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## МИНОБРАЗОВАНИЯ РОССИИ

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О.Г. Локтионова

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## ENGLISH FOR SCIENCE

Методические указания по английскому  
языку для магистрантов и аспирантов

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Составители: Т.В. Кружилина, Е.Н. Кондратенко

Рецензент

Кандидат филологических наук, доцент В.В. Звягинцева

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Данные методические указания, предназначенные для магистрантов и аспирантов, направлены на формирование навыков говорения и чтения в научной сфере, включая навыки письменной речи, а также на развитие профессионально ориентированной иноязычной коммуникативной компетенции обучающихся. Для достижения этих целей предлагается ряд оригинальных текстов различной научной тематики и система упражнений на составление аннотаций, пересказов и диалогов.

Методическая обоснованность и логичность представленных заданий, разнообразный аутентичный материал дает возможность использовать его для обучения профессионально ориентированному научному языку. Основная цель методических указаний – формирование ключевых компетенций, обусловленных навыками использования иностранного языка в деловой, научной и профессиональной коммуникации.

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## **ВВЕДЕНИЕ**

Данные методические указания предназначены для студентов магистрантов различных направлений подготовки.

English for Science состоит из разделов, освещающих различные аспекты общенаучной сферы деятельности, а также содержит ряд грамматических упражнений, направленных на разбор трудностей перевода научно-технического текста, кроме того в пособие включен ряд коммуникативных и творческих заданий. Все разделы были отобраны с помощью анализа практической значимости материала в профессиональной деятельности магистрантов.

В методической разработке представлены аутентичные тексты общепрофессиональной направленности, а также разнообразные по форме и содержанию упражнения, основанные на активных технологиях обучения и направленных на активизацию изученного материала. Упражнения творческого характера имеют цель сформировать положительную мотивацию к изучению данной темы и предмета в целом, а также обеспечить формирование навыков устной и письменной коммуникации на иностранном языке. В процессе их выполнения обучающиеся вовлечены в квазипрофессиональную деятельность, которая несет в себе черты их будущей профессиональной деятельности с использованием иностранного языка, формируя целостный образ будущей профессиональной ситуации. Кроме того, разработанные творческие задания направлены на стимулирование совместной работы, где каждый обучающийся приобретает навыки социального взаимодействия, коллективную направленность, ценностные ориентации и установки, присущие специалисту.

Методические указания рекомендуются к использованию как для аудиторной, так и для самостоятельной работы студентов-магистрантов и аспирантов всех форм обучения.

## PART 1

### Unit 1.1

#### Planning Career in Science

##### Task 1. Read and learn the words.

*abstract of thesis (article)* – автореферат диссертации (статьи)

*adviser* – n 1 куратор 2 научный руководитель

*assistant professor* – n доцент (учёное звание ниже, чем *associate professor*)

*associate professor* – n 1 доцент университета 2 адъюнкт-профессор

*candidate for Master's degree* – кандидат на соискание учёной степени магистра

*continuing professional development* – CPD продолжение профессионального образования

*Doctor of Science = ScD = DSc* – доктор технических наук

*entrance examinations* – вступительные экзамены

*GCE – general certificate of education* – свидетельство об общем образовании

*Master* – n магистр (учёная степень)

*Magister* – n учёное звание магистра

*degree of master* – степень магистра

*magistracy* – n магистратура

*Master's degree* – n магистр

*MSc – Master's degree in science*

*part time program* – краткий курс

*full time program* – полный курс

*PhD* – кандидат наук

*Postgraduate* – n аспирант

*postgraduate courses* – аспирантура

##### Task 2. Translate the sentences:

1. Every postgraduate has to write abstract of thesis before the thesis.

The abstract of thesis is published or presented online.

2. The adviser has to manage the process of the research and defense. Highly-qualified adviser is very important for each postgraduate student and candidate for Master's degree.

3. The assistant professor position means the scientific work activity and prosecution of research. Assistant professors carry out the scientific work of their own.

4. The associate professor position is higher than that of the assistant professor. Associate professors carry out the scientific work of their own and guide postgraduate studies and their scientific research.

5. Candidates for Master's degree take the course of studies after four years of university studies and graduation. In two years they will get the Master's degree.

6. After graduation one of the ways of the career's promotion is to take the CPD course. Continuing professional development courses gives new job competences.

7. To become Doctor of Science one has to take the course of doctorate. After defense of doctorate thesis my brother will become the Doctor of Science.

8. In magistracy postgraduate students get the degree of master and then take postgraduate studies.

9. Next year I am going to enter magistracy and become the candidate for degree of master. Studies at magistracy are the stage before taking postgraduate course.

10. To become a master the graduate enters magistracy. After studies at magistracy the candidate can get the Master's degree and then the magister.

11. There is a great variety of Master's degrees in science. Among them are the master's degrees in Biological Chemistry, Biological Science, and Physics. I would like to get the degree of master in Biological Physics.

12. All the students, candidates for master's degree, postgraduates, and teachers write research papers. Research papers define the rate of scientists.

13. The magistracy offers a wide range both of part time and full time programs.

14. PhD degree is given after postgraduate studies and defense of thesis.

15. Being postgraduate means carrying out a lot of scientific research. Postgraduates spend much time on studies.

16. Both masters and specialists can take postgraduate courses. Getting postgraduate course certificates is an obligation necessity for continuing one's operational procedures.

**Task 3. Read about the reasons for choosing the postgraduate course. What are your personal reasons? Explain your choice.**

### **Why Do We Choose Postgraduate Studies?**

What does choosing the postgraduate course mean for a person? It is going up the level higher than the first degree. What are the reasons for taking postgraduate studies? The first one is the stimulus of the *intellectual challenge*: working with concepts, approaches, methods and ideas, developing skills of analysis and research among the researchers and academics.

The second reason is the *personal challenge*. What is the difference between the *undergraduate* and the *postgraduate level*? Undergraduate level *develops* study skills and the ability of independent studies, and the postgraduate course specifies skills perfection, responsibility, independence in one's own learning, ability to work with complex ideas and concepts and developing them.

Next, there is the serious problem of career prospects, more interesting and highly paid jobs. PhD degree or degree of Doctor of Science can be an obligatory requirement for entering the career, the researcher career or securing promotion to higher levels. In some professional fields the joint programs of universities and employers are undertaken both at undergraduate and postgraduate level and these programs are defined as the first stage of learning for the trainees.

For a number of postgraduates entering academic career as the university teacher and researcher is important. Besides, with rapid extension of higher education in some countries high-status academic position is available only with the Doctorate. It means the increase of the demand for people educated to Doctorate level.

**Task 4. Read the dialogue and discuss your motivation to enter the postgraduate studies. Make up a dialogue.**

### **Motivation to Enter the Postgraduate Studies**

– Jane, I have not recently seen much of you.

- In fact, I was very busy with entrance exams for postgraduate studies.
- How clever of you!
- You see, mostly it's my choice of intellectual challenge: working with concepts, approaches, methods and ideas, developing skills of analysis and research among the researchers and academics. Besides, it's the personal challenge as well. I would like to master my personal skills. They could improve the development of my future career.
- I myself would also like to take undergraduate course in Computer Science to be able to carry out research projects at the high-tech level.
- Good luck.

***Task 5. Answer the questions and speak about your supervisor. Present your own ideas of the scientific work.***

### **I Am the Magistrate /Postgraduate**

I have chosen the magistracy/postgraduate course. What does it mean? It's my choice.

Why have I done it? The main thing is I would like to become a professional in the sphere of computer science. As a matter of fact, I follow the concept of the extended studies. First of all, I would like to become a programmer and then the computer analyst. I have to learn all the newly advanced technologies both in Russian and in English, to read the electronic and published materials, and also to be capable of carrying out the creative project work.

My research supervisor is the Doctor of Engineering, Professor. I admire him as the scientist. He is the Head of Department of Information and Computing Systems. He is the scientific research organizer. The teachers conduct scientific researches personally and in groups in accordance with the plan of the department. There are lectures and seminars. My supervisor is known both in Russia and in the world. He is often the participant of regional or international home and foreign conferences. He is in contact with the other world scientists.

As for me, I have chosen my subject already. Writing dissertation abstract with research actuality, purposes and tasks, theoretical and practical meaning, innovations is very substantial. After that I have to choose the material and make some notes, write draft, structure of my paper, edit and publish it.



**Task 6. In pairs, discuss the following questions.**

1. Why did you choose a career in science?
2. What field of science are you currently working or studying in?
3. What would you like to do next in your work or studies?

**Task 7. Many scientists continue their education in other countries. The table below summarises higher education for science in the US. Make a similar table for your country and then answer the following questions.**

1. Is science education in the US similar to science education in your country?
2. If you decided to study in the US, which qualification would be best for you?

### **Higher education for science in the US**

<b>Qualification (lowest to highest)</b>	<b>Category</b>	<b>Duration (full-time)</b>	<b>Place of study</b>
Associate of Science degree (AS)	undergraduate	2 years	community college or junior college
Bachelor of Science degree (BS)	undergraduate	2 or 4 years*	college or university
Master of Science degree (MS)	graduate (postgraduate)	2 years	university or graduate school
Doctoral degree (PhD)	graduate (postgraduate)	3 to 8 years	university or graduate school

*\*Students who have already completed an Associate (AS) degree can become a Bachelor of Science if they study for two more years.*

**Task 8.** *Eriko is from Japan and will soon complete a PhD in biotechnology in London. She is discussing the next stage in her career with her supervisor, Susana. Read part of their conversation and tick the options which interest her and put a cross next to the options which do not.*

- teaching (undergraduate) students
- doing post-doctoral research
- supervising a research team
- finding a permanent position at a university
- discussing theory
- doing practical fieldwork
- staying in London
- finding a well-paid job

**Susana:** ... and have you thought about what you'll do once the PhD is finished?

**Eriko:** I don't think of much else! It's actually rather scary. I know I don't want to abandon science and become an accountant, but beyond that ...

**Susana:** Well, let's start with a simple choice. Academia or industry?

**Eriko:** Oh, easy - academia. I've really enjoyed the teaching I've done, so I don't want to give that up.

**Susana:** But in industry you could supervise more junior researchers. You wouldn't have to give up teaching. **Eriko:** No, but it's different. I find it really interesting to explain quite complex topics. Supervising people would be more practical. I really love communicating the theory side of things.

**Susana:** Well, yes ... but I don't think working in industry rules that out. It would just be different. You would also be out in the field more. Someone would pay you to go to real disasters to try the robots out.

**Eriko:** Hm. That's true. But I'm not so interested in doing that. As long as I have time to do work on developing the robots in the lab, that's fine for me. I do really want to teach though. I actually quite enjoy preparing lectures and thinking of creative ways to get the information across.

**Susana:** Really? OK, so assuming you go for academia ...

**Eriko:** I'd like to get a post-doc position first.

**Susana:** OK. And any idea who you'd like to work with? Or where you're looking at?

**Eriko:** Not really ... I'm going to leave here, though.

**Susana:** Oh? You don't like London? The university?

**Eriko:** No, I do ... but I did my Master's here, part-time, while I was working as a research assistant in the lab. And then I transferred to the PhD while still working. So, basically I've done everything here, and I really think I should change, move on.

**Susana:** You're quite right. Going somewhere else is a very good idea – I hadn't realised you'd been here for so many years.

**Eriko:** I came on a student visa nine years ago and never went back. Anyway, applications for a couple of interesting post-docs at Cambridge close early next month.

**Susana:** They get earlier every year! I'll look over them before you send them off, if you like.

**Eriko:** That'd be great. I doubt they'll want me, but I might as well give it a go. And then I'm meeting a couple of people from the University of Glasgow at the conference next month. Just for a chat.

**Susana:** Well, it sounds like you're doing the right things. So then you'd be looking at a full-time position in higher education after that?

**Eriko:** Yes.

**Susana:** And all the paperwork doesn't put you off?

**Eriko:** Well. I don't actually mind it that much. So no, it doesn't bother me.

**Susana:** And the money? You're not tempted by the salaries in industry?

**Eriko:** Not at all. Well, maybe a bit. But there are more important things than money. I know I'm not going to get rich this way. But industry work? I really don't think it's for me.

**Susana:** But it's good to know it's there as a possibility.

**Eriko:** That's true - if things don't work out ...

***Task 9. Think about your career in science and make notes on:***

- what you enjoy most about working in your scientific field
- what you would like to do (and not like to do) next in your career
- which of your past and present experiences are most relevant to your future in science

***Task 10. In pairs, take turns to interview your partner about his/her career path in science.***

## Unit 1.2

### Science and postgraduate programs

#### **Task 1. Read and learn the words.**

*postgraduate certificate – PGCert – свидетельство об окончании аспирантуры*

*postgraduate diploma – PGDip – диплом об окончании аспирантуры*

*postgraduate level – уровень аспирантуры*

*postgraduate studies – аспирантура*

*research – n научное исследование, исследовательская работа*

*research degree – учёная степень*

*research prosecution – проведение исследовательской работы*

*science – n наука*

*scientist – n учёный*

*scientific – adj научный*

#### **Task 2. Translate the sentences:**

1. After passing candidate exams, postgraduates get postgraduate certificates or postgraduate diplomas. Postgraduate certificate allows thesis.

2. Getting postgraduate diploma is a new stage towards the thesis. Postgraduate diploma comprises the name of postgraduate course, the place of studies and the final results of studies during postgraduate training.

3. Postgraduate level is higher than the one of the magistracy. Postgraduate level ensures the career promotion.

4. I will take a course of postgraduate studies after magistracy. I am going to take my postgraduate training in Engineering.

5. I have been conducting the research for two years under the adviser's supervision. The results of my research are both published and presented in the electronic form.

6. Getting the research degree is the final and main purpose of postgraduate studies. Research degree opens the way to research broadening and achieving better results in science.

7. Research prosecution is very important both in theoretical and practical research. Research prosecution is an integral part of the methodological base of studies.

8. My advisor devoted all his life to science. Science is the main thing for the scientist.

9. He is a distinguished scientist in computer science field. I admire his activity.

10. The results of the scientific work are published in scientific journals or in abstracts of thesis, in books, articles and reports. There is the catalogue of scientific publications in traditional and electronic libraries.

**Task 3. Read the text and give the right definitions for the terms below.**

### **Science (I)**

For many thousands of years the earth was inhabited by creatures who lived and died without passing on their experiences to following generations. These early fish, reptiles, birds and mammals could only «talk» to each other through the roars, calls and screams of the jungle. Yet, somehow, from these prehistoric beings a more intelligent animal evolved with a brain able to form the controlled sounds of speech. This human being began to use rocks and trees to fashion weapons to help him hunt for food. Stones and spears were probably the first tools used by humans as extensions of their own bodies – the spear could travel faster in flight than man could run – and this ability to invent tools and pass on knowledge gave man a growing control of his surroundings. His search for new ways to survive and to improve his way of life continued through the ages thus the story of man's world of science and invention was shaped. Writing is known to contribute much to man's experience accumulation, books printing being his greatest brainchild. As knowledge grew and the art of writing developed, parts of the story were recorded – some in one book, some in another. No man could remember all there was to know and writers found it useful to classify their knowledge under separate headings – much like a library arranges its books in sections so that the reader will know where to look for each subject. Science became separated into various branches. But its progress began only when man started to search for natural laws and principles, and produced theories, applying to scientific methods, such as: observation, analysis, synthesis, induction, deduction, hypothesis and experimentation.

1) observation

a) a formal set of ideas that is intended to explain why smth

- |               |  |
|---------------|--|
| 2) induction  | happens or exists.   |
| 3) deduction  | b) the process of using information or finding the answer to the problem.<br>c) a method of discovering general rules and principles from particular facts and examples. |
| 4) analysis   | d) an idea or explanation of smth that is based on a few known facts but has not yet been proved to be true or correct.  |
| 5) synthesis  | e) the act of watch smth carefully for a period of time, esp. to learn smth.   |
| 6) hypothesis | f) the detailed study or examination of smth in order to understand more about it.   |
| 7) experiment | g) the act of combining separate ideas, beliefs, styles; a mixture or combination of them.   |
| 8) theory     | h) a scientific test that is done in order to study what happens and to gain new knowledge.  |

**Task 4. Rea the text and write an abstract of the text in three sentences.**

### **Science (II)**

Science (from Latin scientia, meaning "knowledge") is an enterprise that builds and organizes knowledge in the form of testable explanations and predictions about the world. An older and closely related meaning still in use today is that of Aristotle for whom scientific knowledge was a body of reliable knowledge that can be logically and rationally explained. Since classical antiquity science as a type of knowledge was closely linked to philosophy. In the early modern era the words "science" and "philosophy" were sometimes used interchangeably in the English language. By the 17th century, natural philosophy (which is today called "natural science") had begun to be considered separately from «philosophy» in general, while, "science" continued to be used in a broad sense denoting reliable knowledge about a topic, in the same way it is still used in modern terms such as library

science. However, in modern use, "science" is still mainly treated as synonymous with 'natural and physical science', and thus restricted to those branches of study that relate to the phenomena of the material universe and their laws, sometimes with implied exclusion of pure mathematics. This is now the dominant sense in ordinary use. The word "science" became increasingly associated with the disciplined study of physics, chemistry, geology and biology. This sometimes left the study of human thought and society in a linguistic limbo, which was resolved by classifying these areas of academic study as social science. In its turn the term «humanities» or «arts» refers to the subjects of study that are concerned with the way people think and behave, for example literature, language, history and philosophy (as it understood nowadays). Science is often distinguished from other domains of human culture by its progressive nature: in contrast to art, religion, philosophy, morality, and politics, there exist clear standards or normative criteria for identifying improvements and advances in science. For example, the historian of science George Sarton argued that “the acquisition and systematization of positive knowledge are the only human activities which are truly cumulative and progressive,” and “progress has no definite and unquestionable meaning in other fields than the field of science”. However, the traditional cumulative view of scientific knowledge was effectively challenged by many philosophers of science in the 1960s and the 1970s, and thereby the notion of progress was also questioned in the field of science. Debates on the normative concept of progress are at the same time concerned with axiological questions about the aims and goals of science. The task of philosophical analysis is to consider alternative answers to the question: What is meant by progress in science? This conceptual question can then be complemented by the methodological question: How can we recognize progressive developments in science? Relative to a definition of progress and an account of its best indicators, one may then study the factual question: to what extent, and in which respects, is science progressive?

**Task 5. Say if the following statements are true or false. Correct the false statements.**

1. The term «science» is applied only to natural science. 2. The word «knowledge» is derived from the negation «no», meaning the path leading from ignorance to understanding the world. 3. Natural and physical sciences deal with testable explanations and predictions. 4. Aristotle studied the body of a human being and gained a reliable knowledge in this sphere. 5. There

was a time when «science» and «philosophy» meant the same. 6. The word «science» and the word combination «natural and physical science» are looked upon as synonymous. 7. Pure mathematics is included into the notion «natural and physical science». 8. Library science naturally belongs to humanities.

**Task 6. Read about the types of postgraduate programs. Which ones do you think are the most effective? Why?**

### **Types of Postgraduate Programs**

Actually, there are two main types of postgraduate programs: taught and research. What is the difference? How can one define the program type? In taught programs training is mainly carried out through classroom lectures and practice, seminars, computing and laboratory, coursework and exams. The work in a research program is the knowledge development. It is usually part of the educational institution research. The entry criteria and the description are of a great help.

All master's programs contain the research elements, and there are some combined programs with taught and research elements, for example, the Doctor of Engineering (DEng). Funded integrated programs are of special interest. The designation '3+1' means an academic year in the master's studies and three-year PhD. The conversion courses are intended to change the students' research direction according to the new career. That is why these courses are intense and deep in the new research subject. Program coordinators help everybody to choose the program.

In fact, stand-alone taught postgraduate programs are the first stage in postgraduate education before obtaining a research degree. In the United Kingdom of Great Britain and Northern Ireland (the UK) there are three levels in taught program: postgraduate certificate (PGCert), postgraduate diploma (PGDip) or masters (in science – MSc). They are less than a year and can be either a part of continuing professional development (CPD) or preparation for the full time taught program.

Sometimes diplomas (MScDiplomas) are awarded to students following the masters (full time program during a year, part time program for two years) without completing the dissertation (20, 000 words). Engineering programs can be achieved both as an extended period of undergraduate study during a year – M (Eng) or stand-alone one-year programs for thorough learning the specific area of the discipline – MSc.



In research programs the master's level for two years is called Master of Research (MRes) or Master of Philosophy (MPhil). All these programs teach mainly the research skills. PhD is the highest research degree, three years or more. It is much longer, from 7, 000 to 10, 000 words. With PhD one becomes a leading expert in a certain specialization.

**Task 7. Answer the questions, express your point of view and try to prove it with facts.**

1. Identify the types of programs and their learning goals.
2. Speak about what PhD is.
3. Are you going to become PhD yourself?

**Task 8. Read the text to yourself and be ready for a comprehension check-up.**

### **Scientific method and methods of science**

It is sometimes said that there is no such thing as the so-called "scientific method"; there are only the methods used in science. Nevertheless, it seems clear that there is often a special sequence of procedures which is involved in the establishment of the working principles of science. This sequence is as follows: (1) a problem is recognized, and as much information as possible is collected; (2) a solution (i. e. a hypothesis) is proposed and the consequences arising out of this solution are deduced; (3) these deductions are tested by experiment, and as a result the hypothesis is accepted, modified or discarded.

1. Find two sentences which express two different viewpoints on the existence of "scientific method".
2. What words show that the first sentence is an opinion?
3. What word shows that these viewpoints are in opposition?
4. Find the words equivalent to "scientific method".
5. What procedure does the scientist follow in his research?

**Task 9. Discuss the problem: «I am interested in scientific and research work».**

## Unit 1.3

### Scientific work

#### Task 1. Read and learn the words and phrases.

*analysis n (pl -ses) анализ, исследование, подробное рассмотрение*

*critical analysis - критический анализ*

*advanced research - перспективные исследования*

*basic research - фундаментальные исследования*

*to be engaged in research - заниматься научно-исследовательской работой*

*This researches cover a wide field - исследования охватывают широкую область*

*pilot study - предварительное, экспериментальное исследование*

*desk study - чисто теоретическое исследование*

*thorough examination - а) всестороннее исследование; б) тщательное изучение (материала)*

*to carry on an investigation - проводить исследовательскую работу*

*the scientific method of inquiry - научный метод исследования*

*comparative [experimental] method of investigation - сравнительный [экспериментальный] метод исследования*

*convenient method - подходящий метод*

*data for study - материал исследования*

*laboratory data - данные лабораторных исследований*

*adequacy of data - достоверность данных*

*the backbone of a theory - основа теории*

*to back up a theory with facts - подкрепить теорию фактами*

*to approximate to a solution of the problem - подходить к решению задачи*

*interdisciplinary approach - подход с точки зрения различных наук*

#### Task 2. Translate the sentences.

1. His method is to compare different versions.
2. There are several methods of doing this.
3. This method is attended by some risk.
4. We must apply our energies to finding a solution.
5. His method is to compare different versions.

6. There are several methods of doing this.
7. We began the work by collecting material.
8. application of a theory in actual practice.
9. the results of the experiment contradicted this theory./agreed with the theory.

### **Task 3. Using the tips write about your research work**

My major interest is in the field of....

The title of my future thesis is....

My tutor is ....

The research I am doing now is a part of a bigger work../ within the framework of the academic research conducted by professor.../a group of scientists...

This work is devoted to an important problem into which too few scientists have researched until now.

Earlier studies of this subject show that the problem has not been yet properly explored.

My study deals in the problems of../is devoted to the investigation of...

It touches upon the problems of...

The main purpose/goal/aim of it is...to find out/to define/to characterize/explore/to investigate/to analyse/to gain/.....

It is aimed at .....

I set myself a task to/of... the tasks that face us /that we are faced with/are as follows....

### **Task 4. Read probable questions and answers and roleplay them with your groupmates.**

1 A. Why did you decide to take a post-graduate course?

B. I am interested in scientific and research work. I am sure I will be able to improve my knowledge and upgrade my qualification studying in the post-graduate course. I also hope that my research will help solve the problem of ... in my field.

2 A. What is your field? What are you specializing in?

B. My field is...

The field of my specialization is...

I'm specializing in...

3 A. What is the title/ the headline of your thesis/ dissertation?

What is the theme/ the subject of your thesis?

Have you chosen the subject for your thesis?

B. The title of my thesis is ".....".

The theme of my dissertation is ...

I think that it will consist of an introduction, the main part (that is, two or three chapters), conclusions, and references.

4 A. Is your current research connected with your graduation paper?

B. Yes, it is. In fact, my research is the continuation of my graduation project. On the other hand, I expand the area of study and consider the problem of ... from another point of view.

B. No, it isn't. To say the truth, I changed my field.

5 A. Have you already begun working at your thesis?

B. Yes, I have. I've (already) studied the information dealing with my research (on my research). I've written the Introduction/the first chapter of my thesis.

B. No, I haven't. First I plan to pass my Candidate's exams. I also must collect and analyze the information and data on my research. I must study papers and articles by foreign and Russian scientists and put forward a hypothesis.

6 A. Who is your scientific advisor/ supervisor?

B. My supervisor is Prof. N. He is a Doctor of Technical Sciences, an academician, a correspondence-member of the Russian Academy of Sciences. He is a well-known specialist in his field. He has a lot of published papers and takes part in different conferences and symposiums. I am glad to work under Prof. N's supervision. I read some of his articles in scientific journals and magazines. I think they are not only interesting but useful for my own research.

7 A. What does your supervisor do? / Where does he work?

B. He works at the ... University/ at the Department of...

He is the Head of the ... Department/of the ... Laboratory.

He is the dean of the ... faculty/ department.

8 A. In what way does your supervisor help you (with your research)? How often do you consult your scientific advisor?

B. It's hard to overestimate my supervisor's help. Prof. N., that is my scientific advisor, helped me choose the subject of my research and to make up the plan of my work. I consult him every two or three weeks. He looks through the results of my work and corrects some mistakes.

9 A. Do you prefer to work on your own or in a team?

B. To say the truth, I prefer to work on my own but sometimes the research itself or carrying out experiments cannot be done individually.

10 A. Have you ever taken part in scientific conferences?

Did you participate in any scientific conferences or symposiums?

B. Yes, I have. Last year I took part in the (regional/national/international) conference in Omsk. I made a report on the results of my research.

B. No, I haven't./ Not yet. But next year I am going to participate in a conference (which will be held in Omsk). I know that conferences and symposia are very important for scientists and researchers. They give an opportunity to present the results of one's work and to exchange opinions on this or that problem.

11 A. Is your research theoretical or practical?

B. Well, I think my research is (purely) theoretical work. It is (both) theoretical and practical.

**Task 5. Read the text to yourself and be ready for a comprehension check-up.**

### **Pure and applied science**

As students of science you are probably sometimes puzzled by the terms "pure" and "applied" science. Are these two totally different activities, having little or no interconnection? Let us begin by examining what is done by each. Pure science is primarily concerned with the development of theories (or, as they are frequently called, models) establishing relationships between the phenomena of the universe. When they are sufficiently validated these theories (hypotheses, models) become the working laws or principles of science. In carrying out this work, the pure scientist usually disregards its application to practical affairs, confining his attention to explanations of how and why events occur. Exact science in its generally accepted sense can be referred to as a family of specialized natural sciences, each of them providing evidence and information about the different aspects of nature by somewhat different working methods. It follows that mathematics in its pure sense does not enter into this frame, its object of study, being not nature itself. Being independent of all observations of the outside world, it attempts to build logical systems based on axioms. In other words, it concentrates on formulating the language of mathematical symbols and equations which may be applied to the functional relations found in

nature. This "mathematization", in the opinion of most specialists, is witnessed first in physics which deals with general laws of matter and energy on subatomic, atomic and molecular levels. Further application of these mathematical laws and studies is made by chemistry and results in structural bonds between the elements of matter being established.

### **Task 6. Answer the questions**

1. Does the author give definition of both "pure" and "applied" science? 2. Find the word which is used as an equivalent of "sciences". 3. When does a hypothesis become a principle of science? 4. What questions is the pure scientist concerned with? 5. Find the words equivalent to "how and why events occur". 6. What is usually disregarded by the pure scientist? 7. What is generally understood by exact science? 8. How does the author describe "specialized" natural sciences? 9. Why does mathematics not belong to this family? 10. What is the objective of mathematics? 11. Is there only one definition of the objective? 12. What does the application of mathematical laws in chemistry result in?

**Task 6. *Read the text, divide the text into three parts and suggest a title for each one.***

People are always talking about fundamental research, implying thereby the existence of a nameless opposite. A good definition of fundamental research will certainly be welcomed: let us see whether we can invent one. We have to begin, of course, by defining research. Unfortunately the concept of research contains a negative element. Research is searching without knowing what you are going to find: if you know what you are going to find you have already found it, and your activity is not research. Now, since the outcome of your research is unknown, how can you know whether it will be fundamental or not?

We may say for instance that fundamental research is that which you undertake without caring whether the results will be of practical value or not. It may not be reasonable to go further and say that fundamental research is that which will be abandoned as soon as it shows a sign of leading to results of practical value. By saying this you may limit your own achievement. It will be better to say that fundamental research is that which

may have no immediate practical value, but can be counted upon as leading to practical value sooner or later. The extension of knowledge and understanding of the world around us will always be profitable in the long run, if not in the short.

This is a very powerful argument for fundamental research and it is a completely unassailable one, and yet there are people who will not like it. Let us seek a definition that will give fundamental research a value of its own, not dependent upon other uses appearing soon or late. We say for instance that fundamental research is that which extends the theory. Now we have to theorize upon theory. There have been several viewpoints about theory. One is that theory discerns the underlying simplicity of the universe. The nontheorist sees a confused mass of phenomena; when he becomes a theorist they fuse into a simple and dignified structure. But some contemporary theories are so intricate that an increasing number of people prefer dealing with the confusion of the phenomena than with the confusion of theory.

A different idea suggests that theory enables one to calculate the result of an experiment in a shorter time than it takes to perform the experiment. I do not think that the definition is very pleasing to the theorists, for some problems are obviously solved more quickly by experimenters than by theorists. Another viewpoint is that theory serves to suggest new experiments. This is sound, but it makes the theorist the handman of the experimenter, and he may not like this auxiliary role. Still another viewpoint is that theory serves to discourage the waste of time on making useless experiments.

Let us try to flatter theory by giving it a definition that shall not describe it as a mere handmaid of experiment or a mere device for saving time. I suggest that theory is an intellectual instrument granting a deep and indescribable contentment to its designer and to its users. This instrument is made up of units which can be compared, for instance, to different branches of physics: solid state physics, relativity, acoustics, elementary particles and others, which sometimes have only a remote relation with one another and may not even be interconnected at all. The rest of my talk will be devoted to a different question which is: how are we going to communicate to the layman some of our passion for our science? This is a very important question, for everyone is a layman until he becomes a scientist. If we can solve the problem of interesting the layman we may succeed in attracting the potential Fermis, Slaters, Lands and Fletchers of future into the field of, say, physics. Nothing could be more desirable.

A frequent technique is that of surprise. The trouble with this is that one cannot be surprised if one is not accustomed to the situation which is nullified by the surprise. Imagine, for example, a physicist trying to surprise an audience of laymen by telling them that there are a dozen elementary particles instead of two or three, or that the newest cyclotron imparts an energy of 500 mev to protons. It simply will not work, because the listeners will have no background to compare this information with. It is also a mistake to think that we can excite an audience by solving a mystery for them. The trouble here is that practically no one is interested in the answer to a question which he never thought of asking.

Relativity had a wonderful build-up in the decade before 1905, for the physicists of that era were acquainted with the sequence of experiments which were designed to show that the earth moves relatively to the ether and which obstinately showed the opposite. Each stage in the unfolding of quantum mechanics was exciting to the physicists who knew the earlier stages, because they knew the problems which were left unsolved. The writer of a detective story creates the mystery before he solves it; but the mystery usually begins with the discovery of a murdered man, and this is considerably more exciting than a murdered theory. The corresponding technique in physics consists in trying to create a particular state of out-of-dateness in the mind of the public, in the expectation of bringing them up-to-date at the end of the lecture or paper. There is too much risk of leaving the audience in the out-of-date condition, and this technique cannot be recommended. Another mistake, in my opinion at least, is that of stressing a paradox. Try telling an audience that if you know the exact position of a particle you cannot know its momentum, and vice versa - the effect is unpredictable but obviously not what you wanted. Still another mistake is that of springing an isolated fact upon the audience. An isolated fact is not science and it is not interesting. Facts are of interest only as parts of a system. And we must strive to interest the layman in the system.

### **Task 7. Copy out the words equivalent to:**

весьма желательно иметь хорошее определение, предпринять, не задумываясь; ограничить возможные результаты своей деятельности; расширение знаний приносит пользу, образуют простую, но строгую систему; теории имеют настолько сложный и запутанный характер; вспомогательная функция; предотвращать потерю времени.



**Task 8. Read the text explain what you need for your better education.**

**Introduction a letter to the youth  
(by academician I. P. Pavlov)**

What would I wish for the youth of my fatherland who devote themselves to science? First of all, persistence. I can never speak without emotion of this most important condition for fruitful scientific work. Persistence, persistence, and yet again persistence. From the very beginning of your work train yourselves to be strictly systematic in amassing knowledge. Learn the ABC of science before attempting to ascend its heights. Never reach for the next step without having first mastered the preceding one. Never attempt to cover up the gaps in your knowledge by even the most daring conjectures and hypotheses. No matter how the colorings of such soap-bubbles may please your eye, they will inevitably burst, leaving you with nothing but confusion. Train yourselves to discretion and patience. Learn to do the rough work in science. Study, compare, and accumulate facts. No matter how perfect a bird's wing is it could never raise the bird aloft if it were not supported by air. Facts are the air of the scientist. Without them you will never be able to soar. Without them your "theories" are useless efforts. Yet, while studying, experimenting, observing, try not to stop only at the surface of facts. Do not become an archivist of facts. Try to penetrate the mystery of their origin. Seek persistently the laws governing them. Secondly, modesty. Never think that you already know everything. No matter in what high esteem you are held, always have the courage to say to yourself: «I am ignorant». Don't allow yourself to be overcome by pride. Pride will make you stubborn where it is necessary to agree; it will make you reject useful advice and friendly assistance: you will lose your sense of objectivity. In the group which I am called to direct, atmosphere is everything. We are all harnessed to one common cause and everyone furthers it to the best of his strength and ability. Often we cannot distinguish between what is our own and what is our neighbors', but through this our common cause only gains. Third - passion. Remember, science requires your whole life. Even if you had two lives to give, it would still not be enough. Science demands of men effort and supreme passion. Be passionate in your work and in your quests. Our fatherland opens broad vistas to scientists, and we must truthfully say science is being generously introduced into the life of our country. Extremely generously. What is there to say about the position of a young

scientist in our country? It is perfectly clear. To him is given much, but of him much is demanded. And it is a matter of honour for the youth, as well as for all of us, to justify those great hopes which our fatherland places in science.

**Task 10. Answer the questions.**

1. What is persistence?
2. What should you do to carry out some research work?
3. Facts are not the priority, aren't they? Why?
4. Does anyone know everything?
5. Why does pride have negative influence on people?
6. Is friendly atmosphere an "engine" for the research work?
7. Are you a patriot of your country?
8. What can you do for the development of your country?

***Task 10. Discuss the problem: «Are there any other conditions under which you could become a well-trained specialist? What are they?»***

## PART II RESEARCH WORK

### Structure of Research

Topic / Theme – Тема исследования
Relevance of the Topic (Motivation for the Study) – Актуальность темы исследования
Object of Research – Объект исследования
Subject of Research – Предмет исследования
Aims of Research – Цели исследования
Research Questions – Задачи исследования
Hypotheses of Research – Гипотезы исследования
Methods of Investigation – Методы исследования
Original Contribution – Новизна
Significance – Значимость
Implementations – Внедрения
Conclusions – Выводы

### Useful Language

#### Topic / Theme of Research

<i>The theme of our investigation is</i>	<i>Темой нашего исследования</i>
<i>...</i>	<i>является...</i>
<i>The theme of our exploration is</i>	<i>Тема нашего исследования</i>
<i>devoted to ...</i>	<i>посвящена ...</i>

#### Relevance of the Topic (Motivation for the Study)

*The problem of ... is one of the most important* – Проблема ... одна из самых важных.

*The actual range of problems is much wider* – Реальный круг проблем гораздо шире.

*The problem of ... has not lost its topical significance* – Проблема не потеряла своей актуальности ...

*The problem became more acute, it took a new form* – Проблема стала более острой, она приобрела новую форму.

*The problem requires a detailed study* – Эта проблема требует детального изучения.

*The question of ... has become acute.* – Вопрос ... стал особенно актуальным.

---

*The study of ... is of primary importance – Изучение ... имеет первостепенное значение.*

*Much has been said and written about ... – Много было сказано и написано о ...*

*Much (little) has been done on ... – Много (мало) было сделано в ...*

*Much has been done in the field of ... – Много было сделано в области ...,*

*but undoubtedly much remains to be done in it. – однако, несомненно, многое еще предстоит сделать.*

*Although a number of issues have been analyzed and discussed much – Несмотря на то, что ряд вопросов был проанализирован и обсужден,*

*Much remains to be done in the field of ... – многое еще предстоит сделать в этой области ...*

*The problem has not received all the attention it deserves – Проблема не получила должного внимания.*

*It was this ... which first attracted the notice of – Именно это впервые привлекло внимание ...*

*At present there is a growing interest in – В настоящее время наблюдается повышенный интерес к ...*

*The question still remains open. – Вопрос еще остается открытым.*

*No one has made a careful inquiry into – Никто не провел тщательного исследования в ...*

*Now the research focus has shifted towards ... – Сейчас исследовательский интерес направлен на ...*

*We possess a vague and general idea of ... – Мы имеем нечеткое и общее представление о ...*

*We are totally ignorant of ... – Мы совершенно ничего не знаем о ...*

*We know little (much) about ... - Мы мало (много) знаем о ...*

*The problem arises (is / was raised) in connection with ... – Эта проблема встает (ставится/ставилась) в связи с тем, что ...*

---

## Object of Research

*We will make a thorough study of ...*

*Мы подвергнем тщательному изучению ...*

*The object of our exploration is ...*

*Объектом исследования является ...*

*The following study is concerned with...*

*Настоящее исследование посвящено...*

*At the heart of the discussion is ...*

*В центре обсуждения находится ...*

*The study of ... raises several interesting problems of a general nature.*

*Изучение ... поднимает несколько интересных проблем общего характера.*

*It requires a detailed study of ...*

*Это требует детального изучения...*

*It requires a direct study of ...*

*Это требует непосредственного изучения ...*

*In the connection with the study of phenomena it is necessary to...*

*В связи с изучением различных various явлений необходимо...*

*Therefore, ... one must take into account ...*

*Следовательно, при изучении ... необходимо принять во внимание...*

*This is achieved by a comprehensive study of ...*

*Это достигается путем всестороннего изучения ...*

*We will deal with ...*

*Мы рассмотрим ...*

*It would be instructive to examine in*

*Было бы полезно детально изучить ... с точки зрения ...*

*detail ... from the point of view of...*

*We will explore ...*

*Мы исследуем ...*

*We are occupied with the problem of...*

*Мы занимаемся проблемой ...*

---

## **Subject of Research**

*The topic of our investigation (exploration, work) is ...*

*Предметом нашего исследования является ...*

*It is one of the key problems of ...* Это одна из основных проблем...

*The problem of ... is very complex.*

*Проблема ... является очень сложной.*

*The question is not free from difficulties...*

*Вопрос не лишен сложности.*

---

*The topic of my dissertation is significant in interpreting ...*

*Тема моей диссертации существенна для понимания ...*

*The problem of ... is in the focus of attention of ...*

*Проблема ... находится в центре внимания...*

*The problem arises (is / was raised) in connection with ...*

*Эта проблема встает (ставится/ ставилась) в связи с тем, что ...*

---

*The problem of studying ... demands special care in using methods and a methodological concept.*

*Проблема изучения ... требует особого внимания к использованию методов и методологической концепции.*

---

*Here we need to*

*Здесь нам необходимо*

<i>consider the problem of ...</i>	<i>рассмотреть проблему ...</i>
<i>Thus the core of the problem is ...</i>	<i>Таким образом, суть проблемы заключается в ...</i>
<i>We turn our attention to a new and more urgent problem.</i>	<i>Мы обращаем наше внимание на новую и более насущную проблему.</i>
<i>In this light we must face the problem ...</i>	<i>С этой точки зрения мы должны рассмотреть проблему ...</i>
<i>Though many aspects of this problem are debated, it is sure that ...</i>	<i>Хотя многие аспекты проблемы остаются спорными, несомненно, что ...</i>
<i>To bring further light on various aspects it is necessary to ...</i>	<i>Для того, чтобы более глубоко осветить различные аспекты, необходимо ...</i>
<i>I will touch upon a question of ...</i>	<i>Я коснусь вопроса ...</i>
<i>The question is usually regarded as ...</i>	<i>Вопрос обычно рассматривается как ...</i>
<i>Not long ago the question was raised in ...</i>	<i>Недавно вопрос был поднят в ...</i>
<i>The question raises all sorts of problems.</i>	<i>Этот вопрос поднимает разнообразные проблемы.</i>

### **Aims of Research**

*The (main) aim of the paper is ...*      *(Основная) цель данной работы*

заключается в ...

<i>To attain our aim we must consider ...</i>	<i>Для достижения цели мы должны рассмотреть ...</i>
<i>One of the chief aims was to test hypothesis ...</i>	<i>Одной из основных целей ... являлась проверка гипотезы ...</i>
<i>It is the main aim of this chapter to examine some of the main causes of ...</i>	<i>Задачей данной главы является изучение некоторых основных причин ...</i>
<i>At present we do not set the aim of...</i>	<i>В настоящее время мы не ставим цели ...</i>
<i>The overall goals of ... require a prior concern with the general problem of ...</i>	<i>Глобальные цели ... требуют предварительного рассмотрения основных проблем ...</i>
<i>In the framework of ... the first objective to achieve is ...</i>	<i>В рамках ... основной целью является ...</i>
<i>Our objective is the investigation of ...</i>	<i>Нашей целью является изучение ...</i>
<i>Our objective is to explain ...</i>	<i>Нашей задачей является объяснение ...</i>
<i>The purpose of our work is to examine and investigate and consequently to determine more precisely ...</i>	<i>Цель нашей работы состоит в том, чтобы изучить и исследовать и в результате более точно определить ...</i>
<i>For this purpose we may examine an example from ...</i>	<i>Для этой цели можно проанализировать пример из ... Нашей целью в данном случае</i>



*It is our purpose on this occasion to analyze some of the basic issues ...* является анализ основных вопросов ...

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*It is the purpose of this investigation to explain the principles of this viewpoint ...* Целью данного исследования является объяснение основных положений данной концепции ...

---

*We are confined to immediate aims to...* Наши непосредственные цели заключаются в ...

---

*What we are aiming at is ...* То, к чему мы стремимся, заключается в ...

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### **Research Questions**

*It has been no part of our aim to make a comprehensive survey of ...* В наши задачи не входило проведение глобального исследования ...

---

*We are fully aware of the nature of the objective ...* Мы в полной мере понимаем специфику данной задачи ...

---

*Our objective is the investigation of...* Задачей нашего исследования является ...

---

*It is not the business of ...* Это не входит в задачи ...

---

*It is not our purpose to describe ...* В нашу задачу не входит описание ...

---

*It is beyond our present purpose to ...* В наши задачи не входит ...

---

*Our task consists in ...* Наша задача состоит в том, чтобы...

---

<i>Our task is to show ...</i>	<i>Наша задача состоит в том, чтобы показать ...</i>
<i>Our task is to study ...</i>	<i>В нашу задачу входит изучение ...</i>
<i>The main task is as follows ...</i>	<i>Основная задача заключается в следующем ...</i>
<i>For carrying out this task it is necessary ...</i>	<i>Для осуществления этой задачи необходимо ...</i>
<i>We are confronted with a complicated task.</i>	<i>Перед нами стоит сложная задача.</i>
<i>The primary task is to study ...</i>	<i>Первоочередной задачей является изучение ...</i>
<i>The task requires considerable rethinking and revision ...</i>	<i>Эта задача требует переосмысления и пересмотра ...</i>
<i>The detailed (comprehensive, thorough, careful, profound) study of... is of great importance.</i>	<i>Детальное (всестороннее, тщательное, глубокое) изучение ... имеет большое значение.</i>
<i>Nevertheless, it is important to observe ...</i>	<i>Тем не менее, важно изучить ...</i>
<i>Comprehensive study of ... is the key to solving our problems.</i>	<i>Всестороннее исследование ... имеет особое значение для решения поставленных проблем.</i>
<i>Within the framework of the paper it is impossible to ...</i>	<i>В рамках этой работы невозможно ...</i>
<i>One of the first tasks was to verify and if possible to amplify knowledge of ...</i>	<i>Одной из первостепенных задач являлась проверка и, по возможности расширение знаний о ...</i>

## Hypotheses of Research

*It is necessary to accept the hypothesis ...*

*Необходимо принять гипотезу ...*

---

*One may put forward a working hypothesis for explaining this phenomenon ...*

*Можно выдвинуть рабочую гипотезу для объяснения этого явления ...*

*To take all possibilities into account, we are compelled to rule out the hypothesis that ...*

*Принимая во внимание все возможности, мы вынуждены выдвинуть гипотезу ...*

---

*We are to form a working hypothesis about ...*

*Мы должны сформулировать рабочую гипотезу о ...*

---

*It may be assumed like a working hypothesis.*

*Это можно принять в качестве рабочей гипотезы.*

---

*For confirmation of the hypothesis we need but turn to a brief consideration of ...*

*Для подтверждения гипотезы необходимо обратиться к краткому рассмотрению ...*

---

*These data confirm our hypothesis.*

*Эти данные подтверждают нашу гипотезу.*

## Methods of Investigation

*There are different approaches to the solution of the problem.*

*Существуют разные подходы к решению этой проблемы.*

---

*This approach is aimed at ...*

*Этот метод направлен на ...*

---

*The usual approach was followed in ...*

*Традиционный метод использовался в ...*

<i>The most promising approach is ...</i>	<i>Наиболее перспективный метод состоит в том, чтобы ...</i>
<i>The approach used here is ...</i>	<i>Метод, используемый здесь, заключается в ...</i>
<i>An important way of approaching the matter is ...</i>	<i>Важный метод в разработке проблемы заключается в ...</i>
<i>This is a reasonable and practical approach ...</i>	<i>Это целесообразный и практический метод.</i>
<i>A modern approach to this problem of ... is based on (consists in ...) ...</i>	<i>Современный подход к проблеме ... основан (состоит в ...) ...</i>
<i>At the present time this research approach rests on ...</i>	<i>В настоящее время этот метод исследования основывается на ...</i>
<i>Such an approach to ... involves ...</i>	<i>Такой подход к ... требует ...</i>
<i>The subjective approach to the study of ... is ...</i>	<i>Субъективный подход к изучению ... заключается ...</i>
<i>The main difference in the approaches is that ...</i>	<i>Главное различие в подходах заключается в том, что ...</i>
<i>The approach taken by ... in ... is quite similar to ...</i>	<i>Метод исследования, принятый ..., идентичен ...</i>
<i>A different approach was taken by ...</i>	<i>Иной метод был использован ...</i>
<i>These approaches are different but ...</i>	<i>Эти подходы различны, но ...</i>
<i>The most common</i>	<i>Самый распространенный</i>

*method for ... is ...*

*метод ... состоит в ...*

---

*The method of research depends on ...*    *Метод исследования зависит от ...*  
...

---

*A method of analogy will help to distinguish a few common features.*    *Сравнительный метод позволяет выделить общие черты ...*

---

*Before we can begin to use this method of analysis we have to deal with ...*    *Прежде чем мы начнем применять данный метод анализа, мы должны рассмотреть ...*

---

*Our work is being carried out in the following directions ...*    *Наша работа ведется в следующем направлении ...*

---

*These are a number of trends in studying ...*    *Существует ряд направлений в изучении ...*

---

*The simplest way of solving this problem lies in ...*    *Самый простой путь решения этой проблемы заключается в ...*

---

*This is one of the ways ...*    *Это один из способов ...*

---

*The methods of analysis are ...*    *Методами анализа являются ...*

---

*The analysis of ... is based on ...*    *Анализ ... основывается на ...*

---

*With regard to the old analysis we can state ...*    *Учитывая данные предыдущего анализа, можно утверждать, что ...*

---

*It requires a thorough analysis.*    *Это требует тщательного анализа.*

---

*At this level of analysis everything is seen as ...*    *На этом уровне анализа все рассматривается как ...*

---

*To analyze with precision we must turn to ...*    *Для того, чтобы провести точный анализ, мы должны обратиться к ...*

---

---

*Before we proceed with our analysis* Прежде чем перейти к анализу ...  
*of ... it is essential to go over the* необходимо изучить проблему ...  
*problem on ...*

---

*The conventional approach to this* Обычный подход к этой проблеме  
*problem is based on ...* основан на ...

---

*Our approach is to study ...* Наш метод заключается в  
изучении ...

---

## **Original Contribution**

*It is the first attempt of the scientific* Это является первой попыткой  
*approach to the problem of ...* использования научного подхода к  
проблеме ...

---

*he main features of our approach*  
*are* Основными направлениями нашего  
... подхода являются ...

---

*We have developed a new approach* Мы разработали новый подход к  
*to the phenomena under* рассматриваемым явлениям.  
*consideration.*

---

*Our approach will make it possible* Наш подход позволит разобраться  
*to* в  
*clear ... up.* ...

---

*We have succeeded in finding a* Нам удалось найти удобный подход  
*convenient approach to ...* к ...

---

*We must approach the problem* Мы должны подойти к проблеме с  
*from viewpoint...* точки зрения ...

---

*Such an approach has made it* Такой подход позволил понять

---

*possible to understand the reasons for ...*    *причины ...*

---

*Our approach may be summarized in the words of ...*    *Наш подход можно изложить следующим образом ...*

---

*The method proposed in this article (investigation) is ...*    *Метод, предложенный в этой статье (исследовании) состоит в ...*

---

*The method of research provides a reasonably objective criterion ...*    *Такой метод исследования обеспечивает нас достаточно объективным критерием ...*

---

*It is in keeping with the methods adopted to solve the problems of ...*    *Это непосредственно связано с методами, разработанными для решения данной проблемы ...*

---

*The method is based on the idea that ...*    *Данный метод основывается на том, что ...*

---

*The method provides an answer to this problem ...*    *Этот метод дает возможность найти ответ на вопрос ...*

---

*The advantage of this method lies in the fact that ...*      *Преимущество этого метода состоит в том, что ...*

---

*This method has thrown light upon ...*      *Данный метод пролил свет на ...*

---

*We may adopt the method to ...*      *Мы можем применять данный метод к ...*

---

*The method is applicable to ...*      *Метод используется для ...*

---

*The application of the new method allows us to ...*      *Применение нового метода позволяет нам ...*

---

*This method can be applied to the study of ...*      *Этот метод можно применить для изучения ...*

---

*I am not suggesting that it is the only way ...*      *Я не считаю, что это единственный способ ...*

---

*There is nothing with which the analysis can be compared ...*      *Этот анализ не имеет аналогов ...*

---

## **Significance**

*The question of great practical importance deals with ...*      *Вопрос, имеющий большое практическое значение, заключается в ...*

---

*A special significance attaches to ...*      *Особое значение придается ...*

---

*What is significant is ...*      *Значительным является то, что ...*  
*In fact it is the first work of general synthesis in which complex problems of ... are posed and given new*      *действительно, это первая обобщающая работа, в которой поставлены сложные проблемы ... и*



*answers ...*

*даны новые ответы ...*

---

*The problem raised by ... assumed  
a place of first importance ...*

*Проблема поднятая ... приобрела  
первоочередное значение ...*

---

*What is important is ...*

*Важным является то, что ...*

## **Conclusions**

*A complex approach to the study  
of allowed me not only to analyze  
precisely the materials but  
to reach specific conclusions,  
based on the analysis...*

*Комплексный подход к изучению ...  
позволил мне не только тщательно  
проанализировать материал,  
но и на этой основе сделать  
выводы ...*

---

*We must  
conclude  
that ...*

*Подводя итог, отметим ...  
необходимо сделать вывод о том,  
что ...*

---

*From this we can conclude ...*

*Из этого мы можем сделать вывод*

---

*All this allows us to conclude ...*

*Все это позволяет прийти к выводу*

---

*Having described ... we must  
conclude in general that ...*

*Описав ..., мы должны в общих  
чертах подвести итог (заклЮчить,  
что...)*

---

*Such are preliminary  
conclusions on*

*Таковы предварительные  
выводы о*

---

*The majority of researches  
incline to  
the conclusion that ...*

*Большинство исследователей  
склоняется к выводу ...*

---

*We thus arrived at the following  
conclusion ...*

*Таким образом, мы пришли к  
следующему выводу ...*

<i>On the basis of the work made we have come to the following conclusion ...</i>	<i>На основании проделанной работы мы пришли к следующему выводу ...</i>
<i>These facts give rise to important conclusions ...</i>	<i>Эти факты дают основание для важных выводов ...</i>
<i>A survey of ... led to the conclusion that ...</i>	<i>Обзор ... позволил сделать вывод, что ...</i>
<i>We, thus, arrive at the following observation ...</i>	<i>Таким образом, мы приходим к следующему выводу ...</i>
<i>Finally mention should be made of ... It has been the result of ...</i>	<i>В заключении следует упомянуть о Это явилось результатом ...</i>
<i>The result of ... is presented in ...</i>	<i>Результат ... представлен в ...</i>
<i>We would like to sum up the main points we made above ...</i>	<i>Мы бы хотели обобщить основные проблемы, о которых говорилось выше ...</i>
<i>It could be summarized in the following way ...</i>	<i>Это можно обобщить следующим образом ...</i>
<i>The analysis is summarized in ...</i>	<i>Анализ суммирован в ...</i>
<i>We have made a brief survey of ...</i>	<i>Мы провели краткий обзор ...</i>
<i>An important result of ... was ...</i>	<i>Важным результатом ... явилось ...</i>
<i>The main result of ... was ...</i>	<i>Основным результатом ... явилось ...</i>

*The results of the work show that ... Результаты работы показывают, что ...*

---

*Through an accurate analysis it has been possible to show that ... Путем точного анализа удалось показать, что ...*

---

*The detailed analysis of the available facts show that ... Детальный анализ имеющихся фактов показывает, что ...*

---

*It is derived from the analysis of ... Из анализа ... следует, что ... that ...*

---

*I have stated the problem very briefly in the light of the research of ... Я кратко изложил проблему в свете исследований ...*

## Supplementary texts

### TEXT 1

## THESIS STRUCTURE: WRITING GUIDE FOR YOUR SUCCESS

If you are about to start writing your thesis, then it is extremely important to know as much as possible about the thesis structure. Learning the main thesis chapters should enable you to quickly structure your academic paper. Keep in mind that not structuring the paper correctly usually leads to severe penalties. We know some of you are probably having questions about numbering dissertation chapters. Basically, you just need to give all the major sections consecutive numbers. Use Arabic numerals (1, 2, 3, and so on).

The first part of the thesis structure is the abstract. It is basically an overview of the entire paper. There is no set dissertation abstract structure. It is just a summary of your thesis and it should be just 200 to 300 words long.

The introduction is one of the most important dissertation chapters. It should contain all of the following information:

- A bit of background about the topic.
- Some information about the current knowledge.
- The aim of your research (the gap in knowledge that prompted you to write the thesis).

Remember that the introduction must present the thesis statement. It is very important to learn more about the thesis statement structure. A great thesis statement will pique the interest of the evaluation committee.

### THESIS LITERATURE REVIEW

Many students who are looking to learn how to structure a thesis don't know about the Literature Review section. Why? Because many people prefer to include it into the introduction. However, by separating the literature review from the intro, you can focus more on why your research is important. You can evaluate the most important research on your topic and clearly show the gap in knowledge.

### THESIS METHODS

In most cases, the **Methods section** is the easiest part of the structure of a thesis. All you have to do is present the method or methods you chose for the research. Don't forget to also explain why you chose that specific research method. Your audience needs to understand that the chosen method is the best for the task.

## THESIS RESULTS

This is one of the most important chapters of a dissertation. In the Results chapter, you need to present your findings. Remember that written text is not enough. You need figures, stats, graphs, and other forms of data. This section contains all the facts of your research and should be written in an objective, neutral manner. It would be unusual for your to discuss your findings in this section.

## THESIS DISCUSSION

The Discussion chapter is very important in the dissertation chapters structure. It is the reason why you didn't discuss your findings in the Results section. This is the section you can use to talk about your findings and provide your own opinions about the results. Here is what you can do in the discussion section:

- Explain to the audience what your results mean for the scientific community.
- Comment on each of the results and discuss how your findings support your thesis.
- Explain any unexpected results so the evaluation committee can see that you know what you're doing.
- Interpret the results and tie them with other research on the subject. How does your research help the academic community?

## THESIS CONCLUSION

While not the most important chapter, the conclusion is one of the important chapters in a dissertation. It is the part where you can show your readers that you have achieved your research objectives. You can talk a bit about what you've learned in the process and even make some suggestions regarding the need for future research. In most cases, students also reiterate the thesis statement at the beginning of the conclusion, followed by a short summary of the paper's most important chapters.

## TEXT 2

### THE ULTIMATE GUIDE TO A TOP DISSERTATION METHODOLOGY

Do you know how to write a successful dissertation methodology with expert practical steps? Read on to find out how you can do this quickly.

A dissertation methodology is one of the sections of a dissertation paper that provides the reader with a clear outline of the methods used during the research. It gives researchers a sense of reliability and validity.

The methodology of the study should entail the following components:

- What is the scope of the research?
- How did you collect your data?
- What method did you use to analyze the findings?
- What tools did you use? (Both primary and secondary)
- Why did you choose the tools above for your research methodology?

Without a proper research methodology, you will not be able to earn the trust of your readers. Now let's explore the practical steps that you will follow to arrive at a top-tier dissertation methodology that will give your professor sleepless nights. Make sure that you keep your eyes peeled; you will not get these professional steps anywhere else:

Step 1: What is Your Research Problem or Question?

Mention your research topic and provide an overview of how you plan to investigate it. Ensure that you provide any details that would make your topic clear so that the reader understands why you settled on specific research methods. It can take different forms, such as the ones listed below:

- Do you intend to give a cause and effect relationship?
- Do you want to describe the characteristics of a given phenomenon systematically?
- Do you want to shed more light on a less-researched topic?
- How are you going to achieve all these?

The type of data you intend to use will be made plain in this part. Is it going to be:

- Qualitative (data in the form of words such as gender; male or female, citizenship, name, etc.) or Quantitative (data in the form of numbers such as amount, height, statistics etc.)
- Descriptive data or controlled data
- Primary or secondary data

For instance, in a case where you are going to use qualitative research, unstructured data collections methods are essential. These include

interviews, observations, documents, and surveys with a primary focus on the reasons for behaviours, motivations, and attitudes. It will not look at the details of what, where and when.

### Step 2: Extensively Discuss Your Data Collection Methods

The next step on how to write a methodology section is the description of the methods of data collection in detail.

Let us see how you can do this task painstakingly:

### QUALITATIVE METHODS OF DATA COLLECTION

It is a broad field of data inquiry that gives you the freedom to maneuver around subjectively and flexibly. Use this dissertation methodology example below for qualitative research:

“Why should doctors and the elderly use N95 face masks?” – A narrow and specific research question. Now, the question above does not require a simple ‘yes’ or ‘no’. That is why it is the best match for qualitative research. Since such methodologies are broad, you can be sure of having useful data at the end of the day. Therefore, narrow down your research to a major urban area or hospitals within 300km of where you live. Remember, it will all depend on your research budget and available financial resources.

You can choose from the following qualitative research methodologies:

1. Direct Observation
  - What (the people or community of interest such as doctors and the elderly in this case)
  - How (the means you used to get to them)
  - When (the time frame you used in observing their behaviour and attitude)
  - How did you interact with the group? (Active or passive?)
  - How you took note of your data (writing, tape recorder, video recorder etc.)
2. Interviews
  - Was it one-on-one?
  - Was it over the phone or internet?
  - Was it structured (using preset questions)
  - Was it unstructured (free-flowing)
3. Existing Written Documents

Focus here is on existing written, visual, and audio documents without any involvement by the researcher. Talk about:

- How you got to the documents
- What type of materials you used

And now on the second type:

#### 4. Quantitative Methods of Data Collection

They help in establishing the relationship between two variables (the independent and the dependent variables).

For this method, describe the following:

- How you arrived at a particular concept
- How did you measure your variables?
- What way did you use to sample?
- What materials or tools did you use?

#### QUANTITATIVE METHODOLOGY SECTION EXAMPLE

“The survey consisted of 10 multiple-choice questions. The study was intended for 100 doctors from Minnesota Hospital living in the hospital premises from 5th to 10th August 2019 between 8:00 and 16:00. A doctor was defined as a trained professional with specialty in handling patients from Minnesota Hospital on the day of questioning. Each of the doctors had 20 minutes to fill in the survey anonymously, and 95 doctors responded. Since 5 of the surveys were dully filled, only 95 of the survey results were included in the analysis.”

You can use the same template for:

- Experiments
- Existing data
- Survey research
- Tracking

Describe the methods in full details to avoid any ambiguity of results.

#### Step 3: Analyze Your Data

After you complete the data collection, the next step is to analyze it. From this, you can come up with answers and theories for your research question.

It should include:



- How to analyze your data (coding, descriptive statistics, narrative analysis etc.)

- Tests used (simple linear regression, two-tailed t-test, etc.)

### QUALITATIVE METHOD ANALYSIS EXAMPLE OF METHODOLOGY IN THE THESIS:

The books were summarized, and thematic analysis was done. It involved a narrative review of the data before identifying the four key themes. A close examination of each subject was done to understand the perceptions and motivations of the participants.

#### Step 4: Justification and Evaluation of the Methodology Used

Discuss why you chose particular methods over the others. It should include:

- The weaknesses of the other ways to your study
- Strengths of the methods used

### SAMPLE OF EVALUATION AND JUSTIFICATION OF METHODOLOGY IN A THESIS PAPER:

“Written questionnaires are only limited to literate people in the society. Those with visual and hearing impairments can find this difficult, but they are effective for getting accurate data.”

#### Research Methodology: 5 Hot Tips

1. Explain the data you collected
2. Do not infer causality
3. Use tables and figures for clarity
4. Refer to existing research
5. Do not give unnecessary information

## TEXT 3

### HOW TO WRITE A THESIS: STEP BY STEP GUIDE

In the academic world, one of the hallmark rites signifying mastery of a course or academic area is the writing of a thesis. Essentially a thesis is a typewritten work, usually 50 to 350 pages in length depending on institutions, discipline, and educational level which is often aimed at addressing a particular problem in a given field.

While a thesis is inadequate to address all the problems in a given field, it is succinct enough to address a specialized aspect of the problem by taking a stance or making a claim on what the resolution of the problem should be. Writing a thesis can be a very daunting task because most times it is the first complex research undertaking for the student. The lack of research and writing skills to write a thesis coupled with fear and a limited time frame are factors that makes the writing of a thesis daunting. However, commitment to excellence on the part of the student combined with some of the techniques and methods that will be discussed below gives a fair chance that the student will be able to deliver an excellent thesis regardless of the subject area, the depth of the research specialization and the daunting amount of materials that must be comprehended (RE: write a thesis or writing a thesis).

What is a thesis?

A thesis is a statement, theory, argument, proposal or proposition, which is put forward as a premise to be maintained or proved. It explains the stand someone takes on an issue and how the person intends to justify the stand. It is always better to pick a topic that will be able to render professional help, a topic that you will be happy to talk about with anybody, a topic you have personal interest and passion for, because when writing a thesis gets frustrating personal interest, happiness and passion coupled with the professional help it will be easier to write a great thesis (see you through the thesis). One has to source for a lot of information concerning the topic one is writing a thesis on in order to know the important question, because for you to take a good stand on an issue you have to study the evidence first.

Qualities of a good thesis

A good thesis has the following qualities

- A good thesis must solve an existing problem in the society, organisation, government among others.
- A good thesis should be contestable, it should propose a point that is arguable which people can agree with or disagree.
  - It is specific, clear and focused.
  - A good thesis does not use general terms and abstractions.
  - The claims of a good thesis should be definable and arguable.
  - It anticipates the counter-arguments

- It does not use unclear language
- It avoids the first person. (“In my opinion”)
- A strong thesis should be able to take a stand and not just taking a stand but should be able to justify the stand that is taken, so that the reader will be tempted to ask questions like how or why.
  - The thesis should be arguable, contestable, focused, specific, and clear. Make your thesis clear, strong and easy to find.
  - The conclusion of a thesis should be based on evidence.

#### Steps in writing a Thesis

- First, think about good topics and theories that you can write before writing the thesis, then pick a topic. The topic or thesis statement is derived from a review of existing literature in the area of study that the researcher wants to explore. This route is taken when the unknowns in an area of study are not yet defined. Some areas of study have existing problems yearning to be solved and the drafting of the thesis topic or statement revolves around a selection of one of these problems.
  - Once you have a good thesis, put it down and draw an outline. The outline is like a map of the whole thesis and it covers more commonly the introduction, literature review, discussion of methodology, discussion of results and the thesis’ conclusions and recommendations. The outline might differ from one institution to another but the one described in the preceding sentence is what is more commonly obtainable. It is imperative at this point to note that the outline drew still requires other mini- outlines for each of the sections mentioned. The outlines and mini- outlines provide a graphical over- view of the whole project and can also be used in allocating the word- count for each section and sub- section based on the overall word- count requirement of the thesis(RE: write a thesis or writing a thesis).
  - Literature search. Remember to draw a good outline you need to do literature search to familiarize yourself with the concepts and the works of others. Similarly, to achieve this, you need to read as much material that contains necessary information as you can. There will always be a counter argument for everything so anticipate it because it will help shape your thesis. Read everything you can—academic research, trade literature, and

information in the popular press and on the Internet(RE: write a thesis or writing a thesis).

- After getting all the information you need, the knowledge you gathered should help in suggesting the aim of your thesis.

Remember; a thesis is not supposed to be a question or a list, thesis should specific and as clear as possible. The claims of a thesis should be definable and also arguable.

- Then collecting and analyzing data, after data analysis, the result of the analysis should be written and discussed, followed by summary, conclusion, recommendations, list of references and the appendices

- The last step is editing of the thesis and proper spell checking.

#### Structure of a Thesis

A conventional thesis has five chapters – chapter 1-5 which will be discussed in detail below. However, it is important to state that a thesis is not limited to any chapter or section as the case may be. In fact, a thesis can be five, six, seven or even eight chapters. What determines the number of chapters in a thesis includes institution rules/ guideline, researcher choice, supervisor choice, programme or educational level. In fact, most PhD thesis are usually more than 5 chapters.

**Preliminaries Pages:** The preliminaries are the cover page, the title page, the table of contents page, and the abstract.

**The introduction:** The introduction is the first section and it provides as the name implies an introduction to the thesis. The introduction contains such aspects as the background to the study which provides information on the topic in the context of what is happening in the world as related to the topic. It also discusses the relevance of the topic to society, policies formulated success and failure. The introduction also contains the statement of the problem which is essentially a succinct description of the problem that the thesis want to solve and what the trend will be if the problem is not solved. The concluding part of the statement of problem ends with an outline of the research questions. These are the questions which when answered helps in achieving the aim of the thesis. The third section is the outline of research objectives. Conventionally research objectives re a conversion the research questions into an active statement form. Other parts of the

introduction are a discussion of hypotheses (if any), the significance of the study, delimitations, proposed methodology and a discussion of the structure of the study.

The main body includes the following; the literature review, methodology, research results and discussion of the result, the summary, conclusion and recommendations, the list of references and the appendices.

The literature review: The literature review is often the most voluminous aspects of a thesis because it reviews past empirical and theoretical literature about the problem being studied. This section starts by discussing the concepts relevant to the problem as indicated in the topic, the relationship between the concepts and what discoveries have being made on topic based on the choice of methodologies. The validity of the studies reviewed are questioned and findings are compared in order to get a comprehensive picture of the problem. The literature review also discusses the theories and theoretical frameworks that are relevant to the problem, the gaps that are evident in literature and how the thesis being written helps in resolving some of the gaps.

The major importance of Literature review is that it specifies the gap in the existing knowledge (gap in literature). The source of the literature that is being reviewed should be specified. For instance; ‘It has been argued that if the rural youth are to be aware of their community development role they need to be educated’ Effiong, (1992). The author’s name can be at the beginning, end or in between the literature. The literature should be discussed and not just stated.

The methodology: The third section is a discussion of the research methodology adopted in the thesis and touches on aspects such as the research design, the area, population and sample that will be considered for the study as well as the sampling procedure. These aspects are discussed in terms of choice, method and rationale. This section also covers the sub-section of data collection, data analysis and measures of ensuring validity of study. It is the chapter 3. This chapter explains the method used in data collection and data analysis. It explains the methodology adopted and why it is the best method to be used, it also explains every step of data collection and analysis. The data used could be primary data or secondary data. While

analysing the data, proper statistical tool should be used in order to fit the stated objectives of the thesis. The statistical tool could be; the spearman rank order correlation, chi square, analysis of variance (ANOVA) etc.

The findings and discussion of result: The next section is a discussion of findings based on the data collection instrumentation used and the objectives or hypotheses of study if any. It is the chapter 4. It is research results. This is the part that describes the research. It shows the result gotten from data that is collected and analysed. It discusses the result and how it relates to your profession.

Summary, Conclusion and Recommendation: This is normally the chapter 5. The last section discusses the summary of the study and the conclusions arrived at based on the findings discussed in the previous section. This section also presents any policy recommendations that the researcher wants to propose (RE: write a thesis or writing a thesis).

References: It cite all ideas, concepts, text, data that are not your own. It is acceptable to put the initials of the individual authors behind their last names. The way single author is referenced is different from the way more than one author is referenced.

The appendices; it includes all data in the appendix. Reference data or materials that is not easily available. It includes tables and calculations, List of equipment used for an experiment or details of complicated procedures. If a large number of references are consulted but all are not cited, it may also be included in the appendix. The appendices also contain supportive or complementary information like the questionnaire, the interview schedule, tables and charts while the references section contain an ordered list of all literature, academic and contemporary cited in the thesis. Different schools have their own preferred referencing styles.

Follow the following steps to achieve successful thesis writing

Start writing early. Do not delay writing until you have finished your project or research. Write complete and concise “Technical Reports” as and when you finish each nugget of work. This way, you will remember everything you did and document it accurately, when the work is still fresh in your mind. This is especially so if your work involves programming.

Spot errors early. A well-written “Technical Report” will force you to think about what you have done, before you move on to something else. If anything is amiss, you will detect it at once and can easily correct it, rather than have to re-visit the work later, when you may be pressured for time and have lost touch with it.

Write your thesis from the inside out. Begin with the chapters on your own experimental work. You will develop confidence in writing them because you know your own work better than anyone else. Once you have overcome the initial inertia, move on to the other chapters.

End with a bang, not a whimper. First things first, and save the best for last. First and last impressions persist. Arrange your chapters so that your first and last experimental chapters are sound and solid.

Write the Introduction after writing the Conclusions. The examiner will read the Introduction first, and then the Conclusions, to see if the promises made in the former are indeed fulfilled in the latter. Ensure that your introduction and Conclusions match.

“No man is an Island”. The critical review of the literature places your work in context. Usually, one third of the PhD thesis is about others’ work; two thirds, what you have done yourself. After a thorough and critical literature review, the PhD candidate must be able to identify the major researchers in the field and make a sound proposal for doctoral research. Estimate the time to write your thesis and then multiply it by three to get the correct estimate. Writing at one stretch is very demanding and it is all too easy to underestimate the time required for it; inflating your first estimate by a factor of three is more realistic.

#### Punctuating your thesis

Punctuation Good punctuation makes reading easy. The simplest way to find out where to punctuate is to read aloud what you have written. Each time you pause, you should add a punctuation symbol. There are four major pause symbols, arranged below in ascending order of “degree of pause”:

1. Comma. Use the comma to indicate a short pause or to separate items in a list. A pair of commas may delimit the beginning and end of a subordinate clause or phrase. Sometimes, this is also done with a pair of “em dashes” which are printed like this:

2. Semi-colon. The semi-colon signifies a longer pause than the comma. It separates segments of a sentence that are “further apart” in position, or meaning, but which are nevertheless related. If the ideas were “closer together”, a comma would have been used. It is also used to separate two clauses that may stand on their own but which are too closely related for a colon or full stop to intervene between them.
- Colon. The colon is used before one or more examples of a concept, and whenever items are to be listed in a visually separate fashion. The sentence that introduced the itemized list you are now reading ended in a colon. It may also be used to separate two fairly—but not totally— independent clauses in a sentence.
1. Full stop or period. The full stop ends a sentence. If the sentence embodies a question or an exclamation, then, of course, it is ended with a question mark or exclamation mark, respectively. The full stop is also used to terminate abbreviations like etc., (for et cetera), e.g., (for exempli gratia), et al., (for et alia) etc., but not with abbreviations for SI units. The readability of your writing will improve greatly if you take the trouble to learn the basic rules of punctuation given above.

## **TEXT 4**

### **TYPES OF RESEARCH METHODS OR METHODOLOGY**

There are different types of research methods either in social science, management, medical, engineering among others. In all the field of study there are various research methods available and understanding of these methods will assist an individuals to choose the right research methodology in his or her research exercise. There are many ways to categorize different types of research. The words you use to describe your research depend on your discipline and field. Generally, the form ones research (types of research methods) approach takes will be shaped by the followings:

- The type of knowledge you aim to produce
- The type of data you will collect and analyze
- The sampling methods, timescale and location of the research.



## **Experiments**

Experimental research is one of the research methods, and it is any research conducted with a scientific approach, where a set of variables are kept constant while the other set of variables are being measured as the subject of experiment. There are times when you don't have enough data to support your decisions. In such situations, you need to carry out experiments to discover the facts. Experimental research can gather a lot of data that can help you make better decisions.

The simplest example of an experimental research is conducting a laboratory test. As long as research is being conducted under scientifically acceptable conditions – it qualifies as an experimental research. A true experimental research is considered to be successful only when the researcher confirms that a change in the dependent variable is solely due to the manipulation of the independent variable.

Experimental research should establish a cause and effect of a phenomenon, i.e. effects are observed from an experiment due to the cause. As naturally, occurring event can be confusing for researchers to establish conclusions. For instance, if a cardiology student conducts research to understand the effect of food on cholesterol and derives that most heart patients are non-vegetarians or have diabetes. They are aspects (causes) which can result in a heart attack (effect).

For instance, people who take part in research involving experiments might be asked to complete various tests to measure their cognitive abilities (e.g. word recall, attention, concentration, reasoning ability etc.) usually verbally, on paper or by computer. The results of different groups are then compared. Participants should not be anxious about performing well but simply do their best. The aim of these tests is not to judge people or measure so-called intelligence, but to look for links between performance and other factors. If computers are used, this has to be done in such a way that no previous knowledge of computers is necessary. So people should not be put off by this either.

The study might include an intervention such as a training programme, some kind of social activity, the introduction of a change in the person's living environment (e.g. different lighting, background noise, different care

routine) or different forms of interaction (e.g. linked to physical contact, conversation, eye contact, interaction time etc.). Often the interaction will be followed by some kind of test (as mentioned above), sometimes before and after the intervention. In other cases, the person may be asked to complete a questionnaire (e.g. about his/her feelings, level of satisfaction or general well-being).

Some studies are just based on one group (within-group design). The researchers might be interested in observing people's reactions or behaviour before and after a certain intervention (e.g. a training programme). However, in most cases, there are at least two groups (a between-subjects design). One of the groups serves as a control group and is not exposed to the intervention. This is quite similar to the procedure in clinical trials whereby one group does not receive the experimental drug. This enables researchers to compare the two groups and determine the impact of the intervention. Alternatively, the two groups might differ in some important way (e.g. gender, severity of dementia, living at home or in residential care, etc.) and it is that difference that is of interest to the researchers.

### **Surveys**

The essence of survey method can be explained as “questioning individuals on a topic or topics and then describing their responses”. In business studies survey method of primary data collection is used in order to test concepts, reflect attitude of people, establish the level of customer satisfaction, conduct segmentation research and a set of other purposes. Survey method can be used in both, quantitative as well as, qualitative studies.

Survey method pursues two main purposes:

1. Describing certain aspects or characteristics of population and/or
2. Testing hypotheses about nature of relationships within a population.

Survey method can be broadly divided into three categories: mail survey, telephone survey and personal interview. The descriptions of each of these methods are briefly explained on the following table

Surveys involve collecting information, usually from fairly large groups of people, by means of questionnaires but other techniques such as interviews or telephoning may also be used. There are different types of

survey. The most straightforward type (the “one shot survey”) is administered to a sample of people at a set point in time. Another type is the “before and after survey” which people complete before a major event or experience and then again afterwards.

### **Questionnaires**

Questionnaires are a good way to obtain information from a large number of people and/or people who may not have the time to attend an interview or take part in experiments. They enable people to take their time, think about it and come back to the questionnaire later. Participants can state their views or feelings privately without worrying about the possible reaction of the researcher. Unfortunately, some people may still be inclined to try to give socially acceptable answers. People should be encouraged to answer the questions as honestly as possible so as to avoid the researchers drawing false conclusions from their study.

Questionnaires typically contain multiple choice questions, attitude scales, closed questions and open-ended questions. The drawback for researchers is that they usually have a fairly low response rate and people do not always answer all the questions and/or do not answer them correctly. Questionnaires can be administered in a number of different ways (e.g. sent by post or as email attachments, posted on Internet sites, handed out personally or administered to captive audience (such as people attending conferences). Researchers may even decide to administer the questionnaire in person which has the advantage of including people who have difficulties reading and writing. In this case, the participant may feel that s/he is taking part in an interview rather than completing a questionnaire as the researcher will be noting down the responses on his/her behalf.

### **Characteristics of a Questionnaire**

The questionnaire design depends on the type of information that is required to be collected. Qualitative questionnaires are used when there is a need to collect exploratory information or proving or disproving a hypothesis. Quantitative questionnaires are used when to validate or test any previously generated hypothesis. Some basic characteristics of a questionnaire are:

- **Uniformity:**

Questionnaires are very useful to collect demographic information, personal opinions, facts or attitudes from respondents. One of the biggest characteristic of questionnaires is that it is standardized and uniform. Every respondent see's the same questions. For example, retail questionnaire contains questions for evaluating retail store purchase value, range of options for product selections, quality of merchandise and more. These questions are uniform for all customers.

- **Exploratory:**

To collect qualitative data, the questionnaire could be exploratory in nature. There is no restriction of the questions that can be in this questionnaire or the specific objective that this collected. For example, if a questionnaire is administered to the female of the household to understand the spend towards household incomes, a very structured question list could limit the data collection.

- **Question Sequence:** The questionnaire typically follows a structured flow of questions to increase the number of responses. This sequence of questions are screening questions, warm-up questions, transition questions, skip questions, difficult questions and classification questions.

### **Types of Questionnaires**

As learnt above, questionnaires can be either structured or free-flow. To explain this a little better:

- **Structured Questionnaires:** Structured questionnaires collect quantitative data. The questionnaire is planned and designed to collect very specific information. It also initiates a formal enquiry, supplements data and checks previously accumulated data and helps validate any prior hypothesis.
- **Unstructured Questionnaires:** Unstructured questionnaires collect qualitative data. The questionnaire in this case has a basic structure and some branching questions but nothing that limits the responses of a respondent. The questions are more open-ended.

### **Types of Questions**

There could be multiple question types in a questionnaire. Some of the widely used types of questions in questionnaire are:

- **Open-Ended Questions:** Open ended question help collect qualitative data in a questionnaire where the respondent can answer in a free form with little to no restrictions.
- **Dichotomous Questions:** The **dichotomous questions** is generally a “yes/no” i.e close ended question . This question is generally used in case of the need of basic validation. It is the easiest form of a questionnaire.
- **Multiple-Choice Questions:**These are a close-ended question type in which a respondent has to select one (single select multiple choice question) or many (multiselect multiple choice question) responses from a given list of options. The multiple choice question is consisted of an incomplete stem (question), right answer or answers, incorrect answers, close alternatives and distractors. Not all questions would have all of the above and these guidelines can be used as deemed fit or that best matches the expected outcome of the question.

### **Interviews**

Interviews are usually carried out in person i.e. face-to-face but can also be administered by telephone or using more advance computer technology such as Skype. Sometimes they are held in the interviewee’s home, sometimes at a more neutral place. It is important for interviewees to decide whether they are comfortable about inviting the researcher into their home and whether they have a room or area where they can speak freely without disturbing other members of the household.

The interviewer (which is not necessarily the researcher) could adopt a formal or informal approach, either letting the interviewee speak freely about a particular issue or asking specific pre-determined questions. This will have been decided in advance and depend on the approach used by the researchers. A semi-structured approach would enable the interviewee to speak relatively freely, at the same time allowing the researcher to ensure that certain issues were covered.

When conducting the interview, the researcher might have a check list or a form to record answers. This might even take the form of a questionnaire. Taking notes can interfere with the flow of the conversation, particularly in less structured interviews. Also, it is difficult to pay attention

to the non-verbal aspects of communication and to remember everything that was said and the way it was said. Consequently, it can be helpful for the researchers to have some kind of additional record of the interview such as an audio or video recording. They should of course obtain permission before recording an interview.

### **Case studies**

Case studies usually involve the detailed study of a particular case (a person or small group). Various methods of data collection and analysis are used but this typically includes observation and interviews and may involve consulting other people and personal or public records. The researchers may be interested in a particular phenomenon (e.g. coping with a diagnosis or a move into residential care) and select one or more individuals in the respective situation on whom to base their case study/studies. Case studies have a very narrow focus which results in detailed descriptive data which is unique to the case(s) studied. Nevertheless, it can be useful in clinical settings and may even challenge existing theories and practices in other domains.

Research methodology.com noted that case studies are a popular research method in business area. Case studies aim to analyze specific issues within the boundaries of a specific environment, situation or organization. According to its design, case studies in business research can be divided into three categories: explanatory, descriptive and exploratory.

**Explanatory case studies** aim to answer 'how' or 'why' questions with little control on behalf of researcher over occurrence of events. This type of case studies focus on phenomena within the contexts of real-life situations. Example: "An investigation into the reasons of the global financial and economic crisis of 2008 – 2010."

**Descriptive case studies** aim to analyze the sequence of interpersonal events after a certain amount of time has passed. Studies in business research belonging to this category usually describe culture or sub-culture, and they attempt to discover the key phenomena. Example: "Impact of increasing levels of multiculturalism on marketing practices: A case study of McDonald's Indonesia."

**Exploratory case studies** aim to find answers to the questions of ‘what’ or ‘who’. Exploratory case study data collection method is often accompanied by additional data collection method(s) such as interviews, questionnaires, experiments etc. Example: “A study into differences of leadership practices between private and public sector organizations in Atlanta, USA.”

Advantages of case study method include data collection and analysis within the context of phenomenon, integration of qualitative and quantitative data in data analysis, and the ability to capture complexities of real-life situations so that the phenomenon can be studied in greater levels of depth. Case studies do have certain disadvantages that may include lack of rigor, challenges associated with data analysis and very little basis for generalizations of findings and conclusions.

### **Participant and non-participant observation**

Studies which involve observing people can be divided into two main categories, namely participant observation and non-participant observation.

In participant observation studies, the researcher becomes (or is already) part of the group to be observed. This involves fitting in, gaining the trust of members of the group and at the same time remaining sufficiently detached as to be able to carry out the observation. The observations made might be based on what people do, the explanations they give for what they do, the roles they have, relationships amongst them and features of the situation in which they find themselves. The researcher should be open about what s/he is doing, give the participants in the study the chance see the results and comment on them, and take their comments seriously.

In non-participant observation studies, the researcher is not part of the group being studied. The researcher decides in advance precisely what kind of behaviour is relevant to the study and can be realistically and ethically observed. The observation can be carried out in a few different ways. For example, it could be continuous over a set period of time (e.g. one hour) or regularly for shorter periods of time (for 60 seconds every so often) or on a random basis. Observation does not only include noting what happened or was said but also the fact that a specific behaviour did not occur at the time of observation.

## **Observational trials**

Observational trials study health issues in large groups of people but in natural settings. **Longitudinal** approaches examine the behaviour of a group of people over a fairly lengthy period of time e.g. monitoring cognitive decline from mid to late life paying specific attention to diet and lifestyle factors. In some cases, the researchers might monitor people when they are middle-aged and then again after 15 years and so on. The aim of such studies is usually to determine whether there is a link between one factor and another (e.g. whether high alcohol consumption is correlated with dementia). The group of people involved in this kind of study is known as a **cohort** and they share a certain characteristic or experience within a defined period. Within the cohort, there may be subgroups (e.g. people who drink moderately, people who drink heavily, people who binge drink etc.) which allow for further comparisons to be made.

In some cases, rather than following a group of people from a specific point in time onwards, the researchers take a **retrospective** approach, working backwards as it were. They might ask participants to tell them about their past behaviour, diet or lifestyle (e.g. their alcohol consumption, how much exercise they did, whether they smoked etc.) They might also ask for permission to consult the participants' medical records (a chart review). This is not always a reliable method and may be problematic as some people may forget, exaggerate or idealise their behaviour. For this reason, a prospective study is generally preferred if feasible although a retrospective pilot study preceding a prospective study may be helpful in focusing the study question and clarifying the hypothesis and feasibility of the latter (Hess, 2004).

## **Studies using the Delphi method**

The **Delphi** method was developed in the United States in the 1950s and 1960s in the military domain. It has been considered particularly useful in helping researchers determine the range of opinions which exist on a particular subject, in investigating issues of policy or clinical relevance and in trying to come to a consensus on controversial issues. The objectives can be roughly divided into those which aim to measure diversity and those which aim to reach consensus.



Different ways to employ this method have been devised but they tend to share common features, namely a series of “rounds” in which the participants (known as “panellists”) generate ideas or identify salient issues, comment on a questionnaire (constructed on the basis of the results from the first round) and re-evaluate their original responses. After each round, a facilitator provides an anonymous summary of the forecasts/opinions made by the experts and of their reasons.

There is no limit to the number of panellists involved but between 10 and 50 might be considered manageable. The panellists are chosen on the basis of their expertise which could take many forms (e.g. academic, professional or practical knowledge, personal experience of having a condition, being a service user etc.). Also choice of research method depends on the aim of the research

### **Types of research methods based on aims**

**Basic vs applied:** Basic research aims to develop knowledge, theories and predictions, while applied research aims to develop techniques, products and procedures. Applied research is also referred to as an action research, and the fundamental research is sometimes called basic or pure research. Similarities between applied and fundamental (basic) research relate to the adoption of a systematic and scientific procedure to conduct the study. What you should consider is whether you want to expand scientific understanding or solve a practical problem? **Exploratory vs explanatory:** Exploratory research aims to explore the main aspects of an under-researched problem, while explanatory research aims to explain the causes and consequences of a well-defined problem. Here you consider the how much is already known about your research problem? Are you conducting initial research on a newly-identified issue, or seeking precise conclusions about an established issue? **Inductive VS Deductive:** Inductive research aims to develop a theory mostly using qualitative data, while deductive research aims to test a theory mostly using quantitative data. **Primary or Secondary.**

**Qualitative VS Quantitative:** Qualitative research methods focus on words and meanings, while quantitative research methods focus on numbers and statistics. Is your research more concerned with measuring something or

interpreting something? You can also create a mixed methods research design that has elements of both.

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