	362	197



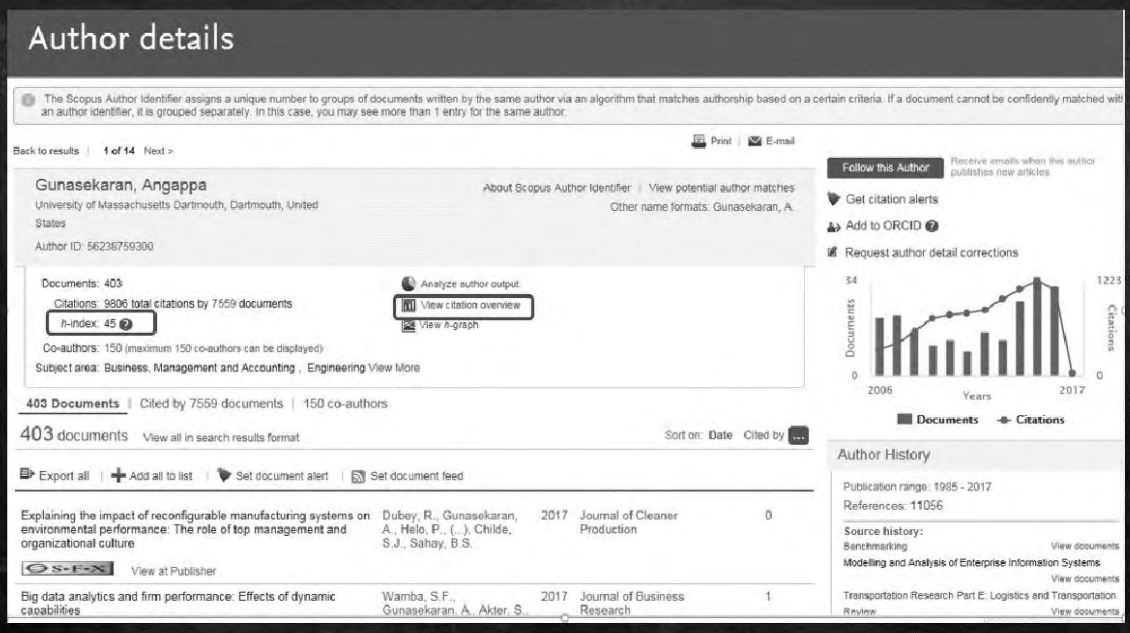
Assessment of Scientific Effectiveness

The majority of scholars recognize two databases: Scopus and Web of Science.
In Scopus the scientist's profile is created automatically if he (she) has published at least one article in an edition that is indexed by this database. But the profile will be viewable only when this author has more than one article.



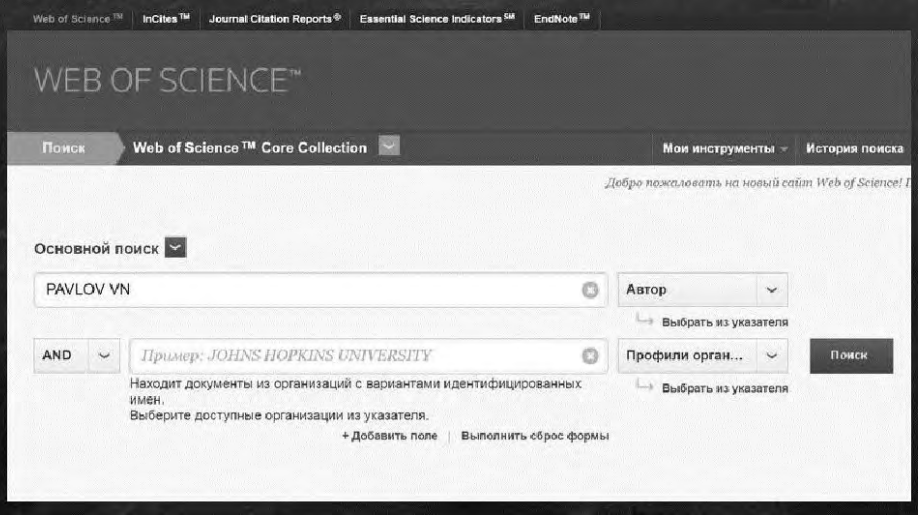
Assessment of Scientific Effectiveness

Scopus profile



Assessment of Scientific Effectiveness

In Web of Science an author can create a profile only in case if his (her) institution (University, laboratory, library) has access to this database.



Publication of Research Results

The journals which are indexed in these databases are considered the most reliable and influential peer-reviewed world's scientific editions. Therefore, creating scientific content for these journals is a highly competitive intellectual activity and the procedure of «blind» peer-reviewing is one of the most important elements of publication process.

WEB OF SCIENCE™ THOMSON REUTERS

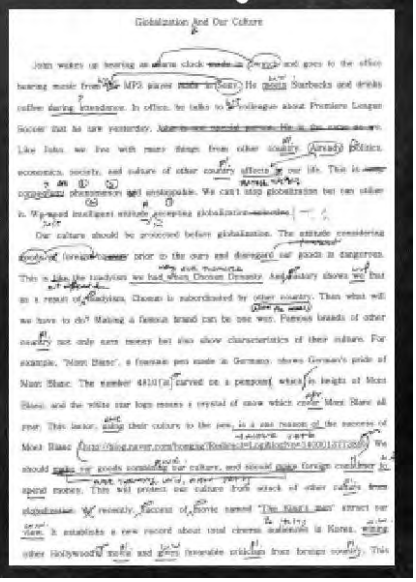
Scopus

PEER REVIEW

Publication of Research Results

Unfortunately, some authors don't fully realize the responsibility, so their articles are often rejected by the editors because of mistakes and drawbacks which are made while preparing the articles.

This problem refers not only to the inexperienced beginner researchers (undergraduates, postgraduates) but also some respectable scientists.

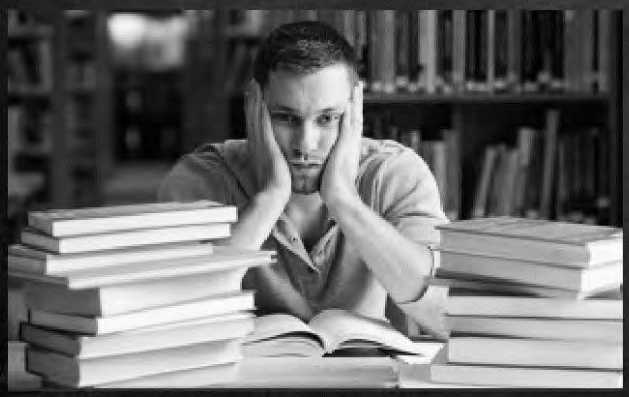

Globalization And Our Culture

John wakes up hearing an alarm clock and goes to the office hearing music from the MP3 player. He meets Starbucks and drinks coffee during attendance. In office, he talks to colleague about Premiere League Soccer that he saw yesterday. Like John, we live with many things from other country. Actually politics, economics, society, and culture of other country affects to our life. This is complicated phenomenon and unstoppable. We can't stop globalization but can utilize it. We need intelligent attitude accepting globalization.

Our culture should be protected before globalization. The attitude considering product of foreign company prior to the ours and disregard our goods is dangerous. This is like the tradition we had when Chosun Dynasty. According history shows we lost as a result of Japanese. Chosun is subordinated by other country. Then what will we have to do? Making a famous brand can be one way. Famous brands of other country not only earn money but also show characteristics of their culture. For example, "Mont Blanc", a fountain pen made in Germany, shows German's pride of Mont Blanc. The number 4810(m) carved on a pen nib, which is height of Mont Blanc, and the white star logo means a crystal of snow which covers Mont Blanc all year. This latter, using their culture to the pen, is a one reason of the success of Mont Blanc (http://blog.naver.com/hongsa?Redirect=Log&logNo=140001377368). We should make our goods considering our culture, and should make foreign customer to spend money. This will protect our culture from attack of other culture from globalization. A recently success of movie named "The King's man" attract our fans. It establishes a new record about total cinema audiences in Korea. Among other Hollywood movie and given favorable criticism from foreign country. This

Publication of Research Results

No author is able to identify and correct all errors at the stage of writing manuscript, so it is important to understand what can be the cause of denial.



?

Why? Oh, Why? What have I done wrong?

Publication of Research Results

Let's discuss the most common and widespread mistakes, the avoidance of which should increase the manuscript's chances for successful publishing. We have formulated some helpful tips for authors.

Publication of Research Results

Tip #1. Choose the appropriate journal

Choosing the appropriate journal can significantly increase the manuscript's chances for being admitted for publication and secures access to the target audience. Remember the respectable peer-reviewed journals NEVER popularize knowledge «about everything in the world». They are mostly specialized - so printed for the limited amount of professionals in the certain branches of knowledge. Choose the journal which is best corresponding to the problem of your research.

Publication of Research Results

Tip #1. Choose the appropriate journal

We don't advise sending manuscripts to the journals which «guarantee» publishing your article «quickly», «cheaply», and «qualitatively» at the same time. Life experience witnesses that at least one of these elements will turn out impossible : (((

Publication of Research Results

Tip #1. Choose the appropriate journal

If such elements as «quickly» and «cheaply» are quite subjective, the element «qualitatively» mostly presumes publishing articles in the journals indexed in Scopus and Web of Science databases.

Scopus

THOMSON REUTERS
WEB OF SCIENCE

Google Scholar

Publication of Research Results

Tip #1. Choose the appropriate journal

For example, let's assume that we want to publish our article in a journal which:

- is devoted to the problems of linguistics
- is indexed in Scopus database
- is published in the Eastern Europe
- is absolutely free.

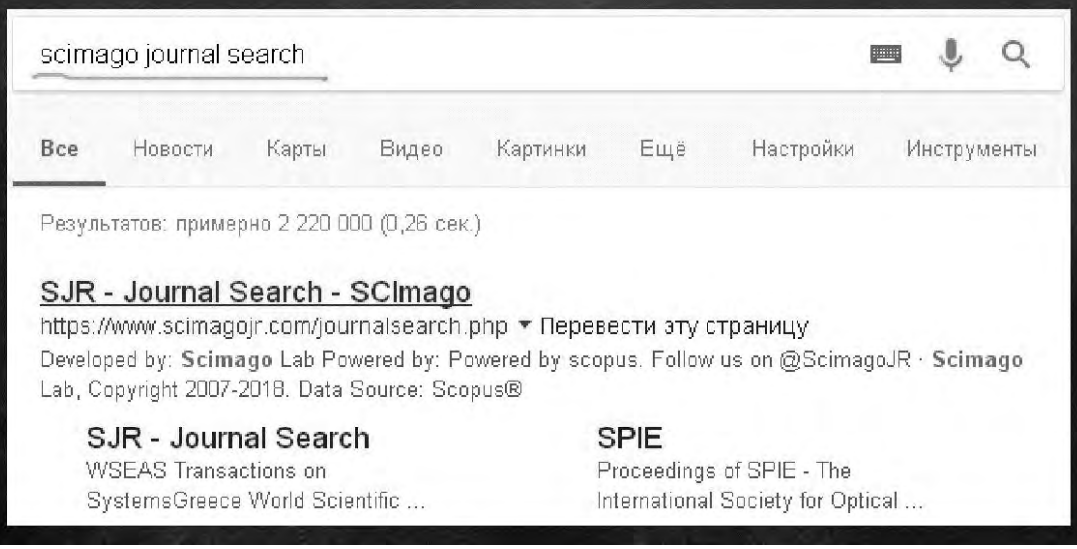
SJR

We recommend carrying out search by means of the specialized online service platform SCImago Journal & Country Rank, which ranks the journals indexed in Scopus.

Publication of Research Results

Tip #1. Choose the appropriate journal

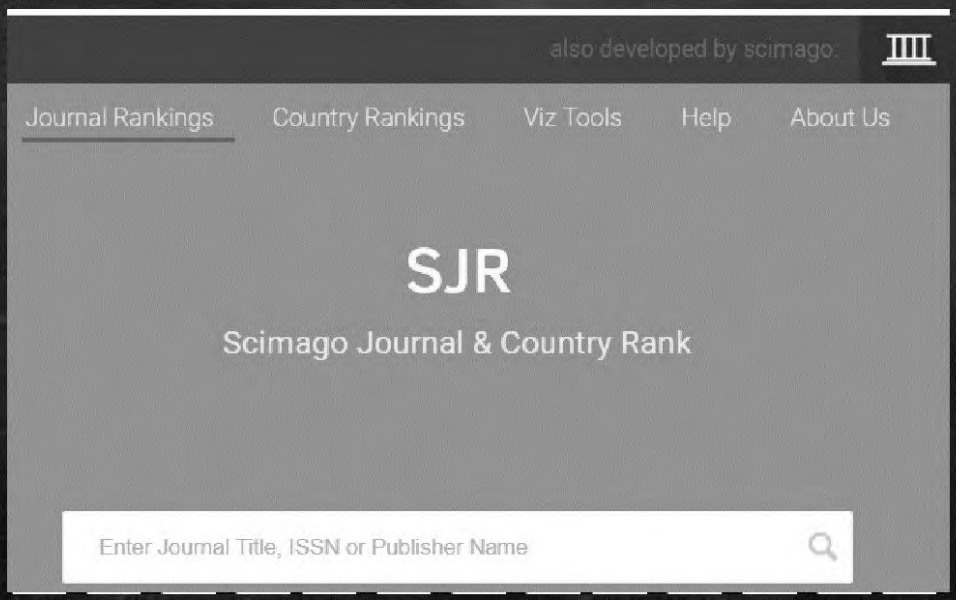
In any browser type the key-words «scimago journal search», then go to this service



Publication of Research Results

Tip #1. Choose the appropriate journal

At the Home Page select the section Journal Rankings



Publication of Research Results

Tip #1. Choose the appropriate journal

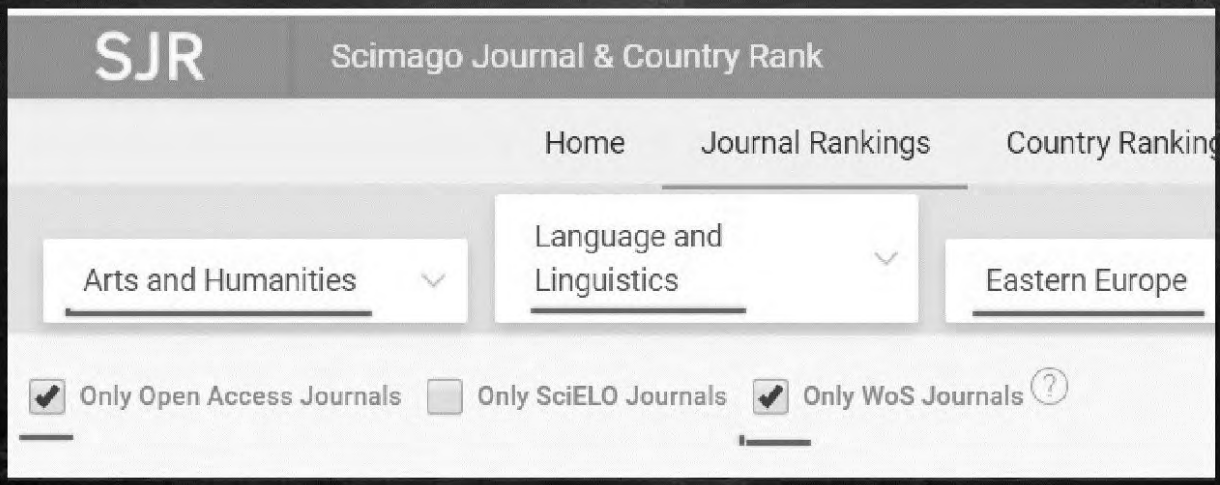
In the Journal Rankings we're proposed to select:

We can also tick the additional options enabling choosing the journals which:
- profess open public access policy
- are published only as electronic objects
- are also indexed in Web of Science database

Publication of Research Results

Tip #1. Choose the appropriate journal

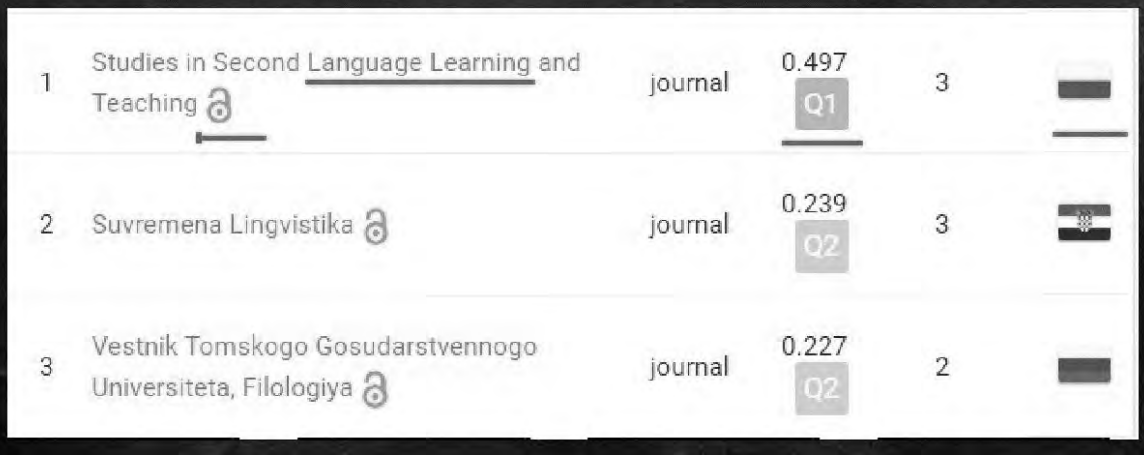
Then we tick those options which meet all our requirements:



Publication of Research Results

Tip #1. Choose the appropriate journal

The platform finds the journals meeting our requirements. Here we can see the journal's title, h-index, location and other related information. «Open Access» journals are marked with the image of an unlocked orange lock.



1	Studies in Second Language Learning and Teaching	journal	0.497 Q1	3	
2	Suvremena Lingvistika	journal	0.239 Q2	3	
3	Vestnik Tomskogo Gosudarstvennogo Universiteta, Filologiya	journal	0.227 Q2	2	

Publication of Research Results

Tip #1. Choose the appropriate journal

Remember, according to SCImago ranking all journals are conditionally divided into four main types (quartiles) - green (Q1), yellow (Q2), orange (Q3), and red (Q4). The most impactful journals belong to the first (green) quartile, the least influential - to the fourth (red) quartile.

SJR
0.497 Q1
0.239 Q2
0.227 Q2

Publication of Research Results

Tip #1. Choose the appropriate journal

We choose the journal "Studies of Second Language Learning and Teaching" because it is humanitarian, linguistic, with Open Access, published in the Eastern Europe (Poland, Adam Mitskevych University Press).

Studies in Second Language Learning and Teaching

Country	Poland - SIR Ranking of Poland
Subject Area and Category	Arts and Humanities Language and Linguistics Social Sciences Education Linguistics and Language
Publisher	Adam Mickiewicz University Press

3

H Index

Publication of Research Results

Tip #1. Choose the appropriate journal

Here we can also visit the online forum where one can discuss the matters connected with the process of publication in this journal.

Join the conversation about this journal

We notice that this journal is a specialized edition in two subject categories - «Education» and «Language and Linguistics» but the articles published in these categories are ranked in different quartiles (Q1-Q2)

Poland - SIR Ranking of Poland

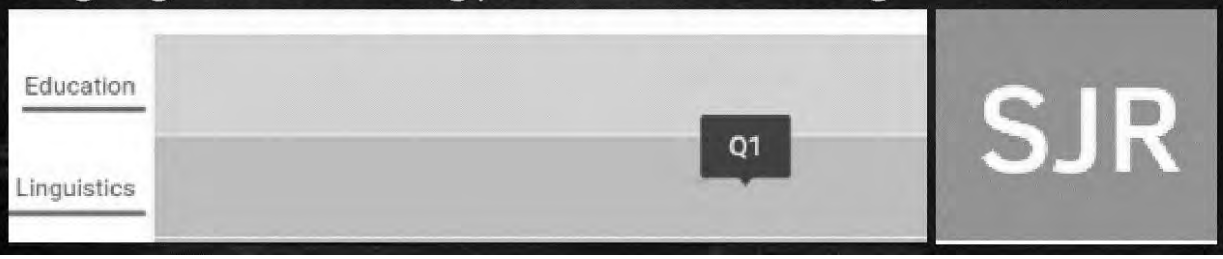
Arts and Humanities
Language and Linguistics

Social Sciences
Education
Linguistics and Language

Publication of Research Results

Tip #1. Choose the appropriate journal

The articles from «Education» category belong to the second (yellow Q2) quartile, at the same time the articles published in the category of «Language and Linguistics» are ranked in the highest (green Q1) quartile. So if the author devotes the articles to the matters of «pure» linguistics, the publication will get to Q1, if he considers the matters of teaching language methodology, the article will get to Q2.



Publication of Research Results

Tip #1. Choose the appropriate journal

Finally we are parting with the platform SJR and go directly to the official web-site of the chosen journal.

STUDIES IN SECOND LANGUAGE LEARNING AND TEACHING

SSLT
STUDIES IN SECOND LANGUAGE LEARNING AND TEACHING

INTRODUCTION:

Studies in Second Language Learning and Teaching (ISSN 2083-5205) is a refereed journal published four times a year by the Department of English Studies, Faculty of Pedagogy and Fine Arts, Adam Mickiewicz University, Kalisz, Poland. The language of publication is English. The journal is devoted to reporting previously unpublished highest quality theoretical and empirical research on learning and teaching second and foreign languages. It deals with the learning and teaching of any language, not only English, and focuses on a variety of topics ranging from the processes underlying second language acquisition, various aspects of language learning in instructed and non-instructed settings, as well as different facets of the teaching process, including syllabus choice, materials design, classroom practices and

Yes! It fits!

At the Home Page we recommend reading description of its scientific areas and reassure that the theme of your article corresponds with the journal subjects.

Publication of Research Results

Tip #1. Choose the appropriate journal

Here one can find additional confirmation that the journal is indexed in Scopus and other popular scientometric databases and see the journal's Digital Object Identifier (DOI) and International Standard Serial Number (ISSN)

INDEXED IN:

SCOPUS; Web of Science Emerging Sources Citation Index (ESCI), European Reference Index for the Humanities (ERIH PLUS); Education Resources Information Center (ERIC); Index Copernicus; Central and Eastern European Online Library (CEEOL); The Central European Journal of Social Sciences and Humanities (CEJSH); The MLA International Bibliography; The MLA Directory of Periodicals; EBSCO; Linguistic Abstracts; Directory of Open Access Journals (DOAJ); WorldCat

JOURNAL METRICS:

Scopus CiteScore 2017 0.77
Scopus SJR 2017 0.497

INDEX COPERNICUS 100

INDEX 12

DOI: 10.14746/sslit

ISSN: 2083-5205 **e-ISSN:** 2084-1965

ARTICLES ARE LICENSED UNDER A CREATIVE COMMONS (2016 -):

EMERGING SOURCES CITATION

Publication of Research Results

Tip #1. Choose the appropriate journal

Then it is advisable finding out the requirements regulating the main steps of future articles' writing and editing. In the section (For Authors) one should carefully study (Author Guidelines).

It will ease your work greatly.

Home > For Authors

INFORMATION FOR AUTHORS

Interested in submitting to this journal? We recommend th
journal's section policies, as well as the Author Guidelines.
submitting or, if already registered, can simply log in and b

Publication of Research Results

Tip #1. Choose the appropriate journal

We can also reassure ourselves that the chosen journal professes the policy of Open Access. Find the corresponding section and read «Open Access Policy».

POLICIES

- Focus and Scope
- Section Policies
- Peer Review Process
- Open Access Policy
- Publishing ethics
- Reviewers
- Journal Statistics

Publication of Research Results

Tip #1. Choose the appropriate journal

If the journal positions itself as a «free of charge» edition, in this section one can surely find something like this text:

> For articles published in SSLLT there are neither article submission charges nor article processing charges whatsoever. Publication in SSLLT is entirely free.

Publication of Research Results

Tip #1. Choose the appropriate journal

So we have fulfilled our task.

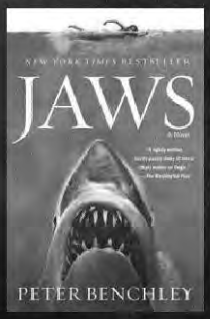
We have found the journal meeting all the requirements:

- devoted to the matters of Linguistics ☑ — Studies in Second Language Learning and Teaching
- indexed in Scopus and WOS bases ☑ — ELSEVIER; Scopus: The largest abstract and citation database of peer-reviewed literature from more than 5,000 publishers
- published in the Eastern Europe ☑ — PL
- absolutely free ☑ — OPEN ACCESS

Publication of Research Results

Tip #1. Choose the appropriate journal

Having considered the preferable journals we must also discuss the journals which aren't worth dealing with. These are so called «predatory editions» which support the open access policy and pretend to the status of real scientific journals but factually profess the practice of unfair publishing. These journals aren't very squeamish and usually publish low-quality articles of pseudo-scientific character, which often show signs of plagiarism.



WARNING!!!
PREDATORY
JOURNALS

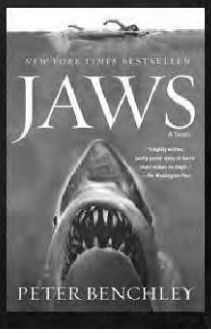
Publication of Research Results

Tip #1. Choose the appropriate journal

Some indications of a typical «predatory journal»:

- quick admission of articles for publishing with minor (or even without) reviewing;
- non-transparent pricing policy;
- excessively wide scope of scientific disciplines;
- inconsistency of the articles' content to the declared subjects of journal;
- publishing policy is outlined in a flashy, loud, sometimes illiterate language;

WARNING!!!



Publication of Research Results

Tip #1. Choose the appropriate journal

Some indications of a typical «predatory journal»:

- ads posters play with «all colors of rainbow», have very aggressive and tasteless design;

IF YOUR RESEARCH WORK WAS COMPLETED AND WANT TO PUBLISH YOUR RESEARCH ARTICLE IN A TRUSTED JOURNAL, THEN

DON'T WORRY !!! WE CARE FOR YOUR PAPER

SHARE YOUR SUCCESS STORY TO THE WORLD COMMUNITY BY THE HELP OF THIS INTERNATIONAL JOURNAL AND GET A HIGH IMPACT VALUE OF YOUR PAPER

GOOD NEWS FOR AUTHORS

Submit Two articles in single article price

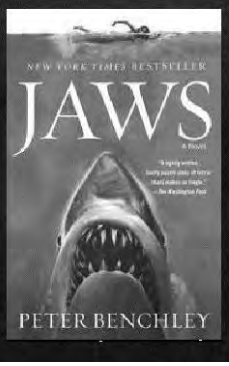
USE PROMO CODE : 2IN1 ON SUBJECT LINE OF YOUR EMAIL

ENJOY UPTO

50% OFF

ON PUBLICATION CHARGE (ONLINE ONLY)

WARNING!!!



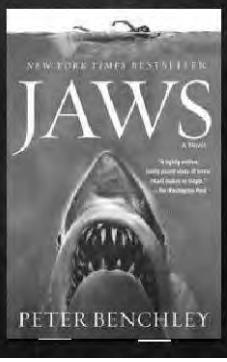
Publication of Research Results

Tip #1. Choose the appropriate journal

Some indications of a typical «predatory journal»:

- inclusion into the editorial board non-existent scholars;
- permanent publication of articles with signs of plagiarism;
- aspiration to be externally similar to well-known world scientific journals;
- false information regarding the actual territorial location of the journal;
- publication of correspondence conferences proceedings;
- severe limitation on the volume of one article;
- incorrect or illegal use of ISSN and DOI;

WARNING!!!



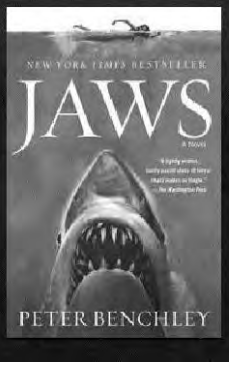
Publication of Research Results

Tip #1. Choose the appropriate journal

Some indications of a typical «predatory journal»:

- missing or fictional Web of Science impact-factor or Scimago ranking;
- lack of clear policies on the use of copyright objects and licenses;
- unusually small or large price for publication of one article;
- primitive hand-crafted looking web-sites with plenty of errors;

WARNING!!!



Publication of Research Results

Tip #1. Choose the appropriate journal

Some indications of a typical «predatory journal»:

- one-way communication (mostly e-mail address from which it is impossible to identify the sender);

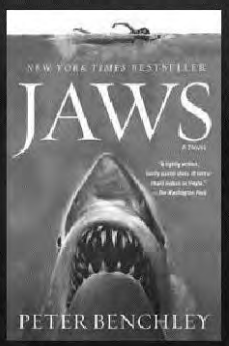
☒ 123456789@yahoo.com

☒ hot-funny-girl@gmail.com

☒ ds96QW76jhg@ukr.net

☒ gimme-all-your-money@i.ua

WARNING!!!



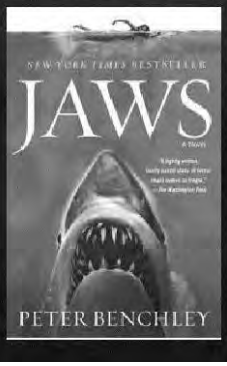
Publication of Research Results

Tip #1. Choose the appropriate journal

Some indications of a typical «predatory journal»:

- persistent dispatching of spam e-mails containing publishing proposals

WARNING!!!



Publication of Research Results

Tip #1. Choose the appropriate journal

If you come across proposals from such editions, we recommend paying no attention to them at all. Don't even send them your negative responses. If they understand that attracted your attention, they will start spamming you. Both Scopus and WOS regularly publish lists of journals which were excluded from these databases. If the journal from this list continues positioning itself as a «true» scientific journal, you can calmly regard it as «predatory».

Publication of Research Results

Tip #1. Choose the appropriate journal

A list of journals removed from databases:

DOAJ: journals added and removed

Added | Removed | Failed to submit a reapplication

	A	B
1	**A list of journals removed from DOAJ from 1st January 2014**	
2	A journal may be removed from DOAJ for the following reasons:	
3	Journal is no longer Open Access; Inactive (has not published in the last calender year); Has not published Suspected editorial misconduct by publisher; Journal not adhering to Best practice	
4		
5		
6	**Journal Title**	**ISSN**
7		
8	Hunafa: Jurnal Studia Islamika	2355-7710
9	Cultural Review	2406-8586
10	RIESED: Revista Internacional de Estudios sobre Sistemas Educativos	2007-9117

Publication of Research Results

Tip #1. Choose the appropriate journal

Here you can see the links to the lists of journals professing unfair publishing practices:

http://beallslist.weebly.com/standalone-journals.html

https://docs.google.com/spreadsheets/d/183mRBRqs2jOyP0qZWXN8dUd02D4vL0Mov_kgYF8HORM/htmlview?pli=1

https://elibrary.ru/titles.asp?risc=2&sortorder=0

Publication of Research Results

Tip #2. Don't hurry with submitting your articles

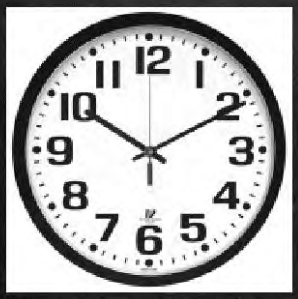
Some inexperienced authors may submit so-called «raw» manuscripts to the editorial office, hoping that they will have an opportunity to correct errors after receiving feedbacks from editors and reviewers.

Be quick, but don't hurry

Publication of Research Results

Tip #2. Don't hurry with submitting your articles

All respectable foreign scientific journals invite reputable scientists as peer-reviewers. Their work is a highly-paid one (it may be one of the reasons for publications high cost).



Basing on their great experience, peer-reviewers are supposed to identify «deep» strategic errors, rather than correct the mistakes which lie «on the surface».

Publication of Research Results

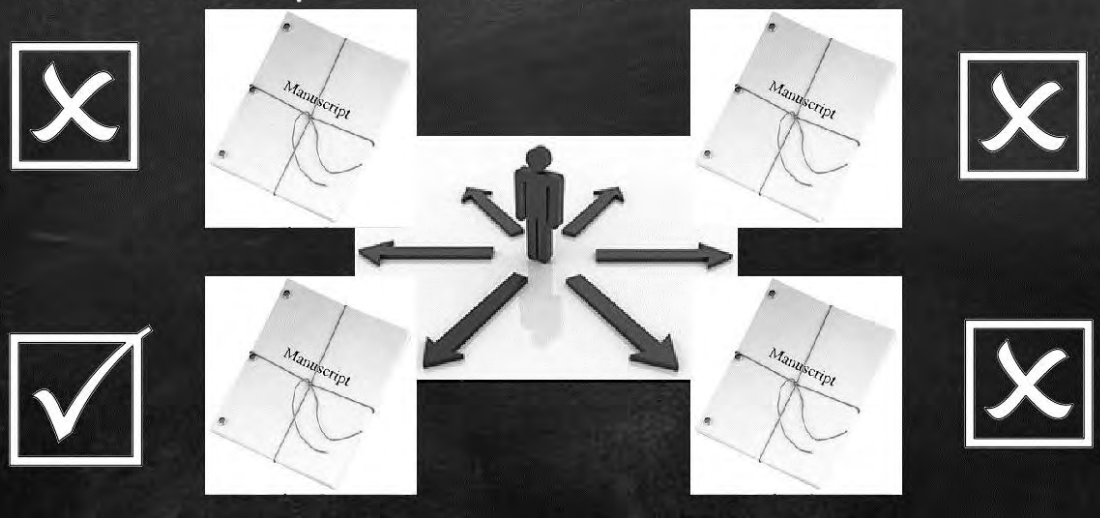
Tip #2. Don't hurry with submitting your articles

Therefore, we advise multiple re-reading your manuscript at different times and in different circumstances.
It may reveal the most obvious drawbacks and mistakes.
It is also desirable to show the manuscript to your colleagues exploring the similar scientific field.
Their «fresh glance» may be very helpful.

Publication of Research Results

Tip #2. Don't hurry with submitting your articles

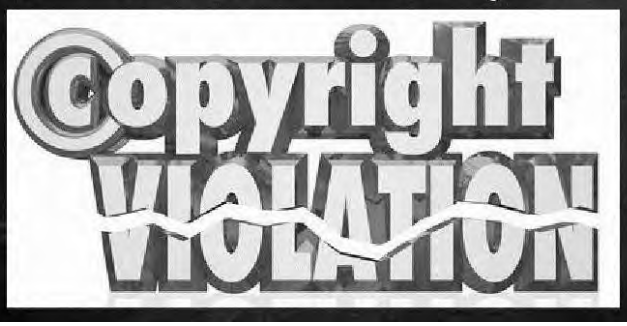
Other inexperienced authors submit their manuscripts simultaneously to several journals, hoping that at least one of the attempts will work. That won't do!!!



Publication of Research Results

Tip #2. Don't hurry with submitting your articles

This is a very harmful and even forbidden practice, because if one and the same manuscript is published by several journals, there may be confusion with article citation, as well as copyright problems. Such practice leads to reputation losses for both the scientist and the journal.

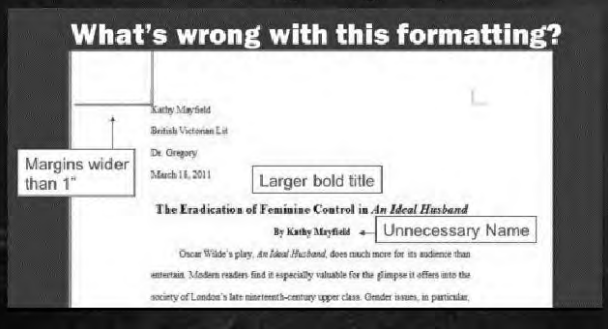


VS

Publication of Research Results

Tip #3. Get to know the journal's subjects, scope and author guidelines

Understanding the journal's recommendations for potential authors may greatly increase your chances. Publishers complain that over 20% of manuscripts do not meet the journals' requirements for editing text, drawings, graphs, tables, links, etc.



WRONG FORMATTING !!!

Publication of Research Results

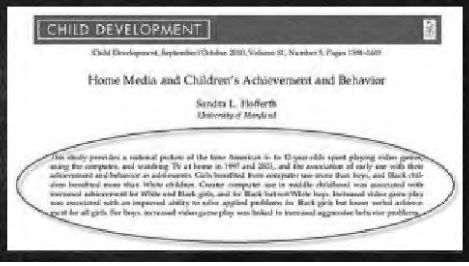
Tip #3. Get to know the journal's subjects, scope and author guidelines

If the subject of your investigation does not meet the journal target audience expectations, if the manuscript is not structured and formatted in accordance with the accepted layout rules — the editor can reject this manuscript without even allowing it to the stage of expert assessment, but only on formal grounds.

Publication of Research Results

Tip #4. Create positive first impression

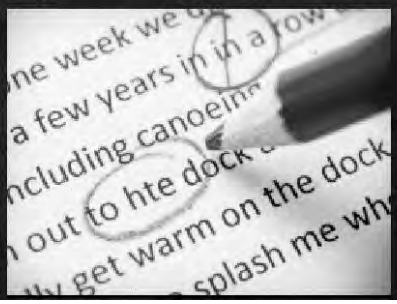
The manuscript title and abstract are the most important components, since they are the first elements to be seen by the journal experts. Therefore, the title should clearly reflect the main ideas of your research, and the abstract should give the clear idea of the research purpose, scope, key problems, methods used, data selection principles, main theoretical and practical results, while reflecting your personal contribution to the general scientific theory.



Publication of Research Results

Tip #5. Your manuscript must be professionally edited and professionally translated (!!!)

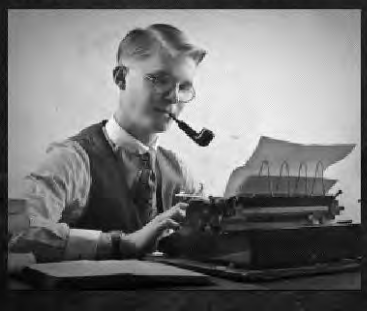
While writing an article for a respectable scientific journal it is not worth saving money on professional editing and translation. Before getting to an expert evaluation, the manuscript is initially considered by the editorial board. According to Scopus, from 30% up to 50% of articles are rejected by editorial boards because of «bad» scientific language - serious spelling, grammar, stylistic mistakes, amateur (machine) translation, poor formatting. Properly written text, especially in English, will be clearly and correctly understood, and will also produce positive impression on the journal's editors and experts.

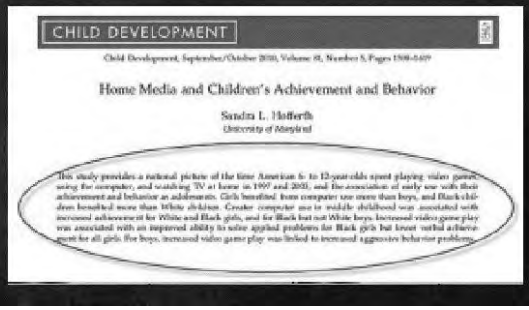


Publication of Research Results

Tip #6. Always send a cover letter along with the manuscript

A good cover letter gives the author an extra opportunity to convince editors that the research is worth paying attention. Some inexperienced authors consider it sufficient to insert in the cover letter just a fragment of the abstract. That won't do.




CHILD DEVELOPMENT

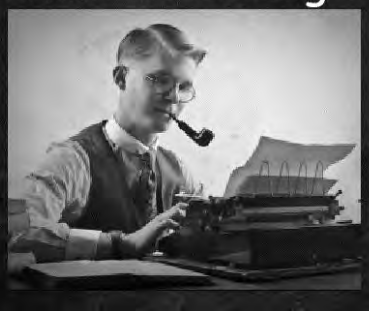
Home Media and Children's Achievement and Behavior

Sandra L. Hofferth
University of Maryland

Publication of Research Results

Tip #6. Always send a cover letter along with the manuscript

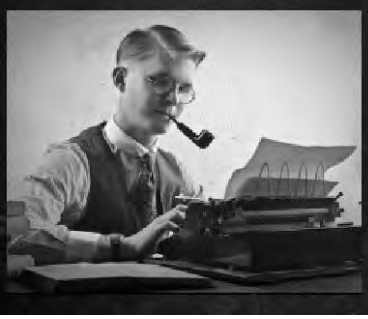
A convincing cover letter must prove the manuscript significance for the target audience of this very journal. We propose limiting the size of your cover letter by half the page. If other colleagues-scientists gave favorable reviews about your research, we also recommend adding them as supporting documents.

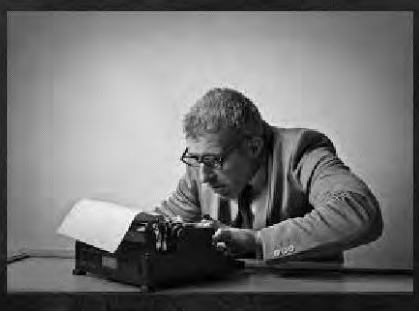


Publication of Research Results

Tip #7. Treat seriously the reviewers' comments

Editors make decisions on admitting, rejecting or directing the manuscripts for additional revision basing on the experts recommendations. They may require both minor and significant corrections, so the revision procedure may consist of several rounds.



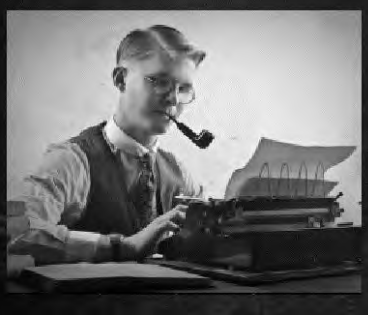


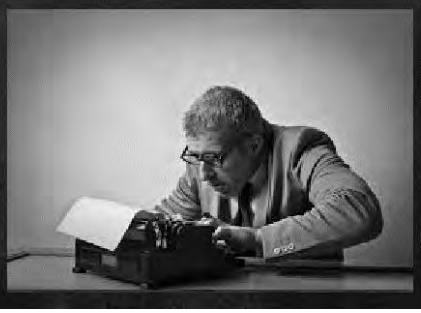
Publication of Research Results

Tip #7. Treat seriously the reviewers' comments

Several key rules for working with expert comments:

- examine carefully all expert comments;
- adhere to the terms given by the editorial board for the mistakes correction;
- respond to all comments, even those that you do not agree;





Publication of Research Results

Tip #7. Treat seriously the reviewers' comments

Several key rules for working with expert comments:

- while submitting a corrected version, make a list of corrections, so as not to force the expert to re-read the entire manuscript once again;
- you must not blindly accept all the comments, but you must explain your point of view, trying to convince the expert in your rightfulness.

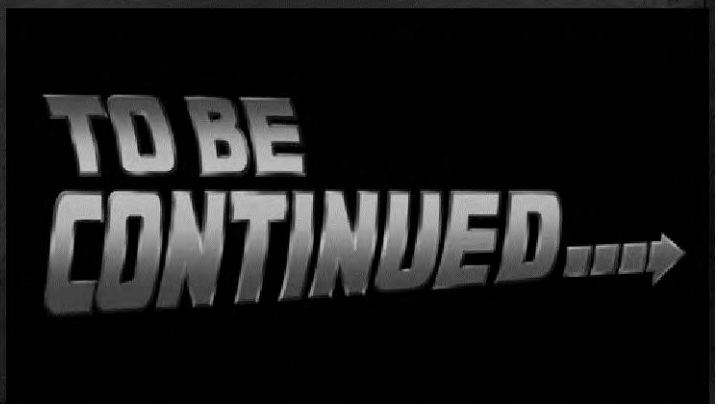
Publication of Research Results

Conclusion

Modern peer-reviewing becomes more thorough and rigorous. Leading scientific journals with high impact-factor accept from 10% up to 40% of the manuscripts. Even experienced scholars sometimes may be rejected by editorial boards.

If it happens to you, you must carefully examine all mistakes, analyze all comments. Perhaps, after the corresponding revision, your manuscript will be accepted for publication.

THE END OF THEME FIVE



Glossary

Words (word combinations, phrases)	Translation
novice researcher	дослідник-початківець
insufficiently motivated	недостатньо мотивований
«pet» problems	улюблена проблематика
«fads» and «vogues» in science	модні наукові забаганки
vague and doubtful perspectives	нечіткі та сумнівні перспективи
«unresearchable» problems	проблема, яку неможливо дослідити
ambiguously defined	неоднозначно визначений
«blind» data mining	накопичення даних навмання
inclusion and exclusion criteria	критерії залучення / виключення
«luck favors the well prepared»	«вдача любить підготовлених»
priceless in helping	неоціненно помічний
to point out weaknesses (limitations)	вказувати на слабкості (обмеження)
size of the study sample	розмір вибірки для дослідження

refutation of the existing theories	спростування існуючих теорій
to narrow down the research topic	звужувати тему дослідження
cause-and-effect statement	причинно-наслідковий зв’язок
experimenting with animal subjects	досліди (експерименти) на тваринах
descriptive statistics	описова статистика
inferential statistics	логічна (та, що виводиться) статистика
to provide a reader with a context	надавати необхідний контекст
to take the responsibility	брати на себе відповідальність
to drift from one thought to another	перескакувати з думки на іншу думку
a well-versed reader	добре обізнаний читач
to inspire a sustained discussion	провокувати тривалу дискусію
manipulations with raw data	операції з початковими даними
to be of primary importance	мати першочергову важливість
to yield different results	отримувати інші (відмінні) результати
to be aware of recent developments	знатися на найсучасніших досягненнях
to provide with pre-set templates	надавати готові шаблони
to proofread a scientific paper	«вичитувати» наукову роботу
a full-blow literature review	вичерпний огляд джерел (літератури)
mistakes uninstalling procedure	процедура виправлення помилок
refutation of the existing theories	спростування існуючих теорій
cause-and-effect statemnet	причинно-наслідковий зв’язок
to conduct a survey	проводити опитування
to experiment with animal subjects	проводити досліди на тваринах
observations in the natural environment	спостереження у природн. середовищі
a standard deviation	стандартне відхилення від норми
to confirm (reject) an original hypothesis	підтвердити (спростувати) гіпотезу
to put in much time and effort	докладати багато часу та зусиль
to identify the existing blank spots	визначати наявні прогалини
to drift from one thought to another	переходити від однієї думки до іншої

Common mistakes in scientific research

The research process is fraught with problems and pitfalls, and novice researchers (after investing substantial amounts of time and effort into a research project) often find that:

- their research questions were not sufficiently answered
- their findings were not interesting enough
- their researches were not of "acceptable" scientific quality

Common mistakes in scientific research

These mistakes are usually made during the design phase, but might also happen during the data collection, analysis or manuscript preparation phases. Some of the most frequent mistakes, that novice researchers make when planning, conducting and writing up a research project, are described in the lecture.

In addition, hints on how to improve your research projects and publications are suggested.

12 common research conducting mistakes

Mistake # 1. Wish to investigate insufficiently motivated research questions.

We often choose our «pet» problems that are interesting only to us but not to the scientific community at large. Usually, such practice doesn't generate new knowledge or insight about the phenomenon being investigated.

12 common research conducting mistakes

Mistake # 1. Wish to investigate insufficiently motivated research questions.

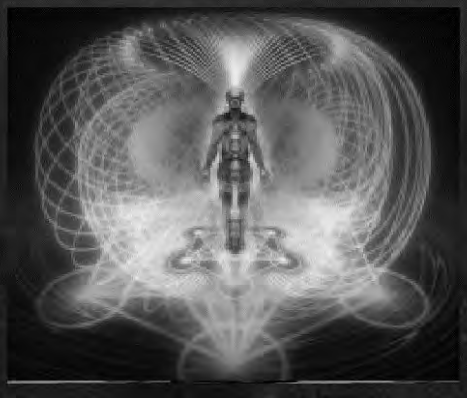
Hint

The research process involves a significant investment of time and effort on the researchers' part, so the researchers must be certain (and be able to convince others) that the research questions they seek to answer in fact deal with real problems (and not hypothetical problems) that substantially affect science and have not been adequately addressed in prior research.

12 common research conducting mistakes

Mistake # 2. Wish to pursue the latest «fads» and «vogues» in science.

Another common mistake is pursuing «fashionable» topics with limited shelf life. A typical example is studying technologies or practices that are very popular today but have vague and doubtful perspectives in future.



12 common research conducting mistakes

Mistake # 2. Wish to pursue the latest «fads» and «vogues» in science.

Hint

Any profound research takes several years to complete and publish. It's possible that popular interest in these fads may die down by the time the research is done and submitted for publication.

A better strategy may be to study «timeless» topics that have always persisted through the years.

12 common research conducting mistakes

Mistake # 3. Attempt to investigate «unresearchable» problems

Some research problems can't be answered adequately based only on observed evidence, or using imperfect but currently accepted methods, procedures, tools, or technical means.

Problem - how to build cities on Mars ?

UNRESEARCHABLE → TREMENDOUS PROBLEM

12 common research conducting mistakes

Mistake # 3. Attempt to investigate «unresearchable» problems

Hint

Such problems are best avoided.

Most of the tremendous, ambiguously defined «unresearchable» problems can be modified or fine tuned into several smaller well-defined and solvable problems which may be helpful when it comes to researching global problems in future.

How to create heat-proof materials? ←

How to make a reliable space-suit? RESEARCHABLE

How to weld in vacuum space? SMALLER PROBLEMS

12 common research conducting mistakes

Mistake # 4. Wish to use «favoured» research methods.

Many researchers have a tendency to recast a research problem so that it is amenable to their favorite research method (e.g., survey research).

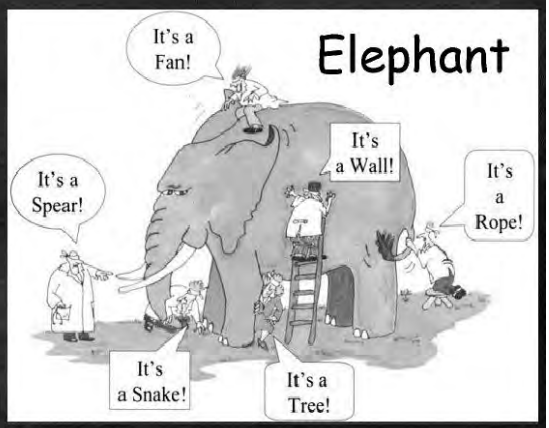
This is an unfortunate trend. Research methods should be chosen to best fit a definite research problem, and not the other way around.

Hint

12 common research conducting mistakes

Mistake # 5. «Blind» data mining.

Some researchers have the tendency to collect data first (using instruments that are already available), and then figure out what to do with it. If researchers jump into data collection without any elaborate planning, the data collected will likely be irrelevant, imperfect, or useless, and their data collection efforts may be entirely wasted (like in the old parable about six blind wise men)



12 common research conducting mistakes

Mistake # 5. «Blind» data mining.

Hint Note that data collection is only one step in a long and elaborate process of planning, designing, and executing research.

A series of other activities are needed in a research process prior to data collection. An abundance of data cannot compensate the shortages in research planning and design, and particularly, the lack of interesting research questions.

Is this the place to learn about mining?

12 common research conducting mistakes

Mistake # 6. Failure to carefully examine the literature for similar prior research

«Everything new is well-forgotten old» (proverb)

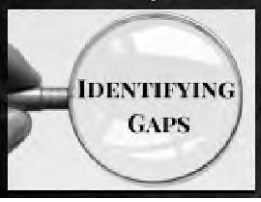
What novice researchers often fail to realize is that the investigated questions are unlikely to be new, because other scientists had frequently made certain attempts to investigate them in the past. Of course, you may have a new variation of the question, or you may use a new methodology or examine a new sample, but it should always be assumed that the core question in some form is likely to have been studied previously.

12 common research conducting mistakes

Mistake # 6. Failure to carefully examine the literature for similar prior research

Hint

The first job in the research design process is to exhaustively pursue, find and then catalog WHAT has already been published. On finding this information, it is critically important to read in detail the discussion sections of similar articles, where most researchers speculate on what needs to be accomplished next in that topical area to advance the science.



12 common research conducting mistakes

Mistake # 7. Failure to critically assess the prior literature

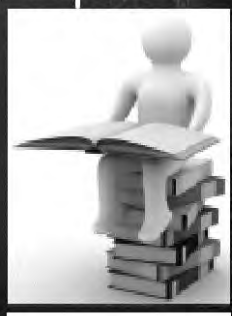
There is an old proverb that says:
«those who forget history are doomed to repeat it» and it is applicable to research as well. Investigators who repeat work previously done and do not recognize prior efforts are likely to find their work ineffective. Even if you systematically accumulated and categorized the literature concerning the problem, the next step is to critically assess these publications trying to find out WHAT could be improved.

12 common research conducting mistakes

Mistake # 7. Failure to critically assess the prior literature

Hint

Select for reviewing 10-15 latest articles on a topic (published in the most respectable journals). Make a critical analysis of them, presenting both the good and bad points. Then include these critical remarks in the introductory section of the resulting manuscript in order to justify why the study was needed and what you as a researcher did better than previous researchers.

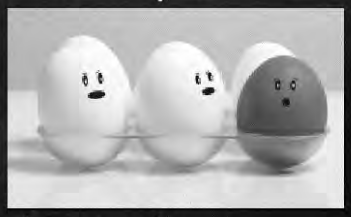


12 common research conducting mistakes

Mistake # 8. Failure to specify the inclusion and exclusion criteria for your subjects

A common omission from many researches is the lack of research subject specifications, e.g. the inclusion and exclusion criteria. Listing these criteria helps other researchers to understand why current results might differ from other published studies. For example:

- your sample group might be younger,
- or might be from a different region,
- or have a different ratio of males to females than were used in other research studies.



12 common research conducting mistakes

Mistake # 8. Failure to specify the inclusion and exclusion criteria for your subjects

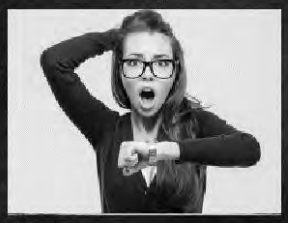
Hint

Even if you have the inclusion and exclusion criteria, be sure that you actually follow these criteria in selecting subjects for the study. If you are not sure how to develop a list of inclusion and exclusion criteria for a specific research question, look at prior research and use criteria that other researchers have specified.

12 common research conducting mistakes

Mistake # 9. Failure to write and stick to a detailed time-line

A detailed time-line or Gantt chart is an essential feature to include in a scientific research protocol, where every step of the research should be noted in the time-line. The problem with novice researchers is that they lack experience and cannot estimate realistically the time needed to achieve a specific task.



12 common research conducting mistakes

Mistake # 9. Failure to write and stick to a detailed time-line

A time-line is a critical and important overall feature in different studies, and failure to create and follow the time-line is a common mistake that is frequently made in research. Good researchers make a time-line plan that includes critical benchmarks along the way. They post it on the wall to see and stick to it!

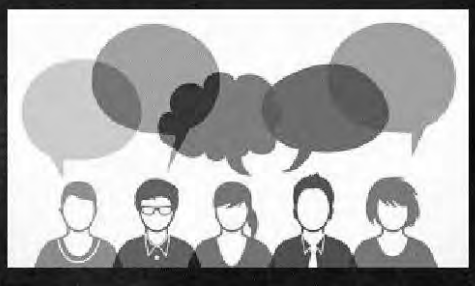
Hint WATCH YOUR TIME-LINE

12 common research conducting mistakes

Mistake # 10. Failure to have a detailed written draft

Novice researchers often begin research without completing any draft. Even if you have a draft, you need to present it to a peer group (hopefully with moderate research experience) with the request that the group provide critical comments and suggestions for improvement.

⇒



12 common research conducting mistakes

Mistake # 10. Failure to have a detailed written draft

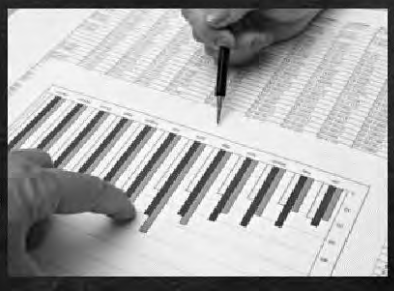
There is an old saying «luck favors the well prepared».

In the field of research, being well prepared means that a well thought out, detailed written draft is available and consulted frequently while conducting a research project.

12 common research conducting mistakes

Mistake # 11. Failure to use an appropriate statistical methodology

When the project's data analysis phase starts, it is critical that an appropriate statistical methodology be selected and implemented. Here a statistician is priceless in helping to conceptualize the analytical methodology that should be used.



12 common research conducting mistakes

Mistake # 11. Failure to use an appropriate statistical methodology

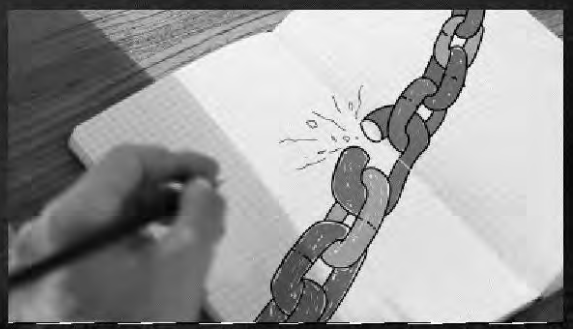
Hint

Typically an experienced researcher will consult a statistician for advice both before beginning the research and after the data has been collected. In many ways, the statistician serves as an outside auditor attesting to the diligence and honesty of the research process and analysis.

12 common research conducting mistakes

Mistake # 12. Failure to point out the weaknesses of your own study

Some novice researchers mistakenly believe that if they point out the weaknesses of their study it will reflect poorly on their work. The opposite is true !!! The studies are required to be critically examined, so pointing out the limitations of your research simply makes this process a bit easier for your colleagues.



12 common research conducting mistakes

Mistake # 12. Failure to point out the weaknesses of your own study

Hint

Remember - nobody expects instant perfect results that clearly prove or disprove certain hypothesis. Science rarely works that way, because even a perfect experiment is often compromised by the ...

REALITIES OF LIFE

" The realities of life do not allow themselves to be forgotten. "

Victor Hugo (Les Misérables)

12 common research conducting mistakes

Mistake # 12. Failure to point out the weaknesses of your own study

Hint

REALITIES OF LIFE

- You may not have access to the ideal solvent or piece of analytical equipment.
- Your experimental means may be very expensive, limiting the size of your study sample.
- You may not have the possibilities to perform follow-up measurements for the optimal length of time.
- And many, many, many others...

12 common research conducting mistakes

Mistake # 12. Failure to point out the weaknesses of your own study

Hint

These limitations are the realities faced by all of your colleagues and shouldn't reflect poorly on your abilities as a researcher. In general, hiding your mistakes or obscuring them with the hope that no one will notice - is not a good policy. Keep in mind that «honesty is the best policy».

~~12 common research conducting mistakes~~

Having come to know about the widely-spread mistakes and taking into account the hints for their overcoming, we elaborated the recommended procedure to strictly follow while conducting your scientific research - mistakes uninstalling procedure!

MISTAKES uninstalling...

~~research conducting mistakes~~

STEP # 0. TAKE THE RESEARCH SERIOUSLY

The entire scientific research process - from defining the research question to drawing conclusions - requires the researcher to think critically and approach the investigation in an organized and systematic way.

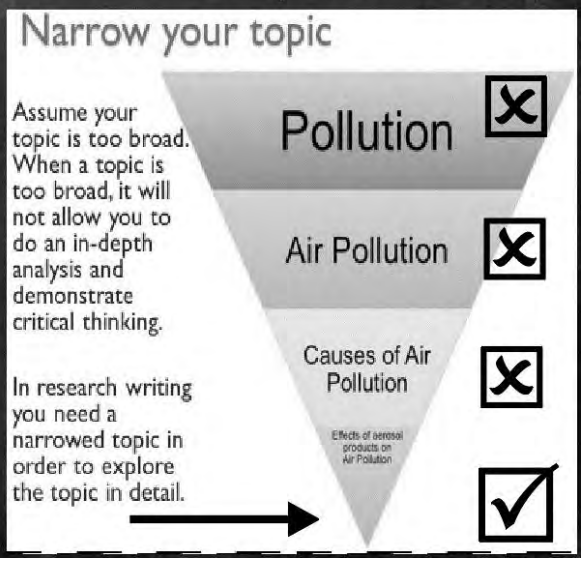
If you want your research to lead to the confirmation, re-evaluation or refutation of the existing theories, or even to the development of an entirely new theory, you must be convinced of the research importance and usefulness.

MISTAKES uninstalling...

~~research conducting mistakes~~

STEP # 1. DEFINE THE RESEARCH PROBLEM

The initial step of any scientific research process involves defining the problem. The topic under investigation mustn't be global (pollution). If initially it is too broad, it must be narrowed down into a more concrete issue. (effects of aerosol products on air pollution) →



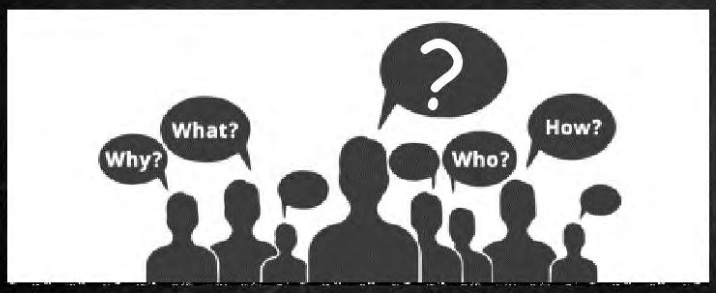
MISTAKES uninstalling...

~~research conducting mistakes~~

STEP # 1. DEFINE THE RESEARCH PROBLEM

This step also involves reading scholarly journal articles from other scientists to determine:

- if the question has been already answered;
- the conclusions drawn by other researchers;
- the experiments carried out in relation to the question.



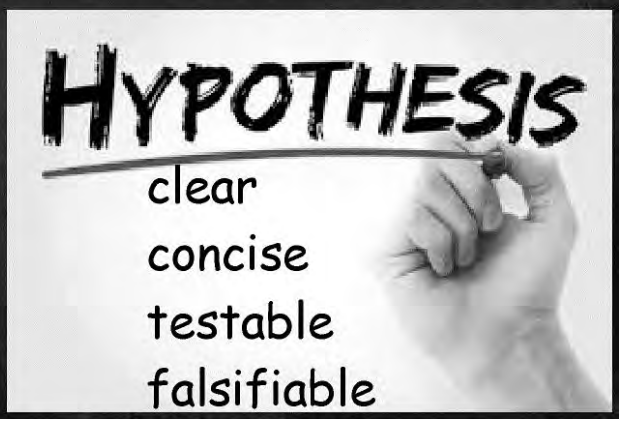
⇐

MISTAKES uninstalling...

~~research conducting mistakes~~

STEP # 2. SET UP A HYPOTHESIS

Hypothesis is a concise, clear statement containing the main idea or purpose of your scientific research. A hypothesis must be testable and falsifiable, meaning there must be a way to test the hypothesis and it can either be supported or rejected based on examining data.

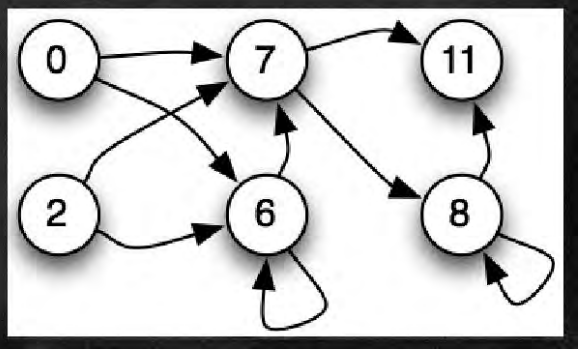


MISTAKES uninstalling...

~~research conducting mistakes~~

STEP # 2. SET UP A HYPOTHESIS

Crafting a hypothesis requires defining the variables you're researching (e.g. who or what you're studying), explain them with clarity and explain your position. When writing the hypothesis, scientists either make a specific cause-and-effect statement about the studied variables or make a general statement about the relationship between them.



MISTAKES uninstalling...

~~research conducting mistakes~~

STEP # 3. DESIGN AN EXPERIMENT

Designing a scientific experiment involves planning how you're going to collect data. Often, the nature of the research question influences how the scientific investigations will be conducted (e.g., researching people's opinions naturally requires conducting surveys).

MISTAKES uninstalling...

~~research conducting mistakes~~

STEP # 3. DESIGN AN EXPERIMENT

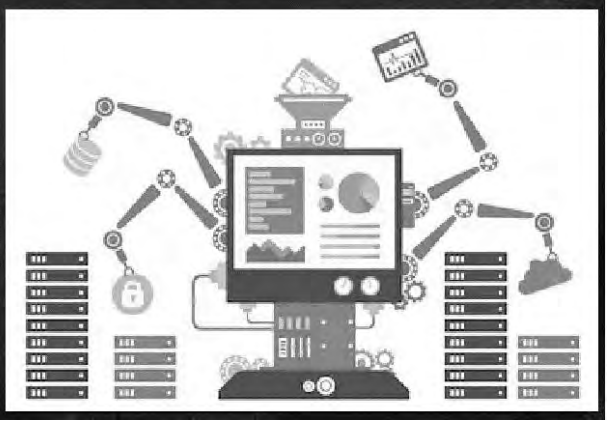
When designing the experiment, the scientists select from where and how the sample will be obtained, the dates and times for the experiment, the controls being used and the other measures needed to carry out the research.

MISTAKES uninstalling...

~~research conducting mistakes~~

STEP # 4. COLLECT DATA

During this process, the scientists record the data and complete the tasks required to conduct the experiments. In other words, the scientist goes to the research site to perform the experiment, such as a laboratory or some other setting.



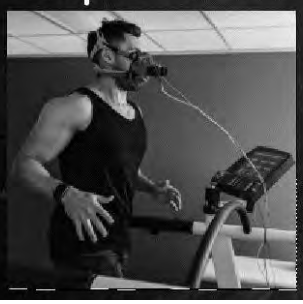
MISTAKES uninstalling...

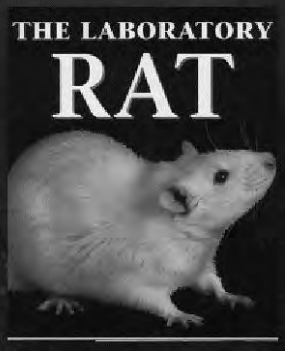
~~research conducting mistakes~~

STEP # 4. COLLECT DATA

The experiment's tasks vary depending on the research type. For example, some experiments require:

- bringing human participants in for a test,
- conducting observations in the natural environment,
- experimenting with animal subjects.



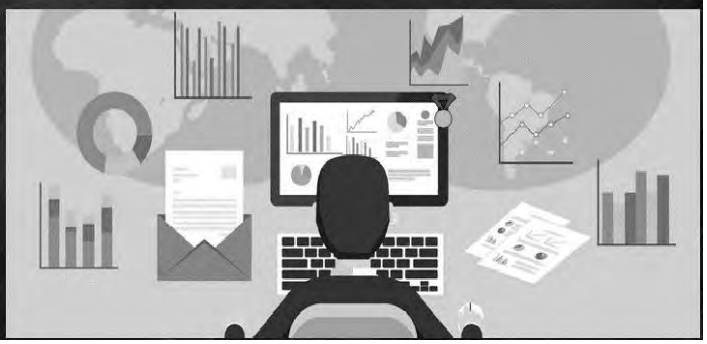


MISTAKES uninstalling...

~~research conducting mistakes~~

STEP # 5. ANALYZE DATA

Analysis involves bringing the data together and calculating statistics. Statistical tests can help the scientist understand the data better and tell whether a significant result is found. Calculating the statistics for a scientific research experiment uses both <u>descriptive</u> statistics and <u>inferential</u> statistics measures.



MISTAKES uninstalling...

~~research conducting mistakes~~

STEP # 5. ANALYZE DATA

Descriptive statistics describe the data and samples collected, such as sample averages or means, as well as the standard deviation that tells how the data is distributed.

Descriptive Statistics

- Organise
- Summarise
- Simplify
- Describe and present data

MISTAKES uninstalling...

~~research conducting mistakes~~

STEP # 5. ANALYZE DATA

Inferential statistics involves conducting tests of significance that have the power to either confirm or reject the original hypothesis.

Inferential Statistics

- Generalise from samples to populations
- Hypothesis testing
- Make predictions

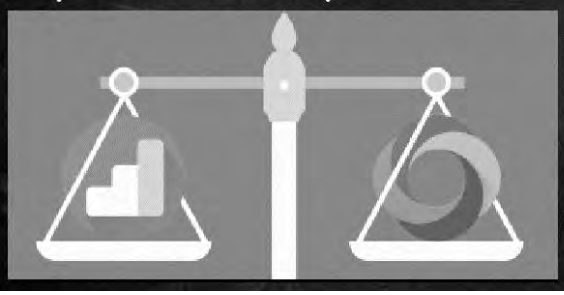
MISTAKES uninstalling...

~~research conducting mistakes~~

μ/λ

STEP # 6. DRAW THE CONCLUSIONS

After the experiment's data is analyzed, the scientist examines the information and makes conclusions based on the findings. He compares the results both to the original hypothesis and the conclusions of previous experiments by other researchers.



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MISTAKES uninstalling...

~~research conducting mistakes~~

μ/λ

STEP # 6. DRAW THE CONCLUSIONS

When drawing conclusions, the scientist explains what the results mean and how to view them in the context of the scientific field or real-world environment.
He also makes his suggestions for future research.

12 common research writing mistakes

It is disappointing to see an scientist who, after putting in much time and effort into conducting the research, finds his paper rejected by scientific journals after being judged basing on styling or linguistic errors, rather than its scientific merit. Experienced researchers understand that shaping your research effectively is as important as conducting solid scientific research. There are a few common research writing mistakes you must keep in mind to avoid unnecessary rejections.

12 common research writing mistakes

Mistake # 1. Failure to provide sufficient context for the reader

The Introduction section of any manuscript sets the stage for what follows. This section should provide the subject's brief history, with most of the attention focused on current research. The current research should be presented in such a way as to clearly identify the existing blank spots in knowledge, at filling which your investigation is aimed.

12 common research writing mistakes

Mistake # 1. Failure to provide sufficient context for the reader

Hint This section must present your work as relevant, important, and interesting to the reader. Here it is time to explain how your experiment will help to solve the Problem. In any case, you must present your work to the audience as a solution to the Problem.

Finally, having a clear understanding of the Problem and how you are attempting to solve it provides the reader with a context that makes it easier to follow the rest of your paper. PROBLEM — SOLUTION

12 common research writing mistakes

Mistake # 2. Failure to emphasize on WHY the problem under discussion is so IMPORTANT

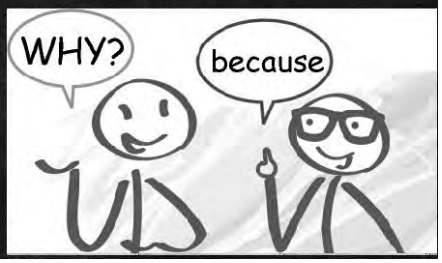
The Introduction sets the tone of the entire paper. Authors often utilize this section to talk about the objectives of the study and explain the problem they are addressing. But many authors leave it up to the reader to understand WHY the problem is so serious, important, and challenging.

It is a big mistake... ha, ha, ha...

12 common research writing mistakes

Mistake # 2. Failure to emphasize on WHY the problem under discussion is so IMPORTANT

Hint Authors must take the responsibility of convincing the reader about the problem gravity. Give detailed arguments to explain, why it is a difficult problem to solve, how the current solutions are falling short to solve it, and what makes your solution so compelling. Explaining the challenges faced in solving the problem is also a good way to intrigue the reader.



12 common research writing mistakes

Mistake # 3. Failure to focus on the primary research question

Unnecessary information like why you used a particular software to create pie-charts, or explaining well-known fundamentals of a topic when the majority of your readers are already well-versed with it, are easy ways to make people lose their interest in your work.

UNNECESSARY INFORMATION

12 common research writing mistakes

Mistake # 3. Failure to focus on the primary research question

The longer the research paper, the more challenging it becomes to keep readers engaged until the end. It is easy to drift from one thought to another, but a strong research question is always at the center !!!

⇒

12 common research writing mistakes

Mistake # 3. Failure to focus on the primary research question

Hint

Authors must note that their question should be intriguing enough for those in the same field of study. All supporting statements, first of all, should help with answering this very primary research question, at the same time, inspiring a sustained discussion around it.

12 common research writing mistakes

Mistake # 3. Failure to focus on the primary research question

Hint

Even if you want to present some good ideas, but they don't relate directly to the answer to your primary research question, it's best to keep them for another day.

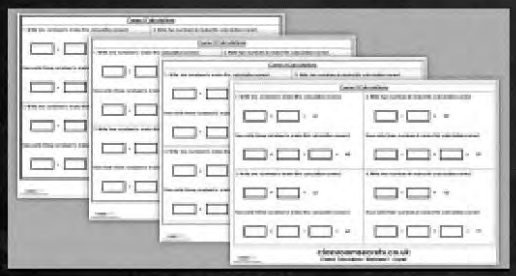
☒ secondary research questions

primary research question ☑

12 common research writing mistakes

Mistake # 4. Incorrect presentation of raw data

Many studies require manipulations with raw data. If it's possible, you should provide access to your raw data to let the readers determine whether your calculations, transformations, and other manipulations with data were appropriate and accurate.



?

accessible raw data

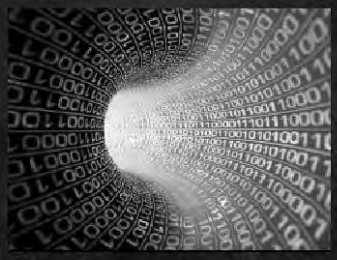
correctness checking

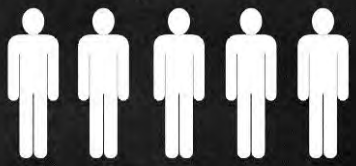
12 common research writing mistakes

Mistake # 4. Incorrect presentation of raw data

Transparency is an important part of the process, but remember, only those deeply interested in your calculations (usually others working in the same field whose own research correlate with yours) may feel the need to dive into an abyss of your raw data, so don't let it become a distraction for everybody else.

Yes, very interesting





No, too much data

12 common research writing mistakes

Mistake # 4. Incorrect presentation of raw data

Hint

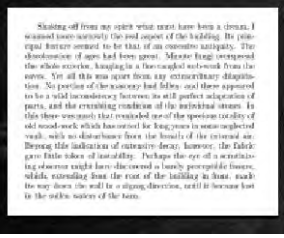
If there is a great deal of raw data, it's okay to provide it in an Appendix section or as an online supplement. As a general rule, the less raw data you have, the more accessible it should be to the reader and vice-versa. You can also present your raw data in a table along with the processed data, but be careful that you don't end up drowning the key points in a sea of numbers.

MUCH RAW DATA ⟶ APPENDIX

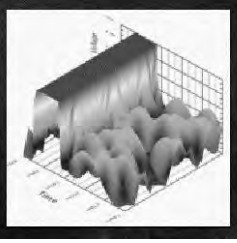
12 common research writing mistakes

Mistake # 5. Failure to enrich paper with appropriate figures and tables

Using text to describe everything can be boring and doesn't present your results (data) as effectively as a table or a figure. Adding figures and tables will also help you flesh out your results and give them the emphasis they deserve. But authors often make a lot of mistakes when formatting figures and tables.



boring presentation



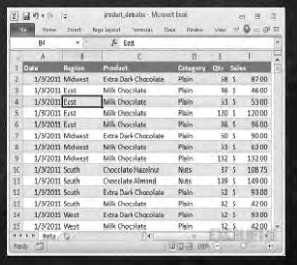
effective presentation

12 common research writing mistakes

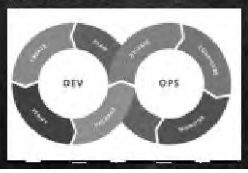
Mistake # 5. Failure to enrich paper with appropriate figures and tables

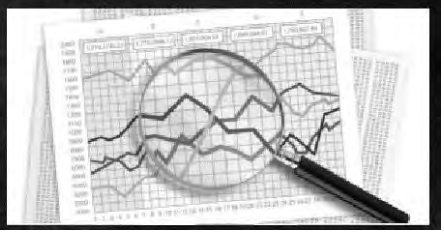
Hint

If you are unable to decide what would be the best way to represent your data - tables or figures - the general rule is that:



- tables present the experimental results,
- while figures offer a better visualization when comparing experimental results with theoretical (calculated) values or previous works.

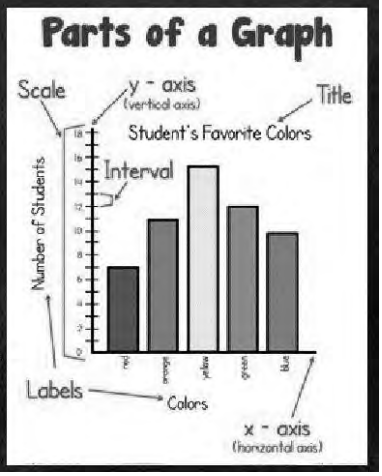




12 common research writing mistakes

Mistake # 5. Failure to enrich paper with appropriate figures and tables

- Figures and tables should be numbered in the same order in which they appear in your text.
- Use the right size for axis labels
- Make sure your symbols are clear and it is easy to distinguish data sets.
- Avoid including long boring tables and add them as supplementary material.
- Regardless of the choice you make, do not duplicate the information you've covered elsewhere in the manuscript.



12 common research writing mistakes

Mistake # 6. Incorrect data presentation in tables

Tables are designed to visually present data that is too complex to describe in text.

When describing your results in the text, stick to the major points and refer to tables where appropriate.

If the quantitative aspects of your results are of primary importance, a table allows the reader to easily locate the exact value of a measurement without having to wade through descriptive text.

Table 1.

The Number of thousands of litres of hot sauce consumed in Canada, the United States, and Britain 2007-2012

Column1	2007	2008	2009	2010	2011	2012
Canada	12	18	13	22	19	18
United States	57	64	66	72	74	69
Britain	20	16	15	18	21	19
Total Litres	89	98	94	112	114	106

Note. Data for hot sauce consumption in the United States from Kantar Media (2010), for Canada from Statistics Canada (2011), and for Britain from Euromonitor International (2010b).

12 common research writing mistakes

Mistake # 6. Incorrect data presentation in tables

Hint Do your readers a favor and don't use the text to walk them through every line and column in a table. Instead, describe the trend or point out one or two important data points, and then use the tables as a means of providing additional information. Tables can also help the reader to visualize simple relationships among groups or variables, such as an increasing or decreasing trend.

Ratio	2009	2008
ROA % (Net)	6.97	5.74
ROE % (Net	14.16	13.25
ROI % (O	12.01	10.72
EBITDA Margin %	10.27	9.58
Calculated Tax Rate %	38.51	41.63
Revenue per Employee	69,024	59,156

12 common research writing mistakes

Mistake # 7. Incorrect data presentation in graphs

Whether to use a table or a graph depends largely on the message you are trying to convey. Where the relationship between values is a significant part of the story, a graph is the better choice.

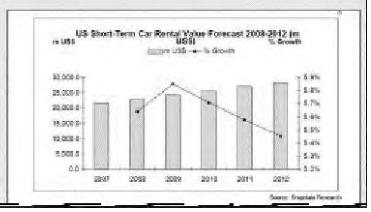
Tables or Figures?

Tables: numbers or words in columns or rows

Table 3. Implementation results of the unit inclusion cost heuristic at six semi-continuous processes from the food processing industry

Process	*Cost reduction (%)*	*Cost reduction ($ × 10⁶)*
1	6.4	1.8
2	5.4	1.5
3	6	0.9
4	7	2.1
5	8.3	0.9
6	12	1.6
Total	6.4	9

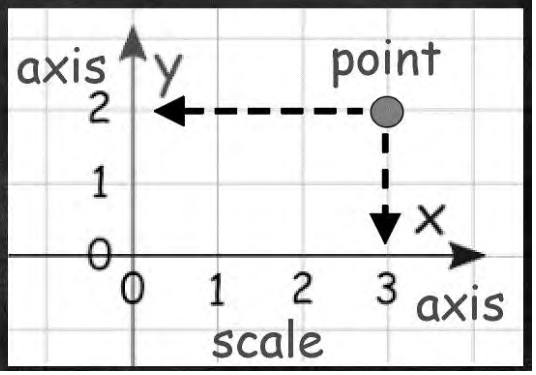
Figures: charts, graphs, drawings, photographs, maps, etc.



12 common research writing mistakes

Mistake # 7. Incorrect data presentation in graphs

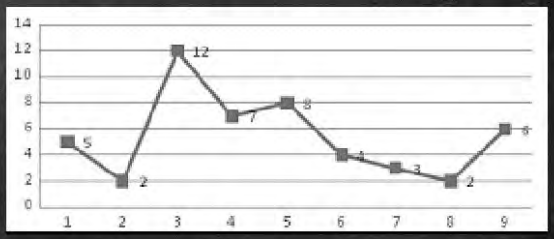
Hint Graphs' main purpose is in visually representing relationships among values. While it is possible to determine the value of a specific point on a graph, it usually requires visually extrapolating to the axis and then determining the value based on the scale and range of values along that axis.



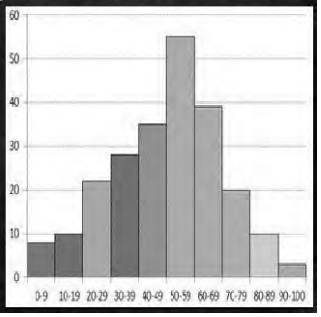
12 common research writing mistakes

Mistake # 7. Incorrect data presentation in graphs

Hint <u>Line graphs</u> are perfect for demonstrating the nature of the relationship between dependent and independent variables.



<u>Bar graphs</u> are excellent for displaying significant differences in results among the groups (but if the bars look too similar in height, a table indicating the significance might be a better choice).



12 common research writing mistakes

Mistake # 8. Failure to discuss the down-sides

When discussing the value of your results in the context of current research, don't just cite those studies whose results support your own. Don't be afraid of citing those authors whose studies yielded different results and suggest why that might be so.

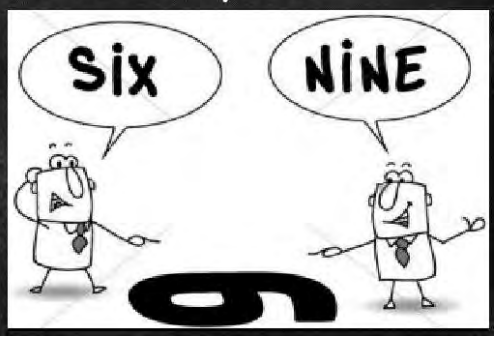
12 common research writing mistakes

Mistake # 8. Failure to discuss the down-sides

Hint You aren't expected to provide a definitive answer, but you are expected to at least come up with some ARGUMENTED (reasoned) guesses. Perhaps you used different experimental design. Perhaps you used different controls or samples.

Or you have another point of view →

It doesn't make you wrong, but it does make you thorough and is the sign of a professional.



12 common research writing mistakes

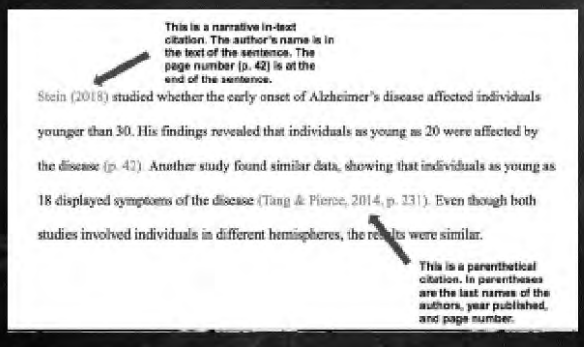
Mistake # 9. Failure to cite the relevant sources

Many novice researchers do not add relevant references to support their key arguments. Most reviewers reject papers that cite references from a long-time-ago as it is unlikely that no scientific progress has been made in a particular field in a couple of years.

12 common research writing mistakes

Mistake # 9. Failure to cite the relevant sources

Hint Citing newer researches is a great way to make a reader sure that your manuscript is up-to-date and relevant to the current conversation about the topic. Add a few newer references from top journals to show how well aware you are about the recent developments.



This is a narrative in-text citation. The author's name is in the text of the sentence. The page number (p. 42) is at the end of the sentence.

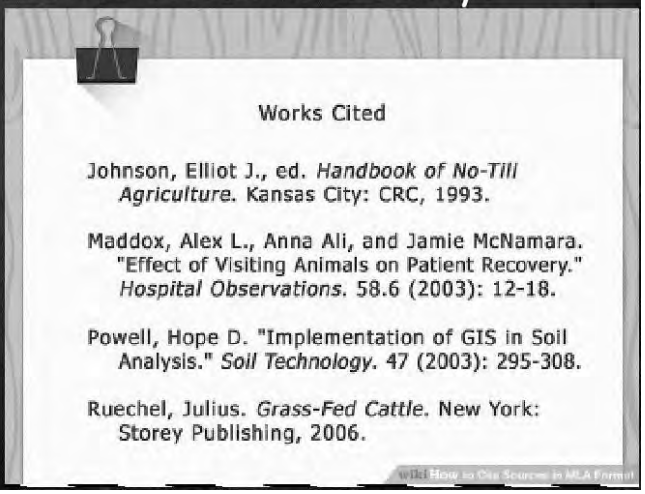
Stein (2018) studied whether the early onset of Alzheimer's disease affected individuals younger than 30. His findings revealed that individuals as young as 20 were affected by the disease (p. 42). Another study found similar data, showing that individuals as young as 18 displayed symptoms of the disease (Tang & Pierce, 2014, p. 231). Even though both studies involved individuals in different hemispheres, the results were similar.

This is a parenthetical citation. In parentheses are the last names of the authors, year published, and page number.

12 common research writing mistakes

Mistake # 9. Failure to cite the relevant sources

Hint Each journal has specific guidelines on how to cite sources. Make sure you do not take these guidelines lightly and follow them correctly. Most journals provide the prospective authors with pre-set templates to follow when adding citations to the paper.


Works Cited

Johnson, Elliot J., ed. *Handbook of No-Till Agriculture*. Kansas City: CRC, 1993.

Maddox, Alex L., Anna Ali, and Jamie McNamara. "Effect of Visiting Animals on Patient Recovery." *Hospital Observations*. 58.6 (2003): 12-18.

Powell, Hope D. "Implementation of GIS in Soil Analysis." *Soil Technology*. 47 (2003): 295-308.

Ruechel, Julius. *Grass-Fed Cattle*. New York: Storey Publishing, 2006.

12 common research writing mistakes

Mistake # 10. Failure to use correct scientific language

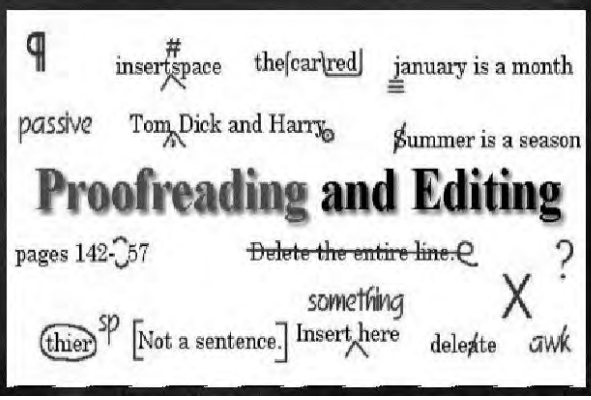
Getting your paper rejected due to linguistic or style errors, or because you aren't acquainted with the latest research, is a waste of time for both you and the reviewers of the journal where you submit.


Herbicide and Insecticide Use on GMO Crops Skyrocketing While Pro-GMO Media Run Interference

Former EPA Senior Scientist's New Article Sets Record Straight

By David Bronner, President of Dr. Bronner's Magic Soaps

REJECTED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Proofreading and Editing

pages 142-57 ~~Delete the entire line.~~ ?

thier sp [Not a sentence.] Insert here something delete awk

12 common research writing mistakes

Mistake # 10. Failure to use correct scientific language

Hint Both experienced and novices researchers, must use the correct scientific language when describing their investigations. If you want to be a good research writer, you must study and understand the nuances of the language associated with the scientific process. Non-native speakers are highly recommended to get their papers proofread by a native speaker at least once before submission.

12 common research writing mistakes

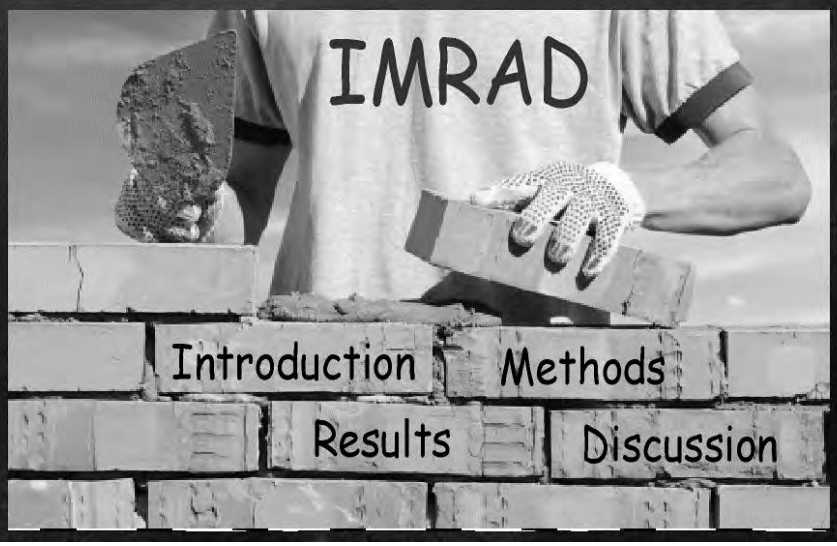
Mistake # 11. Weak structuring of the paper

Unfortunately, the skills that make a good scientist don't always translate to good writing. It doesn't matter how brilliant your experiment is, or how groundbreaking your results are, if your colleagues cannot find logic in what you've done, your paper is at the risk of being rejected by the scientific community. The key to successful writing is getting the structure of the paper right.

12 common research writing mistakes

Mistake # 11. Weak structuring of the paper

The basic structure of a typical research paper is the sequence of: Introduction, Methods, Results, and Discussion (sometimes abbreviated as IMRAD).



12 common research writing mistakes

Mistake # 11. Weak structuring of the paper

Each basic section addresses a different objective:

- in the Introduction section the authors state the problem they intend to address
- in the Methods section the authors say what they did to answer the question
- in the Results section the authors say what they observed/investigated
- in the Discussion section the authors say what they think the results mean

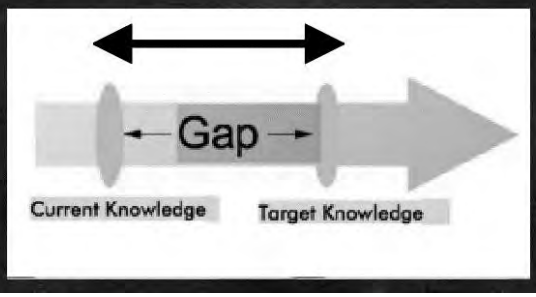
12 common research writing mistakes

Mistake # 11. Weak structuring of the paper

A typical structure provided for a typical research paper

In the Introduction section the authors:

- State why the problem they address is important
- State what is lacking in the current knowledge
- State the study objectives and the research question



12 common research writing mistakes

Mistake # 11. Weak structuring of the paper

A typical structure provided for a typical research paper

In the Introduction section

One should explain the main reasons and background to the study. What is the research question, and why it is important to ask. It is necessary to provide a brief (not a full-blown) review of the literature as a prelude to the study. The research question should always be spelled out and not merely left for the reader to guess.

12 common research writing mistakes

Mistake # 11. Weak structuring of the paper

Hint

A typical structure provided for a typical research paper

The Methods section should provide the readers with sufficient detail about the study methods to be able to reproduce the study if it's necessary. The section is

specific concrete technical detailed




12 common research writing mistakes

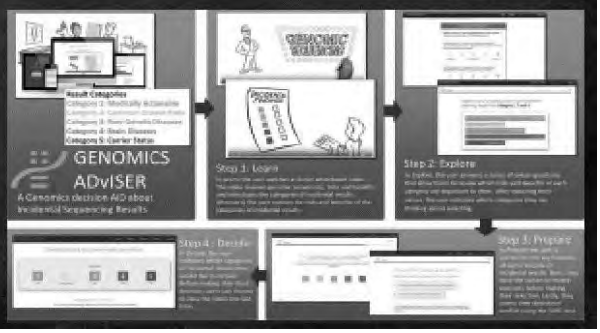
Mistake # 11. Weak structuring of the paper

Hint

A typical structure provided for a typical research paper

In the Results section the authors:

- Report on data collection and recruitment
- Present key findings with respect to the central research question
- Present secondary findings (if there are some)



This section is typically straightforward and factual.

12 common research writing mistakes

Mistake # 11. Weak structuring of the paper

Hint

A typical structure provided for a typical research paper

All results related to the research question should be given in detail, including simple counts and percentages. Resist the temptation to demonstrate analytic ability and the richness of the data-set by providing numerous tables of non-essential results. Finally, make sure your Results section describes your data and only your data. This is not the place for discussing the implications of your results, making assumptions, or drawing conclusions. Such information belongs to the Discussion section →

12 common research writing mistakes

Mistake # 11. Weak structuring of the paper

Hint

A typical structure provided for a typical research paper

In the Discussion section the authors:

- Discuss the main results with reference to previous research
- Discuss policy and practice of the results' implementation
- Analyze the strengths and limitations of the study
- Offer perspectives for future investigations

12 common research writing mistakes

Mistake # 11. Weak structuring of the paper

Hint

A typical structure provided for a typical research paper

The Discussion section allows the most freedom. This is why the Discussion is the most difficult to write, and is often the weakest part of a paper. →

That's why structured and exhaustive Discussion sections are usually high-valued by the scientific journals editors. →

12 common research writing mistakes

Mistake # 12. Failure to keep in mind the most common research writing mistakes

Hint

List of widely-spread mistakes, found by the journals' reviewers (to be remembered and avoided):

1) the research question is not specified
2) the stated aim of the paper is tautological or vague
3) the structure of the paper is chaotic (e.g. methods are described in the Results section)
4) the manuscript doesn't follow the journal's guidelines for authors
5) the paper MUCH exceeds the maximum number of words allowed

12 common research writing mistakes

Mistake # 12. Failure to keep in mind the most common research writing mistakes

Hint

List of widely-spread mistakes, found by the journals' reviewers (to be remembered and avoided):

6) the Introduction is an extensive review of literature
7) research methods and instruments are not described in sufficient detail
8) results are reported selectively (to show them in a good light)
9) the same results appear both in tables/graphs and in the text

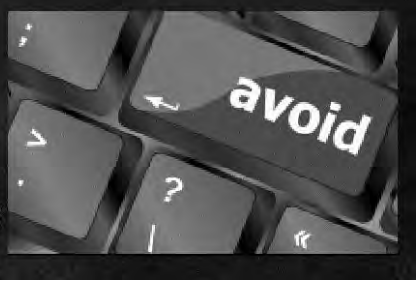
12 common research writing mistakes

Mistake # 12. Failure to keep in mind the most common research writing mistakes

Hint

List of widely-spread mistakes, found by the journals' reviewers (to be remembered and avoided):

10) detailed descriptions are provided for results that do not relate to the main research question
11) in the Introduction and Discussion sections, key arguments are not backed up by appropriate references
12) references are out of date or can't be accessed by most of readers



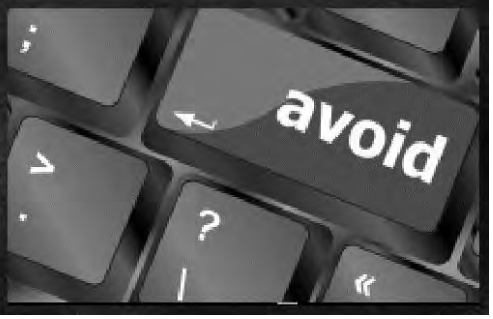
12 common research writing mistakes

Mistake # 12. Failure to keep in mind the most common research writing mistakes

Hint

List of widely-spread mistakes, found by the journals' reviewers (to be remembered and avoided):

13) the Discussion does not provide an answer to the research question
14) the Discussion overstates the implications of the results
15) the paper is written in poor (non-scientific) English



If you avoid all those mistakes, your research paper should be in good shape !!!

THE END

Tests for self-control

Make a proper choice between A, B, C or D variants

Question #1

According to its definition – «constructive methodology»...	
A	offers approaches and principles of a certain object or phenomenon investigation
B	provides theoretical groundings for practical activity
C	explains processes of modeling and projecting of the concrete object
D	regulates forms of logical thinking

Question #2

The main components of science are ...	
A	«theoretical basis» plus «research and development institutions»
B	«investigation results» plus «research methodology and techniques»
C	«theoretical basis» plus «investigation results»
D	all the above-mentioned

Question #3

The methodological principle of systemicity foresees ...	
A	definition of all the relationships of the investigated phenomenon
B	taking into account external influences and internal interactions
C	penetration into the very essence without making anything external or subjective
D	none of the above-mentioned

Question #4

The synergetic approach in methodology foresees ...	
A	studying the processes of externally managed organization
B	emphasis on the investigated system's static position
C	underlining the investigated system's linearity
D	none of the above-mentioned

Question #5

The axiological approach in methodology foresees ...	
A	study of events and phenomena occurring in different countries
B	determination of a personality's value attitude to certain phenomena
C	taking into account over-objectivity and interdisciplinary relations
D	involvement of research subjects in certain activities

Question #6

The synergetic approach takes into account unmanaged external factors which include:	
A	education content and professional experience
B	family circumstances and upbringing actions
C	staff interrelations and teacher's social status
D	political situation and level of communication technologies development

Question #7

The introductory part of a research paper usually includes ...	
A	research goal, tasks, object and subject
B	research connection with scientific projects, plans and programs
C	methods used for the research carrying out
D	all the above-mentioned

Question #8

The scientific research may be regarded as an actual (up-to-date) investigation, if it ...	
A	considers the huge amount of problems with no contradictions
B	uses different methods and approaches for collecting the necessary data
C	corresponds to urgent practical needs and fills in the gaps in theoretical positions
D	shows the author's scientific achievements in a good light

Question #9

Substantiation of the investigated problem's topicality foresees ...	
A	references to the official documents reflecting the problem importance
B	characterization of knowledge at enrichment of which the research is aimed
C	definition of practical needs for improving the investigated phenomenon
D	all the above-mentioned

Question #10

The research theme usually reveals ...	
A	the data which was obtained as the result of investigation
B	for what reason the problem is under investigation
C	how the investigation is conducted
D	none of the above-mentioned

Question #11

Which of the given statements concerning the research object and subject is false?	
A	The research subject is always within the research object
B	One and the same object may be the subject of various investigations
C	The subject serves the general scope of the research, but the object is a concrete one
D	Both object and subject (or at least one of them) should be new for science

Question #12

Which of the scientific novelty levels is characterized by bringing the new elements into theoretical and practical knowledge without changing its essence?	
A	the level of transformation
B	the level of concretization
C	the supplementary level
D	none of the above-mentioned

Question #13

Empirical methods of research include both ...	
A	observation and idealization
B	calculation and deduction
C	measurement and comparison
D	formalization and extrapolation

Question #14

Determination of similarity or dissimilarity of several objects (phenomena) is called ...	
A	observation
B	comparison
C	modeling
D	abstraction

Question #15

Difficulty in considering all possible factors of influence belongs to ...	
A	theoretical research advantages
B	empirical research advantages
C	theoretical research disadvantages
D	empirical research disadvantages

Question #16

Induction ...	
A	is based on scientific positions that require no experimental confirmation
B	is used for super-complex objects and creates their simplified theoretical models
C	presumes imaginary isolation of the most essential properties of a phenomenon
D	none of the above-mentioned

Question #17

Dissemination of conclusions obtained for one part of a system to its other parts is called ...	
A	extrapolation
B	synthesis
C	generalization
D	modeling

Question #18

When certain research actions are conducted without foreseeing any likely outcome ...	
A	the researcher uses the «brainstorming» method
B	the researcher uses the «black box» method
C	the researcher uses the «tries and errors» method
D	the researcher uses the «long-term goals» method

Question #19

While using the «short-term goals» method, the researcher usually ...	
A	discusses a problem within a group of 12-18 other researchers
B	transfers the characteristics of the investigated phenomenon to other phenomena
C	divides the totality of minor tasks into six subgroups (2-3 task for one subgroup)
D	looks at a problem or phenomenon from an unexpected point of view

Question #20

A researcher with «the intellect of success» ...	
A	does not postpone the consideration of problems for later
B	does not know when it's necessary to be persistent in achieving the goal
C	does not stop timely when the problem can not be currently solved
D	does all the above-mentioned actions

Question #21

The initial reason for science emergence was ...	
A	complication of subject-practical and transformative activities
B	rapid increase of human cognitive activity
C	formation of subject-object relations between human and the environment
D	profound changes in the structure of brain, mentality and body morphology

Question #22

Among the prerequisites for science emergence there are ...	
A	formation of spoken and written language
B	emergence of Philosophy and Fine Arts
C	development of calculation system and world outlook
D	all the above-mentioned

Question #23

As a stage of science development the Renaissance was characterized by ...	
A	emergence of scientific periodical literature (the first journals, bulletins etc.)
B	division of science into Physics (nature), Ethics (society) and Logic (thinking)
C	emergence of new physical disciplines (thermodynamics and electrodynamics)
D	none of the above-mentioned

Question #24

The concept of reconstruction and development of scientific cognition is presented in	
A	«On the Origin of Species by Means of Natural Selection» by Charles Darwin
B	«The Structure of Scientific Revolutions» by Thomas Kohn
C	«Uncertainty Principle» by Werner Heisenberg
D	«The Special Theory of Relativity» by Albert Einstein

Question #25

Among the main parameters of a scientist's publication activity there are ...	
A	total number of articles in the journals indexed in Scopus and WOS databases
B	the Hirsh-index and i-10-index
C	overall number of scientific articles and annual number of quotations
D	all the above-mentioned

Question #26

Among all bibliometric databases the most accessible and popular is the free database...	
A	Web of Science (under the auspices of Clarivate Analytics)
B	Scopus (under the auspices of Elsevier)
C	Google Scholar (under the auspices of Google)
D	IMDb Top 250 (under the auspices of Amazon)

Question #27

Real popular international peer-reviewed scientific journals ...	
A	popularize knowledge about all spheres of cognition and all branches of science
B	are printed for the limited amount of professionals in certain scientific branches
C	publish articles quickly, cheaply and qualitatively at the same time
D	publish scientific articles which have neither ISSN nor DOI

Question #28

In the context of a scientific journal the abbreviation ISSN stands for ...	
A	Impudent Supersonic Spaceship Newcomer
B	Invented Symbolic System by Newton
C	Integrated Submission Security Network
D	International Standard Serial Number

Question #29

Indications of a typical «predatory journal» ...	
A	excessively wide scope of scientific disciplines
B	lack of clear policies on the use of copyright objects and licenses
C	persistent dispatching of spam e-mails containing publishing proposals
D	all the above-mentioned

Question #30

The experienced authors of scientific articles usually ...	
A	submit their manuscripts to several journals simultaneously
B	never send any cover letters along with their manuscripts
C	never show their manuscripts to the colleagues exploring the similar field
D	none of the above-mentioned

Test for self-control (keys)

Question = Answer		Question = Answer		Question = Answer	
1	C	11	C	21	C
2	D	12	C	22	D
3	B	13	C	23	D
4	D	14	B	24	B
5	B	15	D	25	D
6	D	16	D	26	C
7	D	17	A	27	B
8	C	18	C	28	D
9	D	19	C	29	D
10	B	20	A	30	D

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