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Предназначено для формирования профессионально - ориентированной коммуникативной компетенции магистрантов. В пособии предлагаются различные виды творческих, коммуникативных заданий, направленных на формирование профессионально-ориентированной коммуникативной компетенции магистрантов в сфере будущей профессиональной деятельности, которые знакомят их с различными аспектами научной деятельности в международном профессиональном сообществе.
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Предисловие

Учебное пособие предназначено для использования в учебном процессе при обучении студентов магистратуры.

В качестве учебного материала в пособии используются англоязычные тексты, взятые из оригинальных печатных и электронных источников, связанные с различными аспектами научного общения и научной деятельности в целом.

Материал учебного пособия нацелен на формирование профессионально-ориентированной коммуникативной и универсальной компетенций магистрантов.

Структура учебного пособия сформирована в соответствии с поставленной задачей. Пособие содержит шесть основных разделов (units), каждый из которых включает следующие подразделы: 1) систему заданий для ознакомления и закрепления лексики раздела; 2) работу с аутентичными текстами, включающую задания на понимание прочитанного и обсуждение идей текста и тематики раздела; 3) тексты с заданиями на передачу содержания на русском и английском языках (render the following text into Russian / English); 4) раздел Watching Video с заданиями, позволяющими магистрантам не только формировать и развивать навыки устного профессионально-ориентированного иноязычного общения в научной речи, но и ознакомиться с выступлениями ведущих ученых, представляющих свою точку зрения на различные проблемы современной науки.

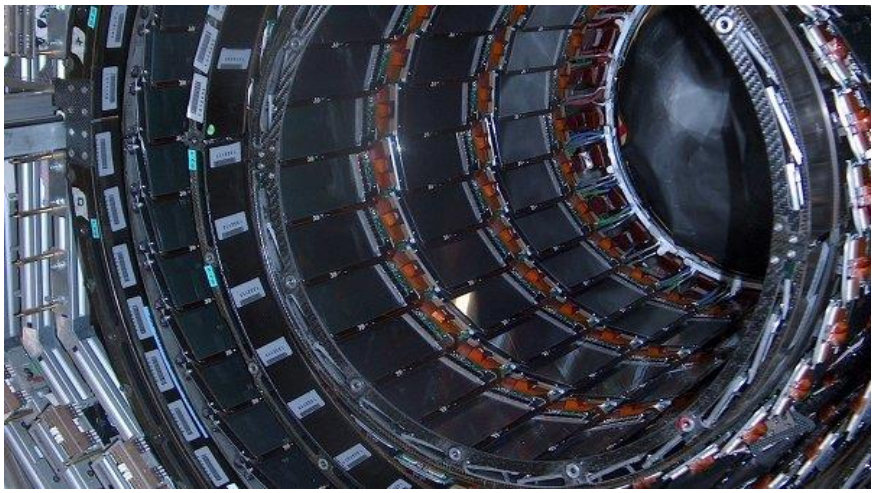
Учебное пособие предназначено для аудиторной и внеаудиторной (групповой и индивидуальной) работы. Подразделы Discussion и Watching Video предлагают студентам раскрыть различные аспекты тематики раздела, подготовить и обсудить доклады, презентации, выполнить

проектные задания, а также научиться составлять резюме, необходимое в процессе поиска работы, подготовиться к общению во время собеседования.

В целом задания направлены на формирование профессионально-ориентированной коммуникативной компетенции магистрантов в сфере будущей профессиональной деятельности и знакомят их с различными аспектами научной деятельности в международном профессиональном сообществе.

Все англоязычные тексты, используемые в пособии, взяты из оригинальной литературы. Они сокращены, но не адаптированы. Основные темы текстов, которые представлены в пособии, это – современное состояние науки, глобализация и наука, рынок труда и ученые, высшее образование в России и за рубежом, интернет-образование, научное общение.

Unit 1. MODERN STATE OF SCIENCE



LEAD-IN

1. The enormous growth of science during the classical period engendered an optimistic attitude on the part of many that all the major scientific discoveries had been made and that all that remained was the working out of minor details. Faith in the absolute truth of science was in some ways comparable to the faith of earlier centuries in such ancient authorities as Aristotle and Ptolemy. This optimism was shattered in the late 19th and early 20th centuries by a number of revolutionary discoveries. These in turn attracted increasing numbers of individuals into science, so that whereas a particular problem might have been studied by a single investigator a century ago, or by a small group of scientists a few decades ago, today such a problem is attacked by a virtual army of highly trained, technically proficient scholars. The growth of science in the 20th century has been unprecedented.

In much of modern science the idea of progressive change, or evolution, has been of fundamental importance. In addition to biological evolution, astronomers have been concerned with stellar and galactic evolution, and astrophysicists and chemists with nucleosynthesis, or the evolution of the chemical elements. The study of the evolution of the universe as a whole has involved such fields as non-Euclidean geometry and the general theory of relativity. Geologists have discovered that the continents are not static entities but are also evolving; according to the theory of plate tectonics, some continents are moving away from each other while others are moving closer together.

Try to remember as many important inventions made in XX-XXI centuries as it is possible. Have they all had only positive influence on people's life?

2. How many branches of science e.g. chemistry, physics, etc. do you know? Make a list of them. Think of subfields which you might have omitted.

WORD STUDY

3. Study the following definitions and memorize the terms.

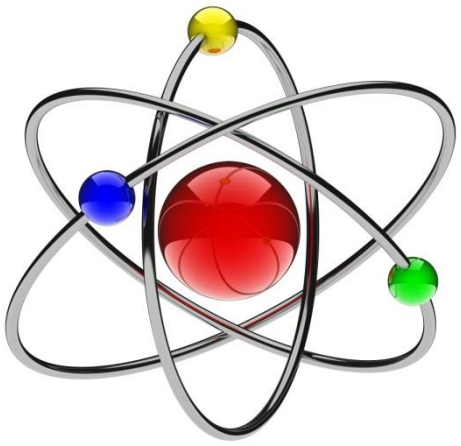
unprecedented(adj)	never done or known before; extraordinary, uncommon: *The scheme has been hailed as an unprecedented success.*
breakthrough (n)	a sudden, dramatic, and important discovery or development: *Scientists have made a breakthrough in the fight against cancer.*
turning-point(n)	a time at which a decisive change in a situation occurs, especially one with beneficial results: *This could be the turning point in Nigel's career.*
hence (v)	as a consequence; for this reason: *Many vehicle journeys and hence a lot of pollution would be saved.*
servile (adj)	having or showing an excessive willingness to serve or please others: *He bowed his head in a servile manner*
indispensable (adj)	absolutely necessary: *Internet is becoming indispensable to life.*
collaborator (n)	someone that you work with to produce a piece of work, especially a book or some research: *The Irvine group and their collaborators are testing whether lasers do the job better.*
contemplate (v)	look thoughtfully for a long time at; think about: *He contemplated his image in the mirrors; She couldn't even begin to contemplate the future.*
token (n)	a thing serving as a visible or tangible representation of a fact, quality, feeling, etc.: *I wanted to offer you a small token of my appreciation.*
hinder (v)	create difficulties for (someone or something), resulting in delay or obstruction: *Further investigation was hindered by the loss of all documentation on the case.*
advent (n)	the arrival of a notable person, thing, or event: *The advent of the computer has brought this sort of task within the bounds of possibility.*
hail (v)	if a person, event, or achievement is hailed as important or successful, they are praised publicly.
hallmark (n)	the hallmark of something or someone is their most typical quality or feature: *His designs show a love of simplicity which is very much his hallmark.*
observability (n)	ability to be noticed or perceived

4. Match branches of science with their definitions.

A	B
1. genetic engineering	a) the study of the structure and function of the organic molecules associated with living organisms
2. ergonomics	b) he study of life in germ-free conditions
3. molecular biology	c) deals with the use of micro-organism in commercial processes for producing fine chemicals such as drugs, vaccines, etc., on a large scale
4. geopolitics	d) the manipulation of living things DNA to alter hereditary traits
5. cryogenics	e) he study of the way geographical factors help to explain the basis of the power of nation states
6. andragogy	f) the study of physical systems at temperatures less than 183^0C
7. gnotobiology	g) the study of the design of physical working spaces and how people interact with them
8. praxeology	h) the study of practical or efficient activity; science of efficient action
9. helioseismology	i) science of teaching adults
10.biotechnology	j) study of sun's interior by observing its surface oscillation

5. Match words in A to their abbreviations in B and the quantity it measures in C.

A	B	C
1.metre	a)K	a)temperature
2.kilogram	b)cd	b)electric current
3.second	c)mol	c)requency
4.ampere	d)kg	d)thermodynamic temperature
5.kelvin	e)s	e)time
6.candela	f)m	f)amount of substance
7.mole	g)A	g)mass
8.hertz	h)Ω	h)length
9.joule	i)^{0}C	i)energy
10.ohm	j)Hz	j)resistance
11.degree Celsius	k)J	k)luminous intensity



6. Look at the table below which shows the symbols for some of the prefixes and the factor they represent. Then complete the third column using the prefixes in the box.

symbol		factor		prefix	
1	k	a	10^{3}	a	
2	M	b	10^{6}	b	
3	G	c	10^{9}	c	
4	T	d	10^{12}	d	
5	c	e	10^{-2}	e	
6	m	f	10^{-3}	f	
7	μ	g	10^{-6}	g	
8	n	h	10^{-9}	h	
9	p	i	10^{-12}	i	

7. Match the following words with their synonyms.

A	B
1. breakthrough	a) variety
2. servile	b) symbol
3. indispensable	c) slavish
4. hinder	d) progression
5. sophisticated	e) prevent
6. diversity	f) method
7. deoxyribonucleic acid	g) important
8. sequence	h) DNA
9. technique	i) complex
10. hallmark	j) advance

8. Fill in the gaps with appropriate words and word combinations from the box:

genetics	**equipment**	**analyzed**	**investigations**	**the electron**
vacuum tubes	**DNA**	**diversity**	**sophisticated**	**wiring**
progressed	**observations**	**supercollider**	**diverse**	**knowledge**
analysis				

When Gregor Mendel began his _____ of plant genetics in the 1800s, he worked alone — a middle-aged European monk counting peas in the abbey garden. One hundred and fifty years later, modern plant _____ laboratories, like Chelsea Specht's below, look a lot more_____ and employ the latest_____ sequencing techniques. When J.J. Thomson discovered a new particle of matter — _____— at the turn of the century, his lab _____ mainly consisted of _____, magnets, and some

simple _____. One hundred years later, scientists searching for new particles like the Higgs boson use a _____ — a 17-mile-long machine that costs several billion dollars and will produce data to be _____ by the most powerful supercomputer in the world. Science has come a long way in the last 150 years! We now have more powerful data _____ techniques, more _____ equipment for making _____ and running experiments, and a much greater breadth and depth of scientific _____. And as the attitudes of the broader society have _____, science has benefited from the expanding _____ of perspectives offered by its participants.

READING AND SPEAKING

Pre-reading tasks

9. Think of the trends and achievements that have shaped the state and structure of modern science. Choose the most prominent ones to your mind and explain your choice.

10. **Text 1.** Skim the text and point out the main sources of modern science development.

Modern science and technology

by Jean-Jacques Salomon

It has been said that all the old scientific movements of all the different civilizations were rivers flowing into the ocean of "modern" science. Modern science has its roots in a past that is extremely diverse in both time and space, ranging from the earliest civilizations of Asia, Mesopotamia, Egypt, to the "Greek miracle," through the Judeo-Christian, Arab, and scholastic traditions. However, science as we understand the term is a relatively recent phenomenon. A major advance occurred in the seventeenth century, an advance so different from all previous ones that it can be called an unprecedented "intellectual revolution."

Gaston Bachelard has labelled it an epistemological breakthrough and Thomas Kuhn - a paradigm shift. Either way, this turning-point was of even greater historical significance because it began in Europe and developed almost exclusively there for several centuries. The economic and social transformations coming in the wake of the invention of printing and the enormous stimulus to curiosity provided by the "great discoveries" and accompanying this scientific revolution helped to ensure, strengthen, and speed up the expansion of Western civilization relative to all the others. It is not surprising that the history of Western science has often been written as a history of conquest, and oversimplified in such a way that science has featured as an agent of European colonialism or as a residual feature of post-colonial imperialism. Yet history is no less complicated than is the concept of a scientific revolution.

Modern science did not happen in a single day - it took time to make an impact on people's thinking and on institutions, with added difficulties because, when experimental

science started, most facts were still so uncertain that speculation had a field day. Furthermore, some of the most innovative thinkers (such as Kepler and Newton) in many respects belonged to the old order, half in the modern era through their radical contributions to astronomy, but half in the past because of their links with hermetics, mysticism, or astrology. In a system of thought that had not freed itself from alchemy nor from the bookish tradition handed down from Aristotle, the spread of new ideas was hindered by strong resistance, resulting from a combination of prejudice, dogma, and habits. The scientific revolution of the seventeenth century has generated a huge literature, which is constantly being reinterpreted and reassessed.

"Nature is expressed in mathematics": Galileo's famous phrase appeared in his *Saggiatore* in 1623; it marks symbolically the break with the ancient notion of Nature as an ensemble of substances, forms, and qualities and suggests instead a completely different conception in terms of quantitative phenomena that can by definition be measured and therefore potentially controlled. This "intellectual reform" led not only to the transformation of science - which gradually developed into a range of many and varied sciences, each of them in turn splitting up into more and more specialized subdisciplines - but also to one of perceptions, structures, and institutions. The break between arts and crafts and science reflected a break in the social order and hence a class distinction; technology, until then reserved for the "servile class", becomes the indispensable collaborator of speculative science, which had been reserved for the "professional class." This nearing of theory and practice is a revolutionary turn at both the intellectual and the social level. For the old saying, "to know is to contemplate," a new one was substituted: "to know is to act, to manipulate, to transform" - *knowledge is power*, in Bacon's phrase. And by the same token, the technician's know-how is to be closely associated with the scientist's theoretical way of thinking and doing.

The process of the creation, expansion, consolidation, and success of modern science has had three distinct phases: institutionalization, professionalization, and industrialization. In all the industrialized countries these phases occurred in the same historical sequence and took several centuries, whereas in the developing countries - most of which became independent nations only very recently - they have often occurred in a different order, with professionalization starting before institutionalization, or even industrialization before professionalization. The problems of the scientific and technological systems in many of these countries, like the lack of social recognition of their scientists and research institutions, can often be largely attributed to this hasty development, which frequently occurs without the benefit of any previous scientific tradition and within a few decades in circumstances very different from those of the industrialized countries.

11. Give synonyms or definitions of the following words and phrases.

Diverse, label, breakthrough, paradigm shift, residual feature, split up, be hindered, perception, indispensable collaborator, contemplate, be attributed, hasty development

12. Answer the following questions.

1. Which period can be considered as the beginning of science?
2. Where was the concept of modern science born?
3. What was characteristic for new ideas generation?
4. What changes in the attitude to nature contributed to the development of science?
5. What stages of science development are pointed out in the text?

13. Discussion.

Do you share the author's point of view?

What alternative ways of science development could you think of?

Find out the concepts of the origin of science developed by different scientists, summarize them and point out the one you support. Comment on your choice.

What would be the state of modern science if the humanity had followed another trajectory of science development (in terms of the time, place and model of science origin)?

14. Render the following text into Russian.

Characteristics of Modern Science

By David McGuffin

Although there are various answers regarding defining the modern science and its beginning, based on different historical interpretations, the characteristics of modern science remain similar regardless of the historical timelines. The earliest dates for the birth of modern science range from the High Middle Ages in 1277 through the 17th century. Some historians cite a second scientific revolution to have occurred in the early 20th century with the advent of quantum physics.

Observability

As opposed to medieval science, which hailed theology and metaphysics as the pinnacle of scientific knowledge, modern science only references natural objects which can be perceived by the five senses or can be perceived with the aid of instruments. As a result, methods of observation have also led to developing branches of science that deal only with theoretical components, such as quantum physics and some parts of astronomy. Once facts have been observed, tested and retested, scientists try to arrange their observations in the format of expressions referred to as scientific laws. Observations which cannot yet be tested and proven on a consistent basis are referred to as scientific theory.

Scientific Method

The scientific method is another important component of modern science, as it describes the objective basis for testing and communicating results from scientific investigations. Using the scientific method, a scientist will form an educated guess regarding the outcome of a process or experiment and then use various tests, which isolate one or more variables, in order to obtain an objective and certifiable outcome. If the hypothesis does not match up with the conclusion of the experiment, then the hypothesis must be modified to meet the outcomes.

Mathematics

A strong emphasis on mathematics over philosophy, symbols and attitudes is another hallmark characteristic of modern science that goes hand-in-hand with observability and the scientific method. For example, in the Middle Ages, until the time of Galileo Galilei, the Earth was thought to be the center of the universe because of the attitude and symbolic importance of humans being at the center of everything and its religious implications, which were expounded upon by the church. However, Galileo's use of math sparked one of the foundations of modern science in that it replaced philosophy and speculation with objective observation. Isaac Newton, one of the fathers of modern science, further solidified the importance of mathematics in theorizing that the entire universe could be explained through the use of mathematical models.

Two Types of Science

Modern science can be divided into two different branches, which are known as applied science and pure science. Pure science describes the science of discovery. Applied science describes the process of developing new technology and products for consumers and often results from the experiments and theories of pure science. While both branches of science utilize the powers of observation, the scientific method and mathematics, pure science is more concerned with expanding and testing the existing body of scientific knowledge while applied science seeks to put that knowledge to use.

15. Render the following text into English.

Отношение общества к науке с течением времени менялось. На протяжении всего Нового времени, начиная с эпохи Возрождения (более ранних эпох мы касаться не будем), роль науки неизменно связывалась в общественном сознании с прогрессом человеческого общества. Она рассматривалась не только как средство улучшения материальных условий жизни, но и как свидетельство торжества человеческого разума, проявления его беспредельных творческих возможностей. Особенно ярко такой взгляд выражен в философии русского космизма. И хотя его представители принадлежали к совершенно различным направлениям мысли – от религиозного до естественнонаучного, – общее положительное отношение к науке, вера в могущество

человеческого разума и во всесилие науки как средства устроения бытия человека характерны для всех космистов.

В.И.Вернадский связывал увеличивающуюся роль науки с планетарным процессом человеческой эволюции – переходом ее на стадию ноосферы. Характеризуя роль науки в современном обществе, он писал: «В XX веке единая научная мысль охватила всю планету. Это основная предпосылка перехода биосферы в ноосферу. Мы переживаем все увеличивающееся влияние науки на всю нашу жизнь, и, шире, наука вскрывается как планетный фактор <...> Остановлено это быть не может <...> Мы живем на повороте в удивительную эпоху в истории человечества. События чрезвычайной важности и глубины совершаются в области человеческой мысли <...> Можно сказать, что никогда в истории человеческой мысли идея и чувство единого целого, причинной связи всех наблюдаемых явлений не имели той глубины, остроты и ясности, какой они достигли сейчас, в XX столетии <...> Рост науки и силы человечества в окружающей природе растут с неудержимой мощью, несмотря на войны, истребления и т.д. <...> Мы входим в критический период усиления этого процесса; научная работа становится проявлением геологической работы человека <...> Образование ноосферы вне воли людей и не может быть остановлено человеческой историей...» В наше время эйфория в отношении науки сменилась критическим (часто даже негативным) отношением к ней. Это связано с тем, что сейчас, на грани смены эпох, ярко проявились отрицательные черты созданной с помощью науки техногенной цивилизации. Быстрое исчерпание природных ресурсов, загрязнение окружающей среды (не говоря уже о создании средств массового уничтожения) поставили человеческую цивилизацию перед катастрофой. Более того, прогресс внешних материальных форм жизни привел к деградации внутренней духовной сущности человека и, как следствие, к дегуманизации его сознания, к построению сугубо «машинной» цивилизации. Ответственность за подобное положение вещей современный человек все в большей мере склонен возлагать на науку.

WATCHING VIDEO

Before you watch

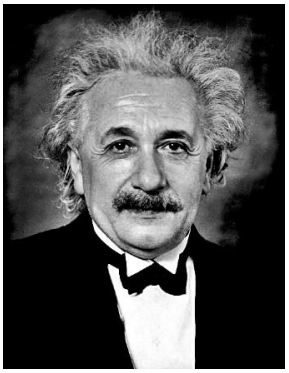
16. Discuss the following questions in pairs.

Do you believe in power of science? Do you think vaccines are useful? How can climate warming be proved?

17.

What are these scientists famous for? Use an encyclopedia while doing the task.

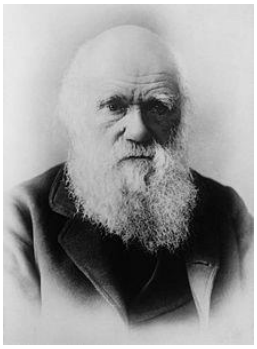
Blaise Pascal



Albert Einstein

Nicolas Copernicus

Ptolemy



Charles Darwin

Henry Cadell

While You Watch

Watch the lecture of an American historian of science, Harvard professor Naomi Oreskes "Why we should trust scientists". You can find it at https://www.ted.com/talks/naomi_oreskes_why_we_should_believe_in_science .

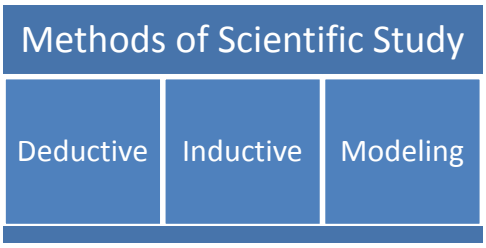
18. Answer the questions.

1. Do most Americans believe in climate change according to public opinion polls?
2. What is the calculus of Pascal's wager?
3. What is a textbook method? What's its second name?
4. Which consequence of Einstein's theory of general relativity is described in the lecture?
5. What does the term "nomological" mean?
6. What are the three problems of the deductive-nomological model?
7. What's the main idea of inductive science?
8. Why do scientists need modeling?
9. What did Henry Cadell want to illustrate with his model?
10. Can computer simulation be called modeling? Why?
11. What is driving climate change?
12. What is the famous quote of Paul Feyerabend about?
13. What is understood by "organized skepticism"?
14. Is a major change in scientific thinking a usual thing?

15. What is scientific knowledge according to the lecturer?
16. Does science appeal to authority?
17. What does the term "show me" culture" mean?
18. Which technology can be a result of accumulated effort?
19. What should our trust in science be based on?
20. What are scientists to do to make people believe them?

After You Watch

19.



Remember the examples of three methods of scientific study from the lecture. Do you know any other scientific events illustrating the three methods?

20.

Make a presentation about one of the scientists mentioned in the lecture. Pay special attention to his scientific merits. Before doing the presentation use the tips given by Tasha Dubrivny in her video "Effective Conference Presentations" at https://www.youtube.com/watch?v=6-WD4X4IKEs .

21.

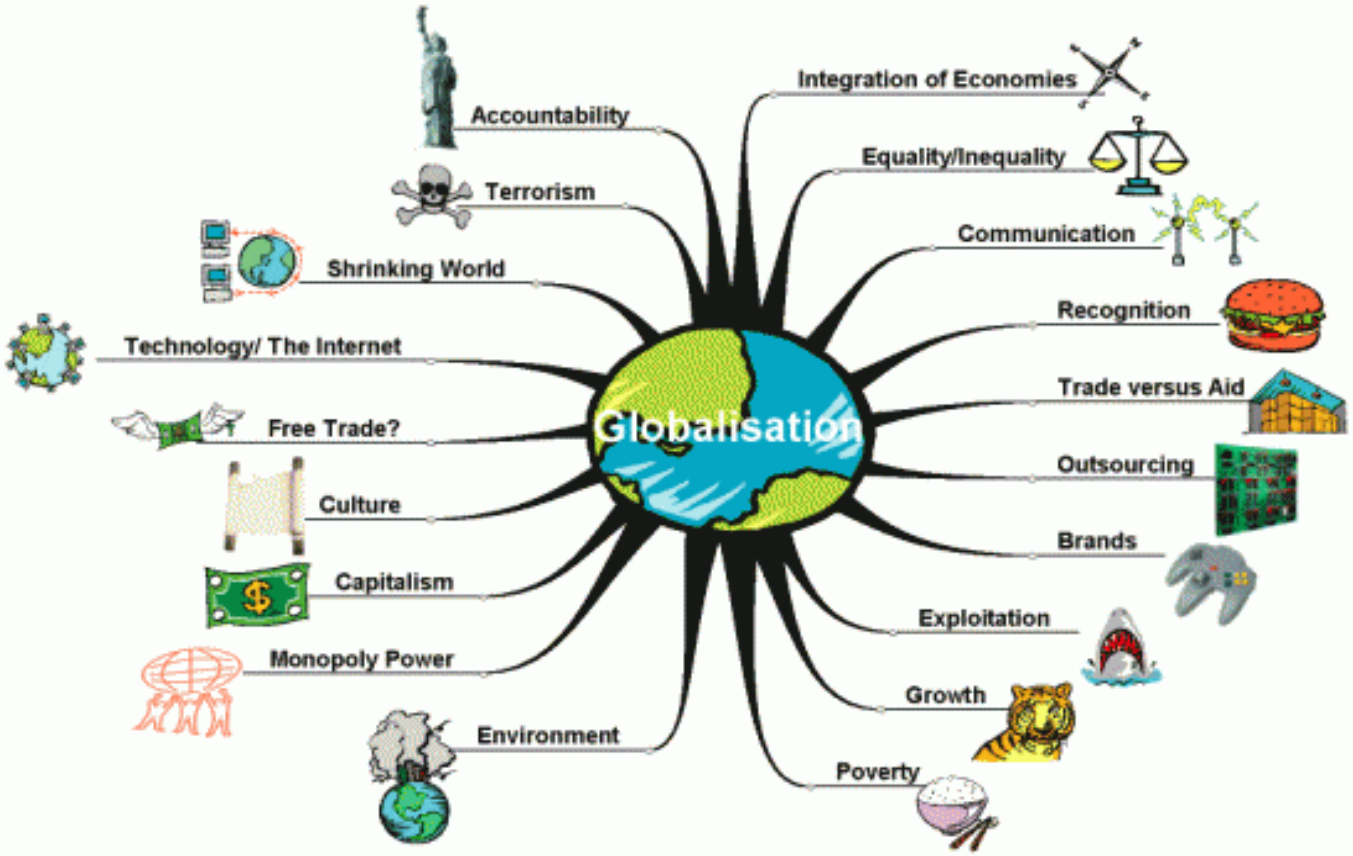
Watch a short lecture "A breakthrough new kind of wireless Internet" by Harald Haas at https://www.ted.com/talks/harald_haas_a_breakthrough_new_kind_of_wireless_internet . Answer the questions.

1. What is "the Internet of Things"?
2. How does Li-Fi work?
3. Can you repeat his experiment? Why (not)?
4. Can we call a solar cell a receiver for wireless signals?
5. What other possibilities of solar cells use can you find in modern technologies?

22.

Make a short speech about one of the most perspective branches of modern science.

Unit 2. GLOBALIZATION AND SCIENCE



LEAD-IN

1. Cambridge Advanced Learner's Dictionary & Thesaurus defines the term globalization (n) [ˌgləʊ.bəl.aɪˈzeɪ.ʃən] as the following:

- the increase of trade around the world, especially by large companies producing and trading goods in many different countries;
- a situation in which available goods and services, or social and cultural influences, gradually become similar in all parts of the world.

The phenomenon of globalization is frequently discussed in mass media but the question whether globalization is good or bad hasn't been answered yet. This issue is rather complicated and ambiguous. It goes without saying that the idea of connecting economies, technologies, cultures is great. However, not all the participants of the process are satisfied with the results. Why? What are the pros and cons of globalization? Are there winners and losers? Is it beneficial?

2. Globalization is a complicated issue. It greatly influences different spheres of our life. Try to think of the most essential areas.

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____
8._____
9._____
10._____

WORD STUDY

3. Study the following definitions and memorize the terms.

boundary (n)	a real or imagined line that marks the limits or edges of something and separates it from other things or places; a dividing line: *national boundaries, Scientists continue to push back the boundaries of human knowledge.*
competitiveness (n)	the fact of trying very hard to be better than others: *the ongoing competitiveness between the two companies*
consumerism (n)	the buying and using of goods and services; the belief that it is good for a society or an individual person to buy and use a large quantity of goods and services: *green consumerism* (= the buying of products that are not harmful to the environment)
currency(n)	A system of money in general use in a particular country: *foreign currency, convertible currency*
developing country	a poor agricultural country that is seeking to become more advanced economically and socially
eliminate (v)	Completely remove or get rid of something: *the need to eliminate poverty*

free trade	a system of international trade in which there are no restrictions or taxes on imports and exports: *a free-trade agreement/area*
leverage (n)	the ability to influence situations or people so that you can control what happens: Thus the US would have greater leverage in negotiations over trade, investments and so forth.
merge (v)	combine or cause to combine to form a single entity: *The two companies merged*
outsource (v)	Obtain goods or services by contract from an outside supplier: *There can be no question of outsourcing components from other countries; outsourcing market; outsourcing partnership*
overseas (adj,adv)	in or to a foreign country, especially one across the sea: *overseas trade*
prosperity (n)	a condition in which a person or community is doing well financially: *a long period of peace and prosperity*
trade (n)	The action of buying and selling goods and services: *a significant increase in foreign trade*
ubiquitous (adj)	Present, appearing, or found everywhere: *Internet is ubiquitous nowadays.*
unilateral (adj)	an action or decision performed by or affecting only one person, group, or country involved in a situation, without the agreement of another or the others: *unilateral decision*

4. Match the following words with their synonyms.

A	B
1. comprise	a) abroad
2. co-operate	b) collaborate
3. debate	c) combine, merge
4. eliminate	d) concurrent
5. inevitable	e) consist of
6. integrate	f) discussion
7. multilateral	g) polygonal , many-sided
8. overseas	h) regulate
9. simultaneous	i) remove
10. standardize	j) unavoidable

5. Match the following words with their opposites.

A	B
1. beneficial	a) complicate
2. converge	b) disadvantageous
3. cumulative	c) discourage
4. efficient	d) diverge
5. encourage	e) export
6. import	f) inactive, undynamic
7. increase	g) ineffective, incompetent
8. prosperous	h) poor
9. robust	i) reduce, shorten
10. simplify	j) subtractive
11. vigorous	k) weak

6. Match the words to make word combinations.

A	B	C
1. cultural	a) competition	a) беспошлинная торговля
2. developing	b) countries	b) богатство в денежной форме
3. economic	c) gain	c) мировая система поставок
4. free	d) identity	d) наличие конкуренции
5. global	e) intermingling	e) наукоемкий товар
6. living	f) product	f) развивающиеся страны
7. loss of	g) standard	g) смешение культур
8. monetary	h) supplier	h) уровень жизни
9. presence of	i) trade	i) утрата индивидуальности
10. scientific	j) wealth	j) экономическая выгода

7. Fill in the gaps with appropriate words and word combinations from the box:

standardization	**ubiquity**	**integrated**	**global**	**loss**
communicate	**trade**	**unilaterally**	**identity**	**co-operate**	**consumerism**

1. Countries in the EU now _____ together to control the level of immigration.
2. There would seem to be a strong connection between _____ and globalization and one symptom of this is the growth of _____ around the world.
3. Not everyone is happy, however, with the_____, no least because it may lead to uniformity.
4. In the world today, it is no possible for governments to adopt policies on immigration _____.

5. It is often said that we live in a _____ village, not least because it is so easy to _____ with people all over the world.
6. Web-based applications are very popular due to the _____ of the Internet.
7. One key feature of globalization is that economies around the world have become much more closely _____.
8. While it can be argued that globalization leads to greater harmony, one drawback is that _____ of cultural _____ may follow.

8. The following acronyms and abbreviations are closely connected with globalization issue. Read what they stand for and memorize them.

G11N - Globalization
VAT - value added tax
WTO- World Trade Organization
NAFTA- North American Free Trade Agreement
GDLN - Global Distance Learning Network
ICFTU - International Confederation of Free Trade Un

9. Watch a video at https://www.youtube.com/watch?v=3oTLyPPrZE4 and answer the following questions:

1. Which issues are not limited by national borders?
2. Why can information be distributed worldwide at affordable prices?
3. How have sea and air freights changed since 1930? Why?
4. Which sphere is called the main catalyst of globalization?
5. Why are multinational companies interested in markets of countries with low wages?
6. Why are some problems cannot be solved by a single state alone? How can politics react?
7. What is an NGO? Give some examples of NGOs.
8. What is an ill effect of globalization in culture?
9. Which countries win the globalization?
10. Which countries suffer from globalization?

READING AND SPEAKING

10. Pre-reading tasks.

How can you define the changes in scientific activity in Russia and the world caused by globalization process?

What has changed in the organization of undergraduate study compared to the period before globalization?

What international educational programs and grants for undergraduates can you name? Have you ever tried to participate in such programs?

11. Text 1. Globalization in science education: an inevitable and beneficial trend

by Charlton B.G, Andras P.

Globalization is one aspect of the larger phenomenon of modernization, which describes societies characterized by progressive growth in the complexity of communications. Despite its inevitable problems, globalization is a generally desirable phenomenon, since it enables increased efficiency, effectiveness and capability of societies and thereby potentially benefits most people most of the time. Scientific research was one of the first global communication systems, especially at its most advanced levels. And high quality scientific education at the post-doctoral level is also now essentially global. The next steps will be for lower level science education - at doctoral, undergraduate, and even school teaching levels - to become progressively globalized. This phenomenon is already happening in the mathematical and quantitative sciences, and will probably spread to include other kinds of science. But to be efficient requires the development of a trading medium of internationally standardized and quantitative educational credits – for instance, standard certificates, objective comparative examinations, and a hierarchical qualifications structure (which will almost certainly be based on the United States system). Globalized education also requires a common language for organizational communications, which is already in place for the quantitative and mathematical sciences, and will be increasingly the case as competence in a simplified form of international scientific English becomes more universal. As such a global science education system grows there will be increased competition and migration of teachers and students. The law of comparative advantage suggests that such mobility will encourage societies to specialize in what they do best. For example, some countries (even among wealthy nations) may provide little advanced scientific education, and import the necessary expertise from abroad – this situation seems to be developing in Germany and France, who lack any top-quality research universities. Conversely, just a few countries may provide the bulk of advanced science education teaching - as well as applied and pure research personnel - for the rest of the world: potentially China and India might supply most of world's mathematical expertise.

The globalization of education is therefore facilitated by an international system of transferable, cumulative and convertible educational credits. As the growth of the economy can be seen in terms of increased monetary wealth (when adjusted for inflation) so the growth of formal education can be seen in the increase of educational credits (when adjusted for inflation).

Educational structures will probably converge on the US model of higher education since this is the dominant, largest and most successful higher education system which

combines the twin imperatives of top-quality research with mass educational provision. This comprises undergraduate Bachelors degrees of 4 years full-time equivalent (with 2 year 'associate degrees' as a half-way form of certification). At a more micro-level of structure, it is likely that degrees will increasingly be modular, flexibly-organized around half-year semesters, and based on (transferable) credit accumulation. Masters degrees will comprise a minimum of 1 year full-time study, and there will be a minimum of 3 years for a Doctorate.

Thus, there are two complementary aspects to the globalization of science teaching: standardization and specialization. There is therefore a simultaneous trend towards international convergence of basic structures and national differentiation of specialist functions.

On the one hand, there is standardization of basic structures towards a single international system of educational certification. Eventually, all countries will share the same basic hierarchy of educational qualifications and examinations, and will communicate in a simplified form of English.

But on the other hand, globalization also entails continually increasing specialization of advanced functions. This implies that each country will end-up with a distinctive profile of specific scientific expertise (including both research and advanced training), and will 'import' other necessary forms of scientific expertise.

Eventually, no single country – not even the USA - will contain a fully-comprehensive range of advanced specialist scientific education and research institutions; and conversely some smaller, less-prosperous and less-developed countries may soon evolve to become global suppliers of specific types of scientific expertise, including science teachers.

In conclusion, we anticipate a simultaneous trend towards international convergence of basic educational structures, certificates and English usage; with increasing national differentiation of specialist educational functions.

12. Give synonyms or definitions of the following words and phrases.

Inevitable, desirable, spread, the law of comparative advantage, encourage, conversely, transferable, cumulative, convertible, comprise, complementary, convergence, entail, anticipate, simultaneous.

13. Answer the following questions.

1. How does globalization influence the process of higher education?
2. Which measures should be taken to make the process of globalization in scientific education effective?
3. Which scientific education system is considered to be the most advantageous by the author of the article? Why?

4. What are the main trends in globalization process concerning the aspects of scientific specialists training?
5. What could be the role of different countries in this process?

14. Discussion.

Do you support the author's vision of globalization and science education?

What are the advantages and disadvantages of globalization in science as you see them?

Prepare a presentation on one of the most effective to your mind science education system.

15. Render the following text into Russian.

Globalization of Private and Public Research Activities.

Government support for S&E research in the U.S.

The 1945 report to President Harry S. Truman by the eminent engineer Vannevar Bush (*Science—The Endless Frontier*) solidified for the U.S. government the value of government investment in research and education in science and engineering for economic growth and improved quality of life. In the subsequent decades the Nation has invested substantial resources in building a preeminent S&E research infrastructure and providing public support for R&D activities generally. This long-term government investment includes the establishment 60 years ago of the National Science Foundation (NSF).

In more recent years, the U.S. government has actively focused on building the S&E capacity necessary for competing in a modern, knowledge-intensive global economy. In its 1997 report on government funding of scientific research, the National Science Board wrote: "In the presence of global competition, a nation should be strong in all the facets of technical innovation and should have available a continuously renewed base of knowledge to inform its decisions and those of its citizens." The Board further wrote, "A nation requires a robust high-tech industry, a scientific talent base, and a vigorous research activity to prosper over the longer term." These arguments for public support of S&E research are even more compelling a decade later as the globalization of science and engineering research continues, and even accelerates.

Impacts of the National Science Foundation and other Federal agencies on global S&E research

NSF has long played a pivotal role in the participation by the U.S. in the global research enterprise. The Foundation supports cutting-edge research across the global frontiers of knowledge, fostering transformational discovery that is the basis for further innovation and application. NSF supports many S&E activities, from direct research project support to sharing and providing funding for major international research facilities that bind international science and engineering research communities. These ties importantly include

facilitating U.S. membership in and providing funding to the International Council for Science (ICSU).

NSF also ties university research to industry through programs such as the Small Business Innovative Research (SBIR) program and the Engineering Research Centers (ERC) program that require industry participation and investment. These ties - internationally and industrially - enable the U.S. to benefit through the participation of researchers in global science and engineering research communities.

16. Render the following text into English.

Об эффективности процессов глобализации науки и технологий свидетельствуют существенное расширение международного научно-технологического сотрудничества, повышение темпов роста мировой торговли наукоемкими товарами, а также постоянное расширение числа стран, производящих такие товары. Следует подчеркнуть, что интернационализация научно-технологического развития не отменяет, а, наоборот, усиливает значение его национальных аспектов в связи с более широкими возможностями использования местных ресурсов развития в сочетании с общемировыми ресурсами. В то же время распространение научно-технологической деятельности ТНК (транснациональных компаний) в другие страны вызывает обеспокоенность руководства этих стран, поскольку они опасаются ослабления собственного научно-технологического потенциала в результате утечки технологий, сокращения национальной базы исследований. Каждая страна самостоятельно определяет степень возможного взаимодействия с научно-технологическими комплексами ТНК с учетом своих национальных интересов.

На сегодняшний день, несмотря на интенсификацию процессов глобализации научно-технологического развития, доминируют национальные факторы этого развития: большинство ТНК по-прежнему осуществляют основную часть исследований в стране своего базирования. Такая ситуация типична для США, Японии, Германии, Франции и Италии, на территории которых сохраняется 80 - 90% собственного потенциала НИОКР (исключение составляют Бельгия и Нидерланды, которые более половины своих НИОКР осуществляют за рубежом). В последние годы подобная ситуация складывается в Великобритании, Швеции, Финляндии, Дании, Норвегии.

Следует заметить, что в настоящее время глобализация науки и технологий в целом уступает по своим масштабам глобализации производственной деятельности. Правда, эта тенденция характерна в основном для компаний, представляющих отрасли низкой наукоемкоести, продукция которых не требует проведения сложных крупномасштабных НИОКР.

Глобализация научно-технологического развития тесно связана с глобализацией высшего образования, о чем, в частности, свидетельствует опыт научно-технологического развития США. Перед Второй мировой войной в США сложилась система НИОКР, нацеленная на распространение научно-технологических знаний с учетом потребностей быстро растущей промышленности страны. Соответственно, американские университеты готовили в больших количествах специалистов прежде всего для нужд промышленности. Одновременно, с целью кадрового обеспечения НИОКР, в США проводилась активная политика по подготовке научных работников в ведущих европейских университетах, а также по привлечению европейских ученых к работе в научных учреждениях США. Это позволило США в послевоенное время быстро догнать Западную Европу в научно-технологическом развитии. По такому же пути пошла в послевоенные годы Япония, а затем и Южная Корея, осуществляя в первую очередь массовую подготовку технических специалистов для обеспечения ускоренного развития промышленности, а затем постепенно подтягивая собственную базу фундаментальной науки до мирового уровня для создания перспективных высокотехнологичных производств.

WATCHING VIDEO

Before you watch

17. Discuss in pairs.

What does “boiled frog phenomenon” mean? What is “crony capitalism”? Have you ever heard about meritocratic plutocracy? Try to find information about the Tea Party movement and about New Deal.

18. Do you know these people? What are they famous for?

David Karp

Bernard Touati

While You Watch

19. Watch the lecture of a Canadian writer, journalist, and politician (currently the federal Minister of International Trade) Chrystia Freeland “The rise of the new global super-rich”. You can find it at

https://www.ted.com/talks/chrystia_freeland_the_rise_of_the_new_global_super_rich#t-147361.

20. Answer the questions.

1. What's the most important economic fact according to the lecture?
2. Is the surging income inequality a global problem?
3. How has the share of the One Percent in the national income in the USA changed since the 1970s?
4. In 2005 Bill Gates and Warren Buffet earned as much as 120 million Americans, didn't they?
5. What feelings do people from the Forbes 400 list have talking about income inequality?
6. What are the reasons of income inequality?
7. What's the role of globalization in the rise of super-rich?
8. What's the advantage of globalization mentioned by the lecturer?
9. What are the three disadvantages of globalization mentioned by the lecturer?
10. What's the Great Gatsby Curve?
11. What should be done to benefit not only plutocrats in a new era of economic transformation?

After You Watch

21. Discuss the questions.

Did you like the lecture? Why (not)? What is the main idea of it according to your opinion?

Can you name any super-rich people?

Listen to a lecture given by one of plutocrats, Nick Hanauer, and compare your impressions. You can find the lecture at http://www.ted.com/talks/nick_hanauer_beware_fellow_plutocrats_the_pitchforks_are_coming#t-67525 .

22. Make a short speech answering the questions:

Are you an optimist or a pessimist about the future of our society? Why?

What do you consider advantages and disadvantages of globalization?

Which ideas can become the foundation of a new New Deal?

Unit 3. LABOUR MARKET AND RESEARCHERS IN GLOBAL SCIENCE AND ENGINEERING

LEAD-IN

1. a) Look at the different types of people. Which do you think are the most desirable for companies to employ?

This type of person:

- is able to come up with ideas
- is respected and listened to by others
- is able to see different points of view
- can see how to put ideas into action
- is determined to succeed in their career
- has lots of energy and often gets excited
- is concerned with details and getting things right even if it takes time
- likes to assess and evaluate
- is able to change with new situations
- is someone you can trust and depend on

b) Match the descriptions to the adjectives in the box.

enthusiastic	adaptable	methodical	reliable	ambitious
objective	creative	analytical	authoritative	practical

2. In your opinion, which factors below are important for getting a job? Choose the five most important. Is there anything missing from the list? Which do you think are not important? Why?

appearance	hobbies/interests	experience	personality
intelligence	marital status	contacts/connections	qualifications
references	age/gender	astrological sign	handwriting
blood group	sickness record	family background	education

WORD STUDY

3. Study the following definitions and memorize the terms.

sufficient (adj)	As much as is necessary; enough: She didn't have sufficient time to answer all the questions.
enquiry (n)	An act of asking for information: Despite making enquiries the gentleman who found the money has still not located the owner.
accumulation (n)	The acquisition or gradual gathering of something: *the accumulation of* wealth
ramification(n)	A complex or unwelcome consequence of an action or event: *Any change is bound to have legal ramifications*
proprietary (adj)	1. Relating to an owner or ownership, 2. (of a product) marketed under and protected by a registered trade name: *The company has a proprietary* right *to the property.*
marginalise (v)	Treat a person, group, or concept as insignificant or peripheral: *By removing religion from the public space, we marginalize it.*
implication (n)	1. a result or effect that seems likely in the future, 2. when you seem to suggest something without saying it directly: I don't disagree that economists said this, but his implication is that they were wrong; *Many people are unaware of the implications of such reforms.*
viable (adj)	Capable of working successfully; feasible: *The* proposed *investment was* economically *viable.*
externality (n)	damage caused by a company's activities for which it does not pay, or something positive created by it for which it does not

	receive payment: *Governments, through laws and regulations, attempt to transfer the costs of externalities such as pollution back to the responsible parties*.
debilitate (v)	to make someone or something physically weak: *The disease exhausted and debilitated him.*
sustainable (adj)	1. able to continue over a period of time: *sustainable development / growth*; 2. causing little or no damage to the environment and therefore able to continue for a long time.
manpower (n)	The people needed or available to do a job: *a manpower shortage.*
anticipate (v)	Regard as probable; expect or predict: *Formal orders in this regard are anticipated in a day or so.*
exogenous (adj)	Having an external cause or origin: *Technological changes are exogenous to the oil industry.*
hasten (v)	be quick to do something; to make something happen faster than usual: And suddenly the crowd hastened away.
fallacy (n)	A belief that is not true or correct: It's a fallacy that problems will disappear if you ignore them.
bedrock (n)	A situation, idea, or principle that provides a strong base for something: *Family life is the bedrock of a stable society*.
corollary (n)	something that results from something else: *Unfortunately violence is the inevitable corollary of such a revolutionary change in society.*
validation (n)	The process of proving that something is true: *The validation of the intelligence test was based on the results of research in the university psychology department.*
ignorance (n)	Lack of knowledge or information; inexperience; unawareness: H*e acted in ignorance of basic procedures.*
feasible (adj)	1. Possible and practical to do easily or conveniently: *The Dutch have demonstrated that it is perfectly feasible to live below sea level. 2.* Likely; probable: *the most feasible explanation*
entrepreneurship (n)	The activity of setting up a business or businesses, taking on financial risks in the hope of profit.

4. Match the following words with their explanations.

A	B
1. job market	a) a term used to describe jobs done with the hands
2. employable	b) a term used to describe office jobs
3. a living wage	c) areas of interest and studies
4. blue-collar jobs/manual labour	d) enough pay to live on
5. white-collar jobs	e) having the right skills to get a job
6. job vacancies	f) learning while you work
7. career paths	g) positions available
8. vocational education	h) series of jobs that will lead to your goal
9. on-the-job training	i) skills and education that prepare you for a job
10. fields	j) the supply of jobs available

5. Match the words with their synonyms.

A	B
1. feasible	a) core, basis
2. debilitate	b) enough
3. redundant	c) increase
4. bedrock	d) join together
5. corollary	e) misconception, mistake
6. fallacy	f) not required
7. sufficient	g) probable
8. lucrative	h) profitable
9. increment	i) result, consequence
10.merge	j) weaken

6. Match the following words and phrases with their opposites

A	B
1. promotion	a) be on strike
2. be on flexi-time	b) decrease
3. employed	c) demotion, reduction
4. take on	d) employee
5. employer	e) erudition
6. lucrative	f) give up
7. feasible	g) redundant
8. to work	h) unprofitable
9. increment	i) unreal
10.ignorance	j) work nine-to-five

7. Match the words to make word combinations

A	B	C
1. a chief	a) a fortune	a) быть уволенным
2. a square	b) a living	b) декретный отпуск
3. to amass	c) deal	c) зарабатывать на жизнь
4. loss	d) executive	d) повышение зарплаты
5. the human	e) factor	e) президент компании
6. maternity	f) increment	f) рекламная продажа
7. salary	g) leader	g) скопить состояние
8. to get	h) leave	h) уйти на больничный
9. to take	i) sick leave	i) человеческий фактор
10.to make	j) the sack	j) честная сделка

8. Find the following phrases in the text below and match them with their meanings

A	B
1. lucrative	a) talk seriously and in detail until a business agreement is made
2. red tape	b) buildings and machines owned by a company
3. merging	c) bureaucracy (negative)
4. reach a compromise	d) producing a lot of money
5. hammer out a deal	e) involvement in business and taking financial risks
6. swallowed up	f) come to an agreement in which both sides have to give in a little bit on what they would have otherwise liked
7. entrepreneurship	g) taken over by a large company (slightly negative)
8. capital assets	h) joining together to form one new company

Sally started her own catering business and this turned out to be very lucrative. However, she got increasingly irritated by all the red tape involved in business and when a larger company suggested merging, she was interested. The two companies didn't agree immediately on all the details of the takeover but they managed to reach a compromise and hammer out a deal without too much delay. In some ways Sally was sad that her company had been swallowed up but she is now quite glad to be free of the hassles of entrepreneurship. She has used the money raised by the sale of her capital assets to buy a large house in the south of France.

9. Study the following expressions and decide if they are usually negative or positive.

- to hit a glass ceiling
- to have a lot of perks

- to be snowed under
- to be demoted
- to be passed over for promotion
- to get turned down for a job
- to be short-listed for a job
- to be a high-flyer

READING AND SPEAKING

10. Pre-reading tasks

How can you characterize the situation at the labour market?

Which jobs and positions are considered to be the most and the least advantageous?

Is the list of prestigious jobs similar in Russia and in other countries?

What are your job perspectives as a Master's degree holder? A researcher?

11. Text 1. Linking Science Education to Labour Markets: Issues and Strategies

by K.M. Lewin

Arguments for Links of SET to Labour Markets

First, investment in education and training in science and technology appear to be necessary but not sufficient condition for economic development. Historical perspective on development, whether in the distant past or more recently, attribute great significance to the interplay between the development of technology and social and economic transformations. Many basic technologies may have been the product of trial and error, rather than knowledge-based solution searching. They may have benefited from inspired guesswork rather than the result of any research and development process dependent on an understanding of scientific principles. Two developments have changed this. Science has evolved from small scale enquiry into the natural world into a vast accumulation of knowledge, information and understanding which is widely accessible to those with problems to solve. Technology, understood in terms of the application of ideas to processes and products, has become much more complex and dependent on an accumulation of ideas and analytical processes. In short, the entry prices to new technologies have escalated to an extent that makes it unlikely that those without formal education and training and an induction into scientific knowledge and thinking will develop the technologies of the future. If this is so, and if technologies based on but not determined by scientific understanding hold one of the keys to development, then linking SET to economic activity must be advantageous.

The second point is that the evidence there is from economic analysis supports the view that investment in education and training is a major factor in creating the conditions under which development can accelerate. There is a vast literature exploring the benefits of

investment in human capital which puts the case that growth and development cannot be explained by increases in traditional factor inputs alone (land, labour and capital).

Third, globalisation has many ramifications. One of these is that the technology balance may become more and more unequal (Mansell and Wehn 1998). The enforcement of intellectual property rights, coupled with changes in the ways in which wealth-generating technologies are developed, poses a threat to the free flow of innovations that can transform the development landscape. More than ever before, technologies are becoming proprietary. Patterns of patent registration illustrate that in most developing countries very small numbers of patents are registered by residents and much larger numbers by non-residents. This may lead to poorer developing counties being marginalised further from main stream developments. An implication of globalisation is that national science and technology capability is becoming more, rather than less, important. If the privatisation of science and technology continues it calls into question development strategies based on the technology transfer and adaptation. The ability to adopt, maintain and improve technologies will be severely curtailed if it is dependent on the grace and favour of visiting specialists rather than grounded in a viable national system of SET.

Fourth, in one sense the case for linking science education to labour markets is already made. From the 1960s it has been difficult to find national plans relating to education and training that do not emphasise the importance of developing capacity in science and technology (Lewin 1985). Education development plans frequently stress this as a central plank. Human capital theory, the underlying philosophy behind most such plans, is based on the potential for education and training to transform capabilities in ways that lead to increased productivity. The conversion of these capabilities into knowledge and skills in the curriculum leads to advocacy of more technology in the curriculum, pre-vocational and vocational studies, and the need for specialised support in this area for different groups. Parents and students value employable skills derived from schooling. The demand for those qualified in SET is specific to different labour markets.

Fifth, we can note that science and technology education are likely to have significant externalities. Key problems in development benefit from public understanding of science and technology that is widely dispersed across the population. Adequate nutrition depends on an appreciation of the principles of a balanced diet. Health is closely related to systematic appreciation of the causes of ill health and the ways of avoiding disease and treating common ailments effectively before they become debilitating. Sustainable development related to land use and environmental preservation is more likely where most of the population share fundamental understandings of ecosystems and their interdependence. All these attributes are more likely to be promoted in the SET elements of the curriculum than in other subjects.

Sixth, SET is relatively expensive. The reasons for this are a mixture of genuine needs (to support some kind of practically based learning, to use specialised equipment and facilities), and those which can be challenged as desirable but not essential to effective science and technology teaching (high cost laboratory provision, small teaching groups). Given that science and technology education and training does justify some higher costs than most other curriculum areas the case for orientating its outcomes to those that have some utility in the labour market is strong.

12. Give the definitions of the following words and word combinations.

Evolve, escalate, ramification, proprietary, be marginalized, be curtailed, a viable national system of SET, a central plank, advocacy, pre-vocational studies, vocational studies, have significant externalities, ailment, become debilitating.

13. Mark the following statements true or false.

1. Human progress has always been based on purposeful scientific work.
2. It is impossible to carry out scientific work without fundamental education nowadays.
3. The results of scientific research are becoming increasingly available for developing countries.
4. Educational plans in nearly any country are oriented on the potential labour market.
5. People's health and environment issues should be a distinct discipline in the curriculum.
6. All labour markets of the world equally need specialists with scientific education.
7. The cost of scientific education makes students choose the specialities which will be better-paid.

14. Analyse and summarise the reasons against links with labour markets. Do you agree with the author's point of view?

Arguments against Links with Labour Markets

First, predicting labour market demand and its implications for SET, over all but the short term demand is unreliable. The techniques that were developed for manpower planning in the 1960s supposed that it was possible to project demand for different categories of labour in different sectors and link these to a qualification profile that would identify the numbers which would need to be trained to different levels in different specialisations. The problems with these methods are well-known (Psacharopoulos and Woodhall 1985). They include the difficulties of building up realistic patterns of future demand from surveys of employers (who may over- or under- estimate growth as a result of failure to

see beyond short term economic conditions); changes in the structure of the economy which are difficult to anticipate and may be exogenously determined (by, for example, falling prices for natural products as a result of the development of synthetics, increased competition arising from production in other countries with lower labour costs); and difficulties with the levels of substitutability in the labour force amongst those trained at different levels (graduates may be susbstituted by non-graduates when demand is high, qualification escallation may lead to graduates undertaking lower level jobs when demand for graduates is weak). These criticisms imply that it is difficult to decide the nature of links with the labour market since its future form is unpredictable.

Second, it can be argued that SET is most relevant to labour markets in developed countries. If so, expanding supply and improving quality will hasten brain drain. The rebuttal here is of two kinds. First, it is only partly true that SET is most relevant to developed country labour markets. To the extent that SET becomes globalised and is characterised by universal curriculum emphases derived from priorities established in developed countries, this may be true. The second rebuttal is that even if it is true that a proportion of the most able migrate to greener pastures, there are two saving graces and one dilemma. First, migrants who remain culturally embedded in their mother country can remit substantial amounts of income generated elsewhere to fuel domestic growth and inward investment. They may become prime vectors in constructive technology transfer. Second, even if proportion do migrate, many do not. They constitute the basis of domestic science and technology capability. The dilemma is that if the proposition is accepted that investment in SET serves mainly to promote the private returns to individuals who migrate and it should therefore be curtailed, then it is difficult to make sense of how domestic demand for SET qualified workers should be met.

A third argument, advanced by some science educators and professional scientists, rests on a view that the conceptual integrity of science education is undermined by an emphasis on application and job related skills. In this view it is the logic of science, rather than the needs of the labour market, that should be the bedrock for the science curriculum. The architecture of science thinking, it is suggested, depends on a cumulative induction to science through a familiar diet of seminal experiments and theoretical reasoning that, at least in part, replicates the processes through which scientific understanding of natural phenomena developed. A corollary is that science is essentially a disciplinary based activity with characteristic modes of knowing and validation of knowledge that are not determined by application, which comes later if at all.

Fourth, there is a strong tradition amongst some educators that schooling is about the development of the whole individual and the nurturing of talents that all individuals possess. From this perspective most educational decisions should not be linked to pragmatic concerns about employable skills, or more generally analyses of national

needs. That is someone else's problem, so this argument goes, to be resolved after students have left formal education. What matters most is the development of human potentials, providing these are generally regarded as constructive traits rather than antisocial ones. Moreover, it is often noted, many if not most of those trained in science and technology do not engage in lifetime careers based centrally on the skills they have acquired. Hence to link SET to labour markets for qualified scientists and technologists is based on a fallacy - that most will use the skills they acquire in SET in employment.

There are many challenges that confront SET systems. Changing labour market needs and new modes of knowledge generation encourage the rethinking of traditional models of SET. So also do the information and communication technologies that open up many new avenues for delivering SET and linking its form to knowledge and skill which has utility and will contribute to development. Effective SET is central to improved living conditions of the poorest. Much of what needs to be known and applied to improve basic health, nutrition and food security is known, but often not by those who have the most to benefit from it. More generally economic development, which depends in part on the application of new and old technologies, is closely related to SET in many different ways.

It can only make its full contribution if links with the labour market and different arenas of production are recognised and incorporated into the forms SET takes.

15. Render the following text into Russian.

Strategies for Linking Science Education to Labour Markets

What then might be some concrete strategies for closer links between science education and labour markets? Seven approaches could be productive.

First, there is a need to identify learning outcomes for SET related to generic and transferable skills that are valued in labour markets. Some of these may be common across countries, but many may not be if labour markets vary widely. If there are to be links which relate SET to competencies which are rewarded, then this needs to be a first step.

Second, it is attractive to audit existing curriculum and encourage the inclusion of content and skills that are relevant to common occupations and livelihoods. This is often not a component of curriculum development. It does imply that systematic knowledge is acquired from the labour market as to what content and skills have utility.

Third, there is a case for technologising SET in ways that relate science concepts to application. Where there is a choice, content and concepts that have economic application should probably be chosen over those that do not. SET pedagogy could stress an emphasis on application in appropriate balance with underlying theoretical knowledge, without losing its core concerns to develop scientific thinking and associated methods of enquiry.

Fourth, links between SET and the labour market can be enriched by involving employers and corporate sponsors in the curriculum development process for SET. This already happens to varying degrees. Educators may be unaware of recent developments in industry and the service sector which are related to SET. Dialogue should be continuous and could result in quality improvement and greater relevance of SET.

Fifth in many countries there is a need to increase awareness of the contribution different kinds of SET can make to the informal sector and to poverty alleviation.

Introducing some elements of "street science" into the SET curriculum could have benefits for scientific literacy in general and informal sector workers in particular. SET designed to meet the science and technology based needs of the poorest might reduce the incidence of malnutrition and disease based on ignorance.

Sixth, it may be feasible to arrange work exposure and experience for teachers and older science students in some SET systems. This has benefits in establishing a dialogue between the SET system and employers. It should contribute directly to SET programmes and their outcomes. Seventh, investment is needed in assessment strategies that reward conceptualization, analysis and application in SET. It remains the case that too much assessment promotes recall based learning, the disconnected accumulation of facts, and the decontextualised application of concepts. If SET is to be more closely linked to labour markets this should be reflected in how it is assessed.

16. Render the following text into English.

Союз между зарубежным бизнесом и российской наукой все более крепнет, несмотря на то, что, например, авторитетный журнал "Euromoney" поставил нашу страну на 147(!) место по надежности иностранных инвестиций в науку. Представители зарубежных компаний осознали, что "могут сэкономить миллионы долларов и годы исследований, покупая мозги в этом настоящем универмаге науки и техники", где к тому же, очень низкие цены. Этот союз позволяет нашим ученым, работающим на зарубежные компании, сводить концы с концами, хотя по международным стандартам их труд покупается крайне дешево. Правда, не всегда такое сотрудничество взаимовыгодно. Подсчитано, что от выполнения российскими учеными зарубежных заказов "Россия ежегодно теряет 600 - 700 млн долл. Ведь эти ученые работают на российском казенном оборудовании, и, по мнению всех заинтересованных ведомств (Миннауки, РАН, Минатома), даже себестоимость работ оказывается выше, чем сумма, которую выплачивают иностранные заказчики. Но основные потери составляет упущенная прибыль от коммерческого использования разработок. В первую очередь деньги теряют сами научные организации, но опосредованно теряет и госбюджет».

Выражение "упущенная прибыль", впрочем, звучит слишком романтично, ибо предполагает, что, если бы эту прибыль не извлекли зарубежные заказчики российской интеллектуальной продукции, ее получило бы наше государство. Но последнее не проявляет к ней никакого интереса, стало быть, приведенное рассуждение построено на сопоставлении реальной альтернативы (продать за рубеж) с альтернативой абстрактной (использовать в нашем обществе), от чего выглядит логически уязвимым.

Действительно, наши производители наукоемкой продукции не только выигрывают, но подчас и немало теряют при ее реализации за рубежом - из-за неумения продавать. В частности, они обычно прибегают к услугам европейских и американских посредников, которые реализуют российскую наукоемкую продукцию по демпинговым ценам. Например, в Бразилии она продается на 30 % дешевле существующих там цен. Отечественные ноу-хау часто скупают за бесценок или вообще воруют, в результате чего, по оценкам экспертов, ежегодные потери нашей страны составляют 3-4 млрд долл.

17. Discussion.

What strategies can help an undergraduate / a young scientist to find a well-paid job with good perspectives?

What steps are you going to take in job search?

What skills and qualities should an applicant have to feel competitive at the international labour market?

WATCHING VIDEO 1

Before You Watch

18. Discuss in pairs.

What do you know about job market's regulation?

Do you think that there are white spots in job markets? What are they if there're any?

Have you ever heard about zero hour contracts?

While and After You Watch

19. Listen to a lecture of Wingham Rowan "A new kind of job market" (you can find it at https://www.ted.com/talks/wingham_rowan_a_new_kind_of_job_market#t-717644) and say if you agree with the lecturer.

Watch a video recorded from BBC1 HD, The Big Questions "Are zero hour contracts ethical?" (it can be found at https://www.youtube.com/watch?v=4QCD-BTJsH8) and discuss with other students the pros and cons of zero hour contracts. Do you think they can solve the problem of job market for people who need flexible job?

WATCHING VIDEO 2

Before You Watch

20. Discuss in pairs how jobs have changed for a decade. What transformations will jobs have in the future?

While You Watch

21. Watch the talk " What will future jobs look like?" given by Andrew McAfee (it can be found at https://www.ted.com/talks/andrew_mcafee_what_will_future_jobs_look_like) and answer the following questions:

1. Which mistake is the most gratuitous according to George Elliot?
2. What will the world of jobs be like in the future?
3. Which invention was the starting point of industrial revolution?
4. What is special in our time according to the lecturer?
5. What is the best economic news and what are the reasons for it?
6. What are the advantages of this news in the eyes of well-educated people?
7. What could possibly go wrong in a new machine age?
8. Which societal challenges can be met in a new machine age?
9. What is the story of Bill and Ted about?
10. How can modern society cope with the challenges of a new working age?
11. Why is education important for people?

After You Watch

22. Discussion.

What are the main points of the talk?

Do you agree with Andrew McAfee on these points?

Do you see other pros and cons of a new working age?

23. Make a short speech on social issues which can help prevent employment disaster in the future. Use examples from the history.

Unit 4. UNIVERSITY EDUCATION IN RUSSIA AND ABROAD

LEAD-IN

1. Study the text and point out major categories of degrees available for postsecondary students.

Hundreds of different degree programs are available for students who wish to continue their education after high school. Universities and community colleges award degrees at varying levels, from associate degrees to doctoral degrees. When comparing different degrees, students can consider which program best fits their career goals and academic interests.

There are four major categories of degrees available for postsecondary students: associate, bachelor's, master's and doctoral degrees. Earning one of these degrees can take 2-8 years, depending on the level of the degree and field of study. Graduate-level programs may require students to complete one or more undergraduate programs prior to enrollment. **Associate-level programs** offer different degrees for a variety of careers. These 2-year programs may provide the necessary training to prepare students for entry-level positions in fields like nursing, graphic design and other vocational areas. Associate degree programs are most commonly available from community colleges and technical schools.

Completing an associate degree program may qualify graduates to enter the workforce. Transferable associate degree programs cover the general education requirements needed to continue a student's education at a 4-year university.

A bachelor's degree program is an undergraduate program that usually takes four years to complete. Enrolling in a bachelor's degree program requires that students choose a major area of study, such as finance, history, communications or biology. Graduates from a bachelor's degree program are qualified to work in entry- or management-level positions, depending on the field.

A bachelor's degree is also usually required for admittance into a graduate program. **Master's degree** programs are graduate programs that let students specialize in an area of study and typically take 1-2 years to complete.

Along with an undergraduate degree, enrolling in a master's degree program usually requires a minimum GPA and an acceptance score on a graduate entrance exam, such as the Graduate Record Examination (GRE). Many master's degree programs require a thesis or capstone project for graduation.

Earning a master's degree may qualify graduates to work in advanced or executive-level positions. A master's degree is also required for entrance into some doctoral programs.

Doctoral degree programs are the most advanced type of degree program available. Admittance into a doctoral degree program usually requires a master's degree. Completing the Ph.D. usually takes several years, involving the completion of a dissertation and a major research project.

Ph.D. graduates are qualified to work as experts in areas of business or research, as well as professors at the university level.

2. Look at the scheme of the US education system. Is it similar to ours? Do they have any differences?

WORD STUDY

3. Study the following definitions and memorize the terms.

enigma (n)	a person or thing that is mysterious or difficult to understand; syn: mystery, puzzle, closed book
defer (v)	put off an action or event to a later time; postpone: *They deferred the decision until February.*
deferral (n)	a postponement of an action or event: *They can offer deferrals on loan repayments.*

postgraduate (adj, n)	(adj) relating to or denoting a course of study undertaken after completing a first degree; (n) a student engaged in a postgraduate course: *The university runs 200 distance-learning degree courses, as well as many postgraduate degree courses.*
determination (n)	when someone continues trying to do something, although it is very difficult; firmness of purpose: *Andy Murray will need great determination and skill to win this match.*
conscription (n)	a system in which people are made to join the army: *Modern warfare required universal short-time conscription, followed by service in a reserve.*
incentive (n)	a thing that motivates or encourages someone to do something; syn: inducement, motivation. : *Conscription is not only an incentive to get into university; it's an incentive to stay there.*
aversion (n)	when you strongly dislike something: *He had a deep-seated aversion to most forms of exercise.*
approximately (adv)	used to show that something is almost, but not completely, accurate or exact; roughly: a journey of approximately two hours.
accomplishment (n)	something that has been achieved successfully; achievement: *It is a remarkable accomplishment on many levels.*
diversity (n)	a range of different things; variety: *India is a land of the greatest diversities and infinite varieties.*
syllabus (n)	the subjects in a course of study or teaching; curriculum: *The syllabus ensures a fair and impartial understanding between the instructor and students.*
dissertation (n)	a long essay on a particular subject, especially one written for a university degree or diploma: *At the end there are 11 items for discussion, much as one finds in university dissertations.*
thesis (n)	a very long, original, research-based work, perhaps 80-100000 words, for a higher degree (e.g.PhD): *a doctoral thesis.*

4. Match the following words with their synonyms.

A	B
1. expel	a) attempt, endeavour
2. dormitory	b) curriculum
3. experiment	c) evaluate, appraise
4. subject	d) hostel
5. truant	e) investigation, trial
6. incentive	f) motivation
7. timetable	g) non-attender, absentee
8. effort	h) postponement
9. assess	i) schedule
10. diversity	j) throw out
11. deferral	k) topic
12. syllabus	l) variety

5. Find phrasal verbs in the text below and match them with their meanings.

A	B
1. fall behind with	a) continue doing something in order to make progress
2. get through	b) delay doing something
3. hand in	c) give homework/assignments to the lecturer
4. work out	d) not finish something by the time you need to
5. catch up	e) only just assessed
6. get by	f) pass a test
7. get on with	g) plan a good way of doing something
8. put off	h) reach the same standard as other people

There are plenty of people who hate exams. A great many people, in fact! Most of us work out a timetable for our revisions and then invent a few excuses to put it off. You can waste a great deal of time when you should be sitting down and studying! But none of us wants to just get by in the exams - we want to be successful! So how can we achieve this?

- ✓ Make sure you keep up to date with your studies and don't hand work in late. It will be hard to catch up if you fall behind with your studies.
- ✓ When it comes to revision, just sit down and get on with it. If you have a lot of problems with a subject, don't just avoid the subject. Many of these problems can be solved by asking your friends or a teacher for help.
- ✓ Do a little work every day so you don't leave yourself too much to do at the end.
- ✓ Stick to your revision timetable and give yourself a few short breaks.

Follow the advice and, with relatively little effort, all of you will get through your exams with success!

6. Study the degrees abbreviations and explain them. If it's necessary, use the dictionary.

PhD, B.A., B.S., M.A. or M.F.A., M.S.**,** M.Res., M.Phil., A.S., **A.A.A**, B.F.A, A.P.S., B.B.A., B.Arch., LL.M.**,** M.D., Ed.D., J.D. **.**

7. Replace the words in bold with words and word combinations from the box:

by heart	cramming	inside out	mind-map	past papers	mnemonics
rote-learning	revising	bury yourself in your books			

When I'm **preparing intensively** for an exam, I don't see any point in looking up **exam papers from previous years**, nor is there any point in just learning things **by memory**. I know some people develop very clever **memory tricks** to help them remember the material, but there is no real substitute for **re-reading and going over** the term's work. It's a good idea to have some sort of **diagram to organise your ideas**, and **memory-learning** is useful, but in a limited way. At the end of the day, you just have to **read a huge amount** until you feel you know the subject **100 per cent**.

8. Here are some idiomatic expressions about studying and exams. Use the context to guess what they mean and choose the right answer.

1. It's very easy to <u>fall behind with</u> your studies if you miss even just a few classes.
   a) stay close behind other students b) find yourself far behind other students
   c) get ahead of other students
2. She seemed to just <u>breeze through</u> the exams. Everyone else was in such a panic and almost had nervous breakdowns.
   a) do them calmly and efficiently b) not take them seriously c)cheat in them
3. I just can't seem to <u>get the hang of</u> English prepositions. Just I think I've learnt them I make new mistakes.
   a) memorise b)understand c) enjoy
4. When I sat down and looked at the exam paper my mind just <u>went blank</u>. Everyone else seemed to be writing away quite happily.
   a) became confused b) became very focused c) became empty

READING AND SPEAKING

Pre-reading tasks

9. Discuss in pairs.

Do you know anyone who is taking part / has taken part in a university exchange program? Would you like to study for a certain period in another university? In another country? Why? Why not? Where would you prefer to study?

What facts to your mind characterize the university education in Russia and abroad?

10. Text 1.

Russia's Cult of Science Education Exposed

by L. Malkov

The fact that Russians are well educated and that education is valued beyond many other forms of cultural and economic capital in Russia is indisputable.

Russia is known for having a very high percentage of Ph.D.s and many Russian students stay in the university system well into their late-twenties.

In the United States, my negotiating partners usually agree that education in Russia, especially technical education, is prestigious and very popular, but they seem to put this love of writing dissertations down to the enigmatic mysteries of the Russian soul.

What surprises me is that almost no one ever guesses the real reasons, which, once known, change the way our U.S. partners think about Russian students. Far from being an enigma, it is a perfectly rational and easily explained phenomenon.

One of the very important reasons why Russians are so educated is not cultural tradition, but compulsory military service. It seems surprising that something so important to young Russians' decision making should be so little realized in other countries.

The fact is that going to university in Russia, as in the Soviet Union, means you can defer military service. If you continue your studies, you get another deferral, and if you keep studying until the age limit of 28, then you get taken off the conscription list altogether. In other words, getting a degree and then going on to postgraduate studies is not just a way to end up with a better-paid job, it's also a way to stay out of the army.

As state university education is free in Russia, your career, and your ability to avoid the draft depend not so much on your material and social status, but on your determination to study hard. Conscription is not only an incentive to get into university; it's an incentive to stay there, because if you drop out, the army will be waiting.

But there is more to the Russian cult of science education than aversion to military service. The Soviet government saw science as an industrializing force; a way to build up the country and its military might. Soviet ideology was built on the replacement of religion by science. The whole of Soviet society was subjected to scientific ideology, and science came to play as much of a political role as religion did in other countries.

I once heard Daniel Greenberg, the author of the book, "Science, Money and Politics," speak. He pointed out that there have historically been very few PhDs (and scientists in general) in the U.S. Congress – approximately one percent. Lawyers and businessmen are far more visible in U.S. political life than scientists, who tend to play a less public role.

In Russia, a fair number of politicians have postgraduate degrees. Given former President Boris Yeltsin's fondness for changing prime ministers, this group will serve as a sufficiently large example. Of the seven prime ministers over the last decade, only two didn't have Ph.D.s. I won't comment on the quality of their academic work – as prime ministers, they tried to keep their scholarly achievements quiet – but the very fact that top Russian politicians are or want to appear academically learned is revealing.

There are many other examples illustrating the priority Russian culture places on academic achievements. Consider this biography, for example:

Alexander Rutskoi, a famous military pilot made it to general's rank, then became vice president of Russia until his politics landed him in prison after he resisted Yeltsin's orders to dissolve the parliament. He then became governor of one of the Russian regions, and, just before standing for reelection, defended a thesis and obtained a Ph.D. – the accomplishment he'd felt was missing from his biography.

The most recent example is even more eye-opening as it concerns an altogether different generation. Miss Universe 2002, Russia's Oksana Fyodorova, decided for a variety of reasons to give up her crown and stay in Russia rather than fulfill her commitments as the world's beauty queen. Officially, she said she was returning to Russia because she had to defend her thesis in a year's time and therefore wouldn't be able to fulfill her obligations. Everyone realizes that, as the world understands it, there is a huge difference between being one of the many Ph.D. holders and being a prominent figure on the world's stage. But for the Russian public, getting a Ph.D. is a perfectly convincing and prestigious argument.

Demystifying the priority given to science in Russia could be a good marketing strategy for attracting investment to science-intensive areas here.

It was always a mystery to me why all developed countries recognize the value of talent as a resource, but don't show much interest in working with countries with a surplus of talent.

One reason for this, aside from the off-putting over-bureaucratization of science in Russia, is that there are no methods for measuring potential talent other than counting how many university graduates a country has in various disciplines.

This is the same thing as being interested in oil and not knowing how to estimate oil reserves. The development of more suitable methods for estimating a country's potential talent could heighten investors' interest in Russian specialists. Perhaps it's the Russian

specialists who should be getting to work on measurement methods, as they certainly stand to gain.

11. Give synonyms or definitions of the following words and phrases.

Well into one's late-twenties, far from being an enigma, defer military service, the conscription list, an incentive, a prominent figure, a convincing argument, off-putting, estimate, heighten investors' interest.

12. Mark the following statements true or false.

1. Higher and postgraduate education is popular in Russia.
2. The main reason to continue education and get Ph.D lies in the specific Russian character.
3. Science in the Soviet period was meant to occupy the niche of religion in the society.
4. American politicians hold more PhDs than Russian ones.
5. Intellectual potential should be treated as any other resource and therefore needs to be evaluated.

13. Discussion.

Which ideas from the article can you agree with?

Present a short report with your analysis of a scientific education system of a country / countries with different level of development. Try to obtain information about the variety of countries.

14. Render the following text into Russian.

Today, the Russian Ministry of Education unites 199 universities, 56 academies, 58 institutes and 42 research organisations. Higher education institutions (HEIs) and research organisations are mainly situated in Moscow, followed by the Urals, West Siberian, Povolzhskiy, and North Caucasus regions, and then the northwestern, including St. Petersburg. Almost half of all HEIs and organisations of the Ministry are engineering with about a quarter to natural science and humanities.

There are 21,000 scientific and industrial subdivisions of HEIs and research organisations, amongst which there are 933 basic research laboratories, 72 technical exhibitions, 229 research institutes, 294 scientific centres, 167 scientific-methodological centres, 92 pilot production centres plus others concentrated in the Educational Department. There are 18,513 Doctors of Science and 91,000 Doctoral Candidates employed in HEIs and research organisations of the Ministry of Education. Most of the highly qualified personnel are concentrated in the branch of technical and physical-

mathematical sciences. The breakdown is shown in Figure 1.

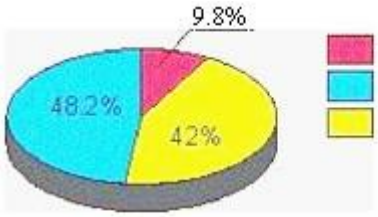
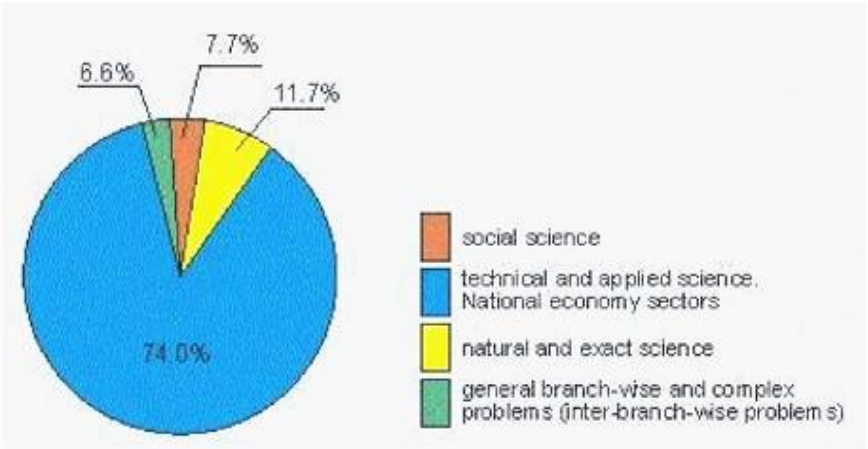


Figure 1: The structure of scientific and educational human resources in Russian higher education and scientific institutions (scientific and educational labour force = 187,228).

One characteristic, and a special object of pride for Russia, are the scientific schools. Considerable influence on the development of science, technical and technological progress and formation of industry in the world comes from engineering schools of Russia. Well-known engineering schools in different spheres were established in technical HEIs and are successfully developing. Engineering HEIs of Russia provide specialist training in a diversity of directions and disciplines for scientific-technical fields of industry. Research financed by the Ministry of Education is provided through the state budget and on the basis of business contracts with enterprises, organisations and industries. Figure 2 illustrates the distribution of business contract research.

It is interesting to compare the correlation of research financed from the federal budget compared to business contracts. It is typical that universities, academies and institutes receive more than half of their financing from business contracts, and only 20-25% is financed from the federal budget, the highest percentage of financing from business contracts is in engineering-technical HEIs and budget financing of natural science and humanities. HEIs and research organisations of the Ministry take an active part in federal specific-purpose programmes on high technologies, as well as in the Ministry's scientific-technical programmes on high technologies



.Figure 2: Distribution of the volume of business contract research funding according to science branch.

HEIs and research organisations of the Ministry of Education took part in 621 international

projects and contracts: European countries - 360 projects, America - 184 projects, Asia - 81 projects and Africa - five projects.

The largest number of international projects and contracts were carried out by HEIs and research organisations of Moscow, St. Petersburg, West Siberia and Ural regions. The distribution of international projects over European countries shows that Germany, France, Slovenia, the United Kingdom, Finland, Sweden, Italy, Belgium, Switzerland, the Netherlands and Norway collaborate with Russia more intensively in the field of research.

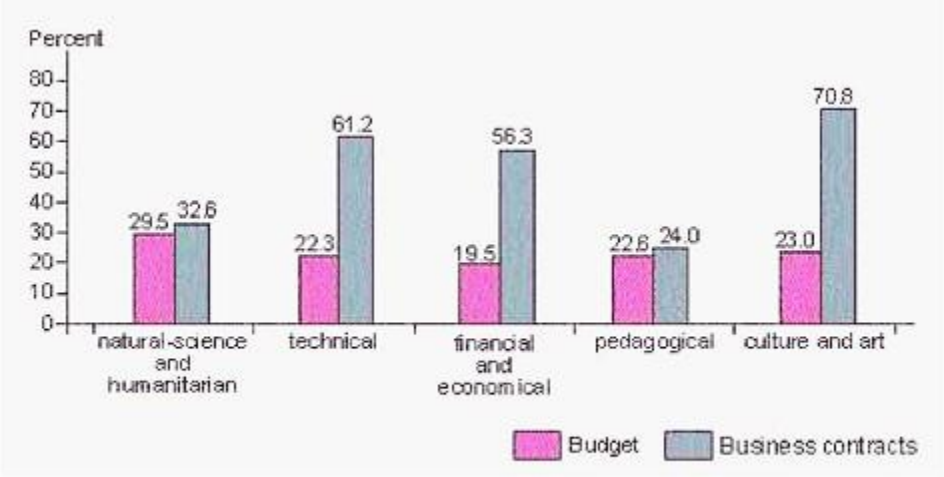


Figure 3: Proportion of research financed by the federal budget compared to business contracts to the total research volume of education and scientific institutions of a certain profile.

15. Render the following text into English.

В ходе реформирования высшей школы в зарубежных странах ярко проявилась тенденция к созданию вариативных многоуровневых систем непрерывного высшего образования. Многоступенчатая структура университетского образования включает: профориентацию абитуриентов (в школах повышенного уровня, на университетских подготовительных курсах), прохождение студентами трех циклов (общенаучный, профессиональный и последипломный) университетской подготовки и последующее за этим повышение квалификации.

Характерной особенностью зарубежного высшего образования является организация “открытого”, “конкурсного” и “избирательного” приема студентов. Открытый прием означает предъявление минимальных требований к абитуриентам. Основным требованием к поступающим является наличие документа об успешном завершении полного среднего образования. Свободный прием в вузы является проявлением демократических тенденций, происходящих в образовательной политике зарубежных стран: предоставление равных прав для всех граждан при поступлении в вузы, возможность выбирать учебное заведение в соответствии с интересами, потребностями, уровнем подготовленности абитуриента. Следствием открытого приема в вузы явился рост контингента студентов за последние десять лет:

в США, Франции - в 3 раза, в Японии, Англии - в 2,5 раза, в ФРГ - в 2 раза. Конкурсный прием проводят вузы, формирующие “элитарные группы студентов”. К этим вузам относятся частные, исследовательские университеты. Они предлагают абитуриентам систему вступительных экзаменов, собеседований или тестирования. В некоторые университеты требуется предоставление характеристики, выданной школой, или рекомендаций отдельных лиц. Избирательный (или селективный) прием абитуриентов применяется в университетских колледжах свободных искусств и специализированных факультетах.

Watching Video 1

Before You Watch

16. Discus in pairs.

How did you choose the university?
What was important for you while choosing?
Which universities are considered to be the best in Russia? In the world?
What are the criteria of your decision?

While You Watch

17. Watch “World University Rankings 2015-2016 results. World's top 10 universities.” at https://www.youtubHow many studentse.com/watch?v=FuuBXIiaMnQ and answer the questions:

1. How many students are there in the world?
2. How many students study abroad?
3. How many universities are there in the world?
4. Do you know all the universities in the Ranking?
5. What are the criteria for university’s estimation?

After You Watch

18. Make a presentation about University ranking. Suggest your criteria for estimation, use statistics and opinions of graduates.

Watching Video 2

Before You Watch

19. Discuss in pairs.

Why do people go to universities? What is the goal of higher education?

While You Watch

20. Watch the talk given by Fred D'Agostino "Higher education is not about getting a job" at http://tedxtalks.ted.com/video/Higher-education-is-not-about-ge and answer the questions:

1. What is a macro element in a knowledge economy?
2. What is the benefit of higher education for Australia according to Minister for Education?
3. What skills do people need to be a part of democracy?
4. What are the marks of a free man according to Harry Truman?
5. How can you participate effectively in modern democratic society?
6. What happened in 1957 in Arkansas?
7. What was the main idea of John Kennedy's speech in Amherst College?
8. What are educated people responsible for?
9. What are the results of not educating girls in Pakistan?
10. What is education for?

After You Watch

21. Discussion.

Answer the questions from Before You Watch section once more. Have you somehow changed your ideas?

Do you know any successful people who have no academic degree?

Listen to a famous Steve Jobs' 2005 Stanford Commencement Address at https://www.youtube.com/watch?v=UF8uR6Z6KLc and discuss its main ideas. Do you think his life could have changed if he had had a degree?

Unit 5. EDUCATION via MODERN TECHNOLOGIES

"Our students have changed radically. Today's students are no longer the people our educational system was designed to teach."

Marc Prensky

LEAD-IN

1. What helps to keep you motivated in studies? Rate the following from 1 (not important) to 7 (extremely important)

___ being able to choose when and where to study
___ use of information and communication technologies
___ opportunity to work in group
___ getting a chance to use knowledge in practice
___ obtaining positive feedback from teachers, tutors or mentors
___ receiving an official document at the end of the course
___ dealing with up-to-date techniques and information

2. Use of modern technologies has a great impact on the process of education and the results of studies. Technologies encourage more independent and active learning, increase motivation. Computer-mediated communication has already proved its efficiency. However, traditional lectures haven't disappeared and are still successfully used. Think of advantages and disadvantages of these methods.

WORD STUDY

3. Study the following definitions and memorize the terms.

collaboration (n)	The action of working with someone to produce something: *work in collaboration with other students*
defunct (adj)	No longer existing or functioning: *Several artefacts of a defunct Indian tribe were discovered last month.*
curriculum (n)	The subjects comprising a course of study in a school, college, etc.; programme of studies; syllabus.
abundance (n)	A very large quantity of something; plentifulness: *Online courses are growing in abundance.*
attendee (n)	A person who attends a conference or other gathering: *seminar attendees; This conference will allow attendees to mix business with pleasure.*
replicate (v)	Make an exact copy of smth; copy; reproduce: *A lot of immigrants finish up replicating the culture they came from.*
facilitate (v)	To make something possible or easier: *It's essential to facilitate cooperation between all the members of the team.*
ubiquitous (adj)	Present, appearing, or found everywhere: *Ubiquitous learning is often defined as learning anywhere, anytime and is therefore closely associated with mobile technologies.*
pervade (v)	When qualities, characteristics, or smells pervade a place or thing, they spread through it and are present in every part of it: *Internet technologies have pervaded culture, education, all our life.*
eschew (v)	Deliberately avoid using; abstain from; give up: *He appealed to the crowd to eschew violence.*
exorbitant (adj)	Excessively high; unreasonably high: *exorbitant price, exorbitant tuition.*
affinity (n)	A natural liking for and understanding of someone or something; empathy.
scholar (n)	A specialist in a particular branch of study, especially the humanities: *Dr Miles was a distinguished scholar of Russian history.*

apprenticeship (n)	A period of time working as an apprentice (trainee); training period: *At the end of their apprenticeships trainees became fully skilled workers.*

4. Match the following words with their synonyms.

A	B
1. recruit	a) accessible
2. enrol	b) avoid
3. register	c) cooperation
4. collaboration	d) employ
pervade	e) evaluation
5. eschew	f) excessive
6. exorbitant	g) make easier, simplify
7. facilitate	h) penetrate
8. assessment	i) register
9. available	j) sign up

5. Match the words with their definitions.

A	B
1. article	a) learning conducted via electronic media, typically on the Internet
2. blended learning	b) a digital audio file made available on the Internet for downloading to a computer or portable media player, typically available as a series, new instalments of which can be received by subscribers automatically
3. blog	c) an occasion when a group of people go on the Internet at the same time to study and discuss something
4. e-learning	d) a set of pieces of creative work intended to demonstrate a person's ability to a potential employer
5. online tools	e) a piece of writing included with others in a newspaper, magazine, or other publication
6. podcast	f) a regularly updated website, typically one run by an individual or small group, that is written in an informal style
7. portfolio	g) some programmes or software that help you to do a particular activity online
8. webinar	h) a way of learning that combines traditional lessons with lessons that use computer technology and may be given over the Internet

6. Match the words to make word combinations.

A	B	C
1. academic	a) access	a) прямо говоря
2. exorbitant	b) achievement	b) проявить инициативу
3. higher	c) array	c) высшее образование
4. labour	d) bluntly	d) успехи в учебе
5. open	e) education	e) решение задач
6. problem	f) institution	f) рынок труда
7. public	g) market	g) чрезмерная стоимость обучения
8. put	h) solving	h) открытый доступ
9. seize	i) the initiative	i) широкий спектр
10.wide	j) tuition	j) государственное учреждение

7. Fill in the gaps with appropriate words and word combinations from the box:

to replicate to eschew e-learning facilitate blogs affinity abundance online tools ubiquitous attendees webinars pervaded podcasts

Nowadays it's absolutely impossible _____the education system popular ten years ago. Internet has become _____all over the world and _____ every sphere of human life including education. It's unreasonable _____ modern technologies and not to appreciate the way they _____ learning possibilities. On-line courses are growing in _____. However, traditional universities are still popular and offer their _____ new information technologies. Modern students have real _____for _____. They use different _____, take part in _____, run _____and download _____ with the information they are interested in.

8. With technology, educators, students and parents have a variety of learning tools at their fingertips. Here are some of the **ways in which technology improves education** over time. Match them with explanations given in the right column. Think of some other examples.

1. Teachers can collaborate to share their ideas and resources online	a) Face-to-face interaction is huge, especially in the younger years, but some students work better when they can go at their own pace. Online education is now accredited and has changed the way we view education.

2. Students can develop valuable research skills at a young age	b) There are plenty of resourceful, credible websites available on the Internet that both teachers and students can utilize. The Internet also provides a variety of knowledge and doesn't limit students to one person's opinion.
3. Students and teachers have access to an expanse of material	c) They can communicate with others across the world in an instant, meet the shortcomings of their work, refine it and provide their students with the best. This approach definitely enhances the practice of teaching.
4. Online learning is now an equally credible option	d) Technology gives students immediate access to an abundance of quality information which leads to learning at much quicker rates than before.

Pre-reading task

9. Discuss in pairs.

How do you think the Internet has changed the process of scientific education?
Which spheres of education have been affected most?
What IT products and systems are used in education nowadays?
What are the advantages and disadvantages of Internet education?

10. Text 1. Is the Internet making universities defunct?

by Saad Rizvi and Katelyn Donnelly

The model of higher education that marched triumphantly across the globe in the second half of the 20th century is broken.

Thanks to advances in technology and connectivity, all the key elements of a traditional university – the curriculum, the teaching, the assessment and the experience – are available in various corners of the web. They no longer need to be located together in one, bricks-and-mortar place.

And yet the next 50 years could still turn out to be a golden age for higher education. If universities embrace these technologies, seize the initiative and act ambitiously, they can survive and even flourish.

The curriculum

Why teach 200 students when you can teach thousands? Education in Britain has, until now, been a concept relatively untainted by ideas of the market or value. But that is now changing.

University applications by UK-born students this year were down almost 8 per cent. Meanwhile, massive open online courses are growing in abundance. The Khan Academy, FutureLearn, Coursera, edX and Udacity are some of the best, with the highest completion rates.

Coursera for instance provides curricula from a wide range of institutions. The start-up founded out of Stanford provides free online classes available to anyone, worldwide, with an internet connection. Although it is just over a year old, over 700,000 students have already enrolled, most from outside the United States.

But the universities themselves are by no means excluded. For instance, the University of Edinburgh now offers six online courses, with 100,000 students already signing up. That is four times more than physical attendees. And in December last year 12 top UK universities announced Futurelearn, a new programme offering online courses of their own to a global public.

The teaching

The actual impact of higher education on employment prospects is often wildly misunderstood. Instead of listing degree grades and academic achievements, the best CVs now present portfolios around performance and link to blogs, published articles, PowerPoint presentations, podcasts and webinars the candidate has produced. Prospective employers can now quite literally interact with their candidates' work.

As a result, a burst of innovative alternatives to mainstream higher education have emerged, allowing students to look beyond universities for the skills that will make them more marketable.

SkillShare is a global community centred on creativity, collaboration and learning by doing. Members can learn any type of skillet from a vast number of global experts – and share their own skills in return.

The assessment

With a growing number of online tools, students are not only learning by themselves, but assessing and grading themselves too.

Projects are becoming publicly available, real-world productions, so the quality is assessed by a broad community which can publicly comment and ‘upvote’.

Take for instance Dev Bootcamp, a nine-week course for self-motivated developers who, quite simply, want to be better developers. It has been described quite accurately as ‘apprenticeship on steroids’. Put bluntly; ‘you learn to ride the bike by getting on the bike’. Users are given the tools to learn. And then they get on with it. It’s an open process with an open result – you assess yourself and get what you put in. No fails, and 90 per cent of students find jobs within three months of graduating.

The experience

A big part of university is the experience. University provides a critical learning opportunity for young people to mature, socialise and grow with a peer community, and not just in the traditional academic sense. The social side is often essential in grooming students for leadership, teamwork and real-world problem solving.

Clearly this unique life experience cannot be replicated online. Therefore online models are relying on different strengths. For example, the eagerly anticipated Minerva Project aims to deliver high-quality education from top professors at half the price of traditional schools. Lectures are delivered through video to students in seven countries and supported by debate and discussion facilitated by the professors.

The project will mean that students in emerging markets, who pass the grades, will be able to study at an 'elite institution' with top professors, without worrying about investment or visa challenges.

A recent investment of $25 million for the project has resulted in non-profit organisations being able to recruit more desirable professors whilst still keeping student costs down – thus providing the same college community experience and high level of learning – at a lower cost.

Ultimately the student will decide which aspect of higher education they wish to prioritise. But in the new world the learner will be in the driver's seat, with a keen eye trained on value. For institutions, deciding to embrace this new world may turn out to be the only way to avoid the avalanche that is coming.

11. Give definitions of the following terms.

Bricks-and-mortar place, seize the initiative, flourish, untainted, in abundance, attendee, look beyond, marketable, apprenticeship, put bluntly, grooming.

12. Mark if the following statements are true or false. Correct the false statements.

1. The author's forecast for the future of traditional university education is quite skeptical.
2. There are a lot of various online courses with services of high quality.
3. British universities mainly ignore the perspectives of Internet education.
4. Internet education involves the most advanced technologies and allows students to feel competitive at the labour market.
5. The marks in Internet education are given by a panel of tutors.
6. The experience of socializing in online education is not enough compared to the one given in traditional universities.

13. Discussion.

Have you ever tried any online courses? What is your opinion about their quality, advantages, disadvantages and perspectives?

Would you like to enroll for an Internet course? Why/why not? Which one?

Do you agree with the author of the article?

What do you think about the future of traditional universities?

How can you characterize the situation with Internet education in Russia? In Russian traditional universities?

15. Render the text into Russian.

How the Internet is Revolutionizing Education

by C. B. MYERS

As connection speeds increase and the ubiquity of the Internet pervades, digital content reigns. And in this era, free education has never been so accessible. The Web gives lifelong learners the tools to become autodidacts, eschewing exorbitant tuition and joining the ranks of other self-taught great thinkers in history such as Albert Einstein, Alexander Graham Bell, Paul Allen and Ernest Hemingway.

"Learning is not a product of schooling but the lifelong attempt to acquire it." - Albert Einstein

10 years ago in April 2001, Charles M. Vest, the MIT President at the time, announced that the university would make its materials for all its courses freely available on the Internet. This initiative, found at OpenCourseWare, has enabled other teachers and lifelong learners around the world to listen and read what is being taught at MIT. 5 years later, in April 2006, UC Berkeley announced its plan to put complete academic courses on Apple's iTunes_U, beginning what is now one of the biggest collections of recorded classroom lectures in the world. One year later, in October 2007, the school launched UC Berkeley on YouTube. According to Benjamin Hubbard the Manager of Webcast at UC Berkeley, the school has had well over 120 million downloads since first sharing videos online, which they began doing in 2001.

He says, "I think there's a wide array of reasons why faculty should be engaged in recording and publishing lectures online. The first is let students have access to materials. The second is for cultivating a really great affinity for a public university that's providing research and community service. The third is closely aligned with this opportunity to provide educational resources all over the world to those from all walks of life, despite what disadvantages they have faced. It's so important that we recognize as a public institution that this is something people value greatly and has great value for us too."

Both Yale and Stanford have followed suit, and even Harvard has jumped on board in the last two years. Open Yale features free and open access to a selection of introductory

courses taught by distinguished teachers and scholars, supported by funding from the William and Flora Hewlitt Foundation. Outside of the U.S., some of the most selective universities in India have created a vast body of online content in order to reach more of the country's exploding student population. At Stanford, you can freely "attend" The Stanford Mini Med School featuring 3 year long series of courses by more than thirty distinguished faculty, scientists and physicians.

16. Render the following text into English.

Сегодня проблему передачи данных и знаний успешно решает Интернет. В сети постепенно набирают популярность образовательные каналы, количество подписчиков которых прибывает в количествах, сопоставимых с подписчиками развлекательных ресурсов. Ведущие профессора лучших университетов мира с интересом относятся к идее записывать свои лекции и выкладывать их в Интернет. Таким образом, исчезает проблема географии и расстояний. Сегодня любознательный студент из Куала-Лумпура или Благовещенска, ищущий доступ к конкретным исследованиям и лекциям, может взять их из первых рук, например, нобелевского лауреата, профессора Кембриджа.

Интернет-образование — это качественно иная структура образования по сравнению с прочими форматами обучения. Она предполагает модульный подход, где доступ к каждому новому учебному блоку возможен через успешное тестирование предыдущего модуля.

Для успешного запуска высшего дистанционного образования вузу необходима сеть центров доступа, которая позволит студентам быть полностью независимыми от головного офиса. Центры доступа обеспечивают промежуточную коммуникацию студентов и головного офиса, администрируют и координируют процесс обучения.

WATCHING VIDEO

Before You Watch

17. Discuss in pairs.

What sites for online education do you know? Have you ever tried any online courses? What pros and cons of online education can you name? Do you think that "ordinary" universities could be substituted by online ones? Why (not)?

While you watch

18. Listen to Daphne Koller, one of the founders of Coursera, at https://www.ted.com/talks/daphne_koller_what_we_re_learning_from_online_education#t-19 and say if the following statements are true or false. Correct the false ones.

1. Daphne Koller was born to a well-educated family.
2. In South Africa, the educational system was constructed in the days of apartheid for the white minority.
3. The cost of higher education tuition in the United States has been increasing at almost twice the rate since 1985.
4. All of recent college graduates in the United States who get a higher education actually are working in jobs that require that education.
5. Coursera's goal is to take the best courses from the best instructors at the best universities and provide it to everyone around the world for symbolic fee.
6. Coursera attracts people who can't attend ordinary universities.
7. Coursera's students can do assignments optionally.
8. Online education allows students to follow a personalized curriculum.
9. Every few minutes the video pauses and the students can have a break.
10. Peer grading is an effective strategy for providing reproducible grades.
11. Universities are obsolete now.
12. The achievement score almost doubles while using active learning.
13. Lifelong learning is one of the principals of quality education for everyone.

After You Watch

19. Practical task.

Choose any educational platform in the Internet and enroll any course you like. After passing it prepare a short speech describing your impressions.

Unit 6. SCIENTIFIC COMMUNICATION

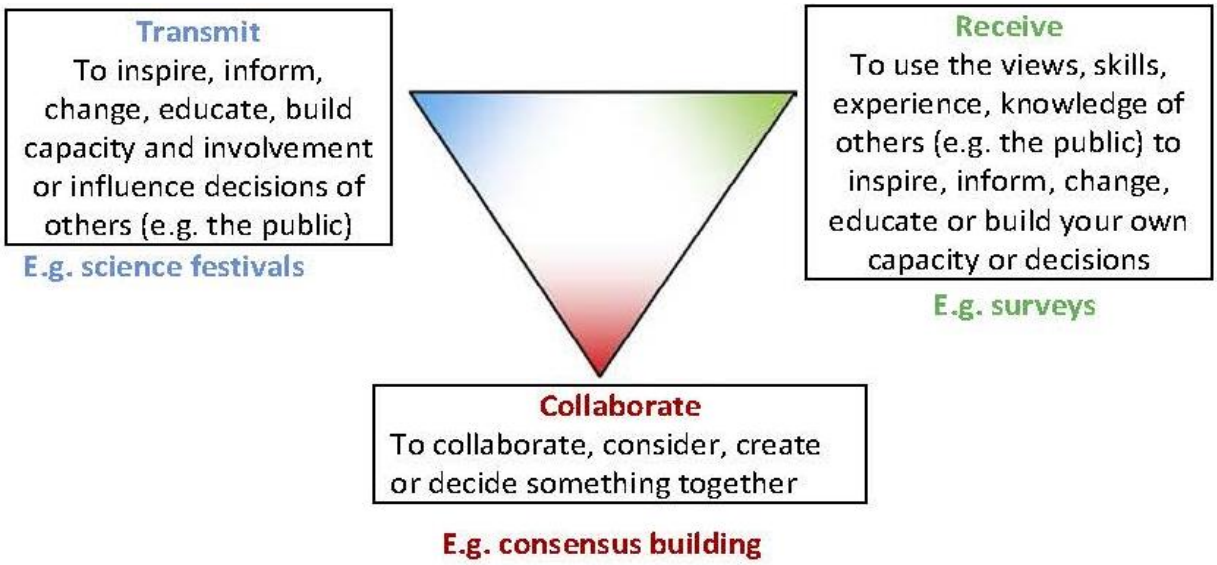
"Science is not finished until it is communicated"

Mark Walport

LEAD-IN

1. How do you understand the words of Mark Walport? Do you agree with this medical scientist and the Government Chief Scientific Adviser in the UK? Why? Why not?

2. Various categorizations have been developed to distinguish between different types of public engagement which can usefully be applied to science communication. One approach has recently been developed by the Science for All Expert Group in the UK. The approach consists of the 'Public Engagement Triangle'. This 'triangle tool' identifies three key communication approaches: Transmit, Receive and Collaborate. Why do you consider them to be important for successful scientific communication?



WORD STUDY

3. Study the following definitions and memorize the terms.

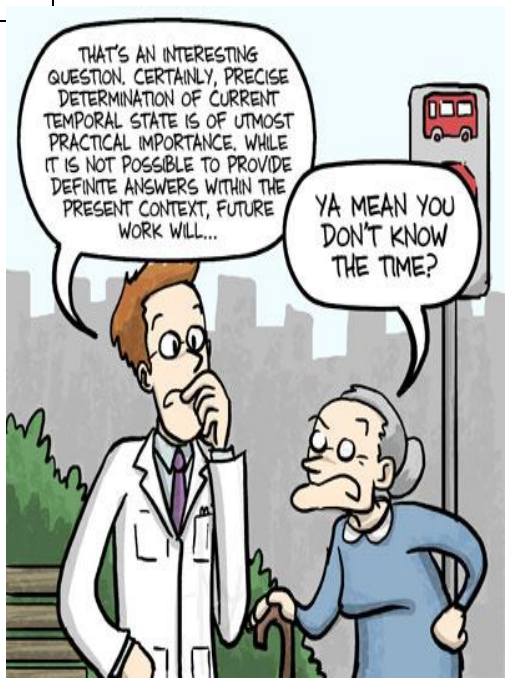
aware (adj)	Having knowledge or perception of a situation or fact: *He was aware that a problem existed.*
advent (n)	The fact of an event happening, an invention being made, or a person arriving: *Life was transformed by the advent of the Internet.*
pursuit (n)	The act of trying to achieve a plan, activity, or situation, usually over a long period of time: *the pursuit of happiness*
spreadsheet (n)	An electronic document in which data is arranged in the rows and columns of a grid and can be manipulated and used in calculations.
subscription (n)	An arrangement to receive something, typically a publication, regularly by paying in advance: *The journal is available on subscription.*
hasten (v)	To make something happen sooner or more quickly: *The results of the survey have hastened the process.*
verify (v)	Make sure or demonstrate that something is true, accurate, or justified: *His conclusions have been verified by later experiments.*
hypothesis (n)	An idea or explanation for something that is based on known facts but has not yet been proved: *Several hypotheses for global warming have been suggested.*
complexity (n)	The state or quality of being intricate or complicated: *an issue of great complexity.*
accuracy (n)	The fact of being exact or correct: *We can predict changes with a surprising degree of accuracy.*
remarkable (adj)	Worthy of attention; striking: The 20th century was remarkable for its inventions.
disruptive (adj)	Causing trouble and therefore stopping something from continuing as usual; troublesome: *His influence was disruptive.*
ripe for smth	Developed to a suitable condition for something to happen: *The company is ripe for takeover.*
casualty (n)	A person or thing that suffers as a result of something else happening; victim; sufferer.

4. Match the words in A with their synonyms in B and opposites in C.

A	B	C
1. reduce	a) at the present time	a) emerge
2. improve	b) low-class	b) enlarge
3. low-quality	c) lower	c) high grade
4. ripe	d) make better	d) ineffective
5. efficient	e) mature, ready	e) long before
6. currently	f) obtain	f) lose
7. gain	g) productive	g) of no prestige
8. lose	h) reputable	h) unwilling
9. prestigious	i) vanish	i) win, get
10. disappear	j) waste	j) worsen

5. Match the words with Russian equivalents.

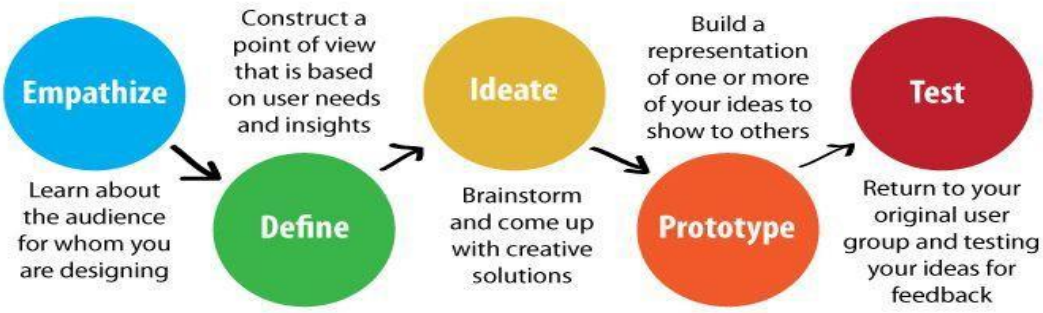
A	B
1. validity	a) достоверность
2. ethics	b) заимствование
3. manuscript	c) неточность
4. borrowing, adoption	d) ответственность
5. original source	e) первоисточник
6. co-author	f) рукопись
7. inaccuracy	g) соавтор
8. quotation	h) утверждение
9. responsibility	i) цитата
10. statement	j) этика



6. Match the words to make word combinations.

A	B	C
1. considerable	a) tools	a) стремление к знаниям
2. costly	b) the prospects	b) значительное преимущество
3. electronic	c) the costs	c) научная публикация
4. journal	d) support	d) подписка на научный журнал
5. pursuit of	e) subscription	e) электронные сервисы
6. raw	f) publishing	f) нуждаться в поддержке
7. require	g) process	g) необработанные данные
8. ruin	h) knowledge	h) полная трансформация
9. scientific	i) data	i) разрушить все шансы на успех
10. sea	j) change	j) затратный процесс
11. slash	k) benefit	k) сократить расходы

7. Look at the picture below. What do you see there? Comment it. How is it connected with scientific communication? In what situations can the ideas be useful?



READING AND SPEAKING

Pre-reading task

8. Discuss in pairs.

What kinds of scientific communication can you remember?

What types of scientific communication have you taken part in?

Are you aware of the rules of scientific intercourse?

9. Text. **Data beyond Words - the Future of Scientific Communication**

By Paul R.

For hundreds of years, formal scientific communication could be characterised as the publication and exchange of papers consisting of words, mathematical equations, and pictures. The knowledge gained by the readers of such papers consists solely of what can be absorbed through their eyes and into their minds. Although the advent of computers, the internet, and the world wide web has radically changed how scientific papers are catalogued and distributed, the role of scientific papers in the pursuit of knowledge has hardly changed at all - they are still collections of words, mathematical equations, and pictures.

While a modern scientific paper would still be recognisable as such to a 17th century scientist, we have reaped considerable benefit from electronic representation and presentation. Although the internet makes it possible to exchange other kinds of content - movies, sounds, spreadsheets, databases - generally, scientists have not taken much advantage of this. This is largely due to the conservative nature of scientific research and the peer-reviewed publishing process. In the next decade, this is all going to change. There are strong forces coming to bear on authors, publishers, and readers that will work together to change the face of scientific publishing:

- The move from paper to electronic form will be completed. The rising prices of scientific journals are causing libraries to cut down on subscriptions.
- The need to make hyperlinks work quickly and painlessly will hasten the move to micropayment systems that allow the reader to pay for access one paper at a time, rather than by journal subscription.
- The need for publishers to 'add value' to their online offerings in order to compete will cause them to make additional functionality available to their readers. Publishers are also competing with author's own websites in providing this additional functionality.
- Readers are increasingly making use of electronic tools, such as statistical analysis and computer algebra programs, in their own work. They will want access to scientists' raw data so they can verify the paper's conclusions for themselves, combine the data with that from other papers, or use the author's data to test their own hypotheses.
- Data sets will continue to grow in size and complexity. Much research attempts to model some aspect of the world. As the accuracy of these models increases, so does the amount of data with which the model is expected to agree.
- Publishers will see increasing demand to make their products more accessible to readers with disabilities. This will be driven by requirements such as Section 508 of USA's Rehabilitation Act and those of educational institutions for accessible versions of textbooks.

These forces will work together. Putting everything online will give more opportunities for hyperlinking. Micropayment systems will reduce the barriers to hyperlinking. The increase in data set size and complexity will make it more difficult for authors to self-publish and require the professional support that a publisher can provide.

For the reasons cited above, scientific papers will become richer by including data beyond the words, equations, and pictures of traditional papers.

Thus, expect a sea change in the way scientific research is created, published, and read in the coming decade. The move to online publishing and distribution contributed greatly to the productivity and economic boom of the 1990s. We have every reason to expect the increasing richness of scientific communication to have an equal or greater effect in the next ten years.

10. **Give definitions of the following words and word combinations.**

Advent, solely, in the pursuit of, reap considerable benefit, painlessly, bear, hasten, raw data, attempt, accessible, a sea change, contribute.

11. Mark if the following statements are true or false. Correct the false statements.

1. The role of scientific communication hasn't changed significantly for several centuries.
2. The invention of the Internet has revolutionized the nature of scientific research.
3. The one-time access to scientific information will not be a widespread form of work with scientific publications.
4. On-line scientific research will gain popularity.
5. All possible forms of enriching the contents of scientific texts will be implemented by the publishers.

11. Discussion.

Do you agree with the author's point of view? Why? Why not?

How do you see the future of scientific communication?

Do you think paper scientific journals will disappear?

Which scientific journals from the sphere of your scientific interests are the most appropriate / prestigious?

Can you generalize the requirements to the authors in such journals?

12. Render the following text into Russian.

The Horrifying Future of Scientific Communication

Technological change has a way of making fools out of experts and experts out of fools. One of the reasons that evaluating the future impact of new technologies is so difficult is that those with the greatest potential often start out looking - and acting - like junk. They can't initially do the job nearly as well as the technologies they end up replacing. They are written off as toys.

But a small number of these toy technologies have two remarkable qualities: (1) they are much cheaper or easier to use; and (2) they improve at a rate much faster than the competition. Over time, their performance is more than enough for even the most demanding uses, at which point the new technology dominates. Disruptive Innovation is the process of cheap, low-quality products ultimately displacing expensive, high-quality products, typically ruining the prospects of organizations caught on the losing side.

Examples of Disruptive Innovation are found throughout technical fields and can take the form of products (personal computer vs. smartphone), services (snail mail vs. email), ways of delivering goods and services (Blockbuster vs. Netflix), and standards (Flash vs. HTML5).

Disruptive Innovation is a process by which previously expensive products or service become radically cheaper or easier to use. Scientific communication is an extremely inefficient and costly process that in many ways appears ripe for disruption. Although Open

Access might seem to fit the bill, the more likely outcome is that existing publishers will simply adopt OA publishing practices.

Real disruptive innovation will slash the costs of creating and using scientific communication products and services. Pre-publication peer review and editorial boards will likely be the first of many casualties. In the process, scientific communication will become accessible to entirely new groups of authors and readers currently being shut out.

It goes without saying that this future scares the hell out of publishers. But it will no doubt scare the hell out of many scientists as well.

13. Render the following text into English.

Кодекс этики научных публикаций

Автор (или коллектив авторов) осознает, что несет первоначальную ответственность за новизну и достоверность результатов научного исследования, что предполагает соблюдение следующих принципов:

- Авторы статьи должны предоставлять достоверные результаты проведенных исследований. Заведомо ошибочные или сфальсифицированные утверждения неприемлемы.

- Авторы должны гарантировать, что результаты исследования, изложенные в предоставленной рукописи, полностью оригинальны. Заимствованные фрагменты или утверждения должны быть оформлены с обязательным указанием автора и первоисточника. Чрезмерные заимствования, а также плагиат в любых формах, включая неоформленные цитаты, перефразирование или присвоение прав на результаты чужих исследований, неэтичны и неприемлемы.

- Необходимо признавать вклад всех лиц, так или иначе повлиявших на ход исследования, в частности, в статье должны быть представлены ссылки на работы, которые имели значение при проведении исследования.

- Авторы не должны предоставлять в журнал рукопись, которая была отправлена в другой журнал и находится на рассмотрении, а также статью, уже опубликованную в другом журнале.

- Соавторами статьи должны быть указаны все лица, внесшие существенный вклад в проведение исследования. Среди соавторов недопустимо указывать лиц, не участвовавших в исследовании.

- Если автор обнаружит существенные ошибки или неточности в статье на этапе ее рассмотрения или после ее опубликования, он должен как можно скорее уведомить об этом редакцию журнала.

WATCHING VIDEO

Before You Watch

14. Discuss in pairs.

What is the most important in writing and publishing articles? Have you ever published an article? If yes, tell your groupmates about your experience.

While You Watch

15. Dr. Bruce Thompson shared his experience of publishing articles with scholars. While watching the video at http://www.youtube.com/watch?v=lO-c668Qecw answer the following questions:

1. What article can be easily published?
2. Where can the rating form of a journal be found?
3. What's the key to good writing?
4. What's the best to revise?
5. Should articles be formal and objective?
6. What is blind review?
7. What is a main hallmark of good writing?
8. Why is it a good idea to select target journals before writing?
9. What does impact factor depend on?
10. Why can Cabell's Directory of Publishing Opportunities be useful for authors?
11. Is it reasonable to write query letters to editors?
12. Are the referees' opinions more important than editor's?
13. Should you strictly follow editor's recommendations?
14. Why should authors have citations in the result section of the article?
15. How can authors promote their publications?

After You Watch

16. **Practical Task.**

John A. Sharp and Keith Howard, in *The Management of a Student Research Project* (Gower, 2nd ed., 1996, p. 195), propose the following logical order for a research report:

- Introduction
- Survey of prior research
- Research design
- Results of the research
- Analysis
- Summary and conclusions

We suggest this structure appropriate for writing all kinds of scientific works. Take any article published in a journal with high impact factor and analyze its structure using the information given above.

Scripts for the video

Unit 1. Modern State of Science

Naomi Oreskes: Why we should trust scientists

https://www.ted.com/talks/naomi_oreskes_why_we_should_believe_in_science

Every day we face issues like climate change or the safety of vaccines where we have to answer questions whose answers rely heavily on scientific information. Scientists tell us that the world is warming. Scientists tell us that vaccines are safe. But how do we know if they are right? Why should we believe the science? The fact is, many of us actually don't believe the science. Public opinion polls consistently show that significant proportions of the American people don't believe the climate is warming due to human activities, don't think that there is evolution by natural selection, and aren't persuaded by the safety of vaccines.

So why should we believe the science? Well, scientists don't like talking about science as a matter of belief. In fact, they would contrast science with faith, and they would say belief is the domain of faith. And faith is a separate thing apart and distinct from science. Indeed they would say religion is based on faith or maybe the calculus of Pascal's wager. Blaise Pascal was a 17th-century mathematician who tried to bring scientific reasoning to the question of whether or not he should believe in God, and his wager went like this: Well, if God doesn't exist but I decide to believe in him nothing much is really lost. Maybe a few hours on Sunday. But if he does exist and I don't believe in him, then I'm in deep trouble. And so Pascal said, we'd better believe in God. Or as one of my college professors said, "He clutched for the handrail of faith." He made that leap of faith leaving science and rationalism behind.

Now the fact is though, for most of us, most scientific claims are a leap of faith. We can't really judge scientific claims for ourselves in most cases. And indeed this is actually true for most scientists as well outside of their own specialties. So if you think about it, a geologist can't tell you whether a vaccine is safe. Most chemists are not experts in evolutionary theory. A physicist cannot tell you, despite the claims of some of them, whether or not tobacco causes cancer. So, if even scientists themselves have to make a leap of faith outside their own fields, then why do they accept the claims of other scientists? Why do they believe each other's claims? And should we believe those claims?

So what I'd like to argue is yes, we should, but not for the reason that most of us think. Most of us were taught in school that the reason we should believe in science is because of the scientific method. We were taught that scientists follow a method and that this method guarantees the truth of their claims. The method that most of us were taught in school, we can call it the textbook method, is the hypothetical deductive method. According to the standard model, the textbook model, scientists develop hypotheses, they deduce the consequences of those hypotheses, and then they go out into the world and they say, "Okay,

well are those consequences true?" Can we observe them taking place in the natural world? And if they are true, then the scientists say, "Great, we know the hypothesis is correct."

So there are many famous examples in the history of science of scientists doing exactly this. One of the most famous examples comes from the work of Albert Einstein. When Einstein developed the theory of general relativity, one of the consequences of his theory was that space-time wasn't just an empty void but that it actually had a fabric. And that that fabric was bent in the presence of massive objects like the sun. So if this theory were true then it meant that light as it passed the sun should actually be bent around it. That was a pretty startling prediction and it took a few years before scientists were able to test it but they did test it in 1919, and lo and behold it turned out to be true. Starlight actually does bend as it travels around the sun. This was a huge confirmation of the theory. It was considered proof of the truth of this radical new idea, and it was written up in many newspapers around the globe.

Now, sometimes this theory or this model is referred to as the deductive-nomological model, mainly because academics like to make things complicated. But also because in the ideal case, it's about laws. So nomological means having to do with laws. And in the ideal case, the hypothesis isn't just an idea: ideally, it is a law of nature. Why does it matter that it is a law of nature? Because if it is a law, it can't be broken. If it's a law then it will always be true in all times and all places no matter what the circumstances are. And all of you know of at least one example of a famous law: Einstein's famous equation, E=MC2, which tells us what the relationship is between energy and mass. And that relationship is true no matter what.

Now, it turns out, though, that there are several problems with this model. The main problem is that it's wrong. It's just not true. (Laughter) And I'm going to talk about three reasons why it's wrong. So the first reason is a logical reason. It's the problem of the fallacy of affirming the consequent. So that's another fancy, academic way of saying that false theories can make true predictions. So just because the prediction comes true doesn't actually logically prove that the theory is correct. And I have a good example of that too, again from the history of science. This is a picture of the Ptolemaic universe with the Earth at the center of the universe and the sun and the planets going around it. The Ptolemaic model was believed by many very smart people for many centuries. Well, why? Well the answer is because it made lots of predictions that came true. The Ptolemaic system enabled astronomers to make accurate predictions of the motions of the planet, in fact more accurate predictions at first than the Copernican theory which we now would say is true. So that's one problem with the textbook model. A second problem is a practical problem, and it's the problem of auxiliary hypotheses. Auxiliary hypotheses are assumptions that scientists are making that they may or may not even be aware that they're making. So an important example of this comes from the Copernican model, which ultimately replaced the Ptolemaic

system. So when Nicolaus Copernicus said, actually the Earth is not the center of the universe, the sun is the center of the solar system, the Earth moves around the sun. Scientists said, well okay, Nicolaus, if that's true we ought to be able to detect the motion of the Earth around the sun. And so this slide here illustrates a concept known as stellar parallax. And astronomers said, if the Earth is moving and we look at a prominent star, let's say, Sirius -- well I know I'm in Manhattan so you guys can't see the stars, but imagine you're out in the country, imagine you chose that rural life — and we look at a star in December, we see that star against the backdrop of distant stars. If we now make the same observation six months later when the Earth has moved to this position in June, we look at that same star and we see it against a different backdrop. That difference, that angular difference, is the stellar parallax. So this is a prediction that the Copernican model makes. Astronomers looked for the stellar parallax and they found nothing, nothing at all. And many people argued that this proved that the Copernican model was false.

So what happened? Well, in hindsight we can say that astronomers were making two auxiliary hypotheses, both of which we would now say were incorrect. The first was an assumption about the size of the Earth's orbit. Astronomers were assuming that the Earth's orbit was large relative to the distance to the stars. Today we would draw the picture more like this, this comes from NASA, and you see the Earth's orbit is actually quite small. In fact, it's actually much smaller even than shown here. The stellar parallax therefore, is very small and actually very hard to detect.

And that leads to the second reason why the prediction didn't work, because scientists were also assuming that the telescopes they had were sensitive enough to detect the parallax. And that turned out not to be true. It wasn't until the 19th century that scientists were able to detect the stellar parallax.

So, there's a third problem as well. The third problem is simply a factual problem, that a lot of science doesn't fit the textbook model. A lot of science isn't deductive at all, it's actually inductive. And by that we mean that scientists don't necessarily start with theories and hypotheses, often they just start with observations of stuff going on in the world. And the most famous example of that is one of the most famous scientists who ever lived, Charles Darwin. When Darwin went out as a young man on the voyage of the Beagle, he didn't have a hypothesis, he didn't have a theory. He just knew that he wanted to have a career as a scientist and he started to collect data. Mainly he knew that he hated medicine because the sight of blood made him sick so he had to have an alternative career path. So he started collecting data. And he collected many things, including his famous finches. When he collected these finches, he threw them in a bag and he had no idea what they meant. Many years later back in London, Darwin looked at his data again and began to develop an explanation, and that explanation was the theory of natural selection.

Besides inductive science, scientists also often participate in modeling. One of the things scientists want to do in life is to explain the causes of things. And how do we do that? Well, one way you can do it is to build a model that tests an idea.

So this is a picture of Henry Cadell, who was a Scottish geologist in the 19th century. You can tell he's Scottish because he's wearing a deerstalker cap and Wellington boots. And Cadell wanted to answer the question, how are mountains formed? And one of the things he had observed is that if you look at mountains like the Appalachians, you often find that the rocks in them are folded, and they're folded in a particular way, which suggested to him that they were actually being compressed from the side. And this idea would later play a major role in discussions of continental drift. So he built this model, this crazy contraption with levers and wood, and here's his wheelbarrow, buckets, a big sledgehammer. I don't know why he's got the Wellington boots. Maybe it's going to rain. And he created this physical model in order to demonstrate that you could, in fact, create patterns in rocks, or at least, in this case, in mud, that looked a lot like mountains if you compressed them from the side. So it was an argument about the cause of mountains.

Nowadays, most scientists prefer to work inside, so they don't build physical models so much as to make computer simulations. But a computer simulation is a kind of a model. It's a model that's made with mathematics, and like the physical models of the 19th century, it's very important for thinking about causes. So one of the big questions to do with climate change, we have tremendous amounts of evidence that the Earth is warming up. This slide here, the black line shows the measurements that scientists have taken for the last 150 years showing that the Earth's temperature has steadily increased, and you can see in particular that in the last 50 years there's been this dramatic increase of nearly one degree centigrade, or almost two degrees Fahrenheit.

So what, though, is driving that change? How can we know what's causing the observed warming? Well, scientists can model it using a computer simulation. So this diagram illustrates a computer simulation that has looked at all the different factors that we know can influence the Earth's climate, so sulfate particles from air pollution, volcanic dust from volcanic eruptions, changes in solar radiation, and, of course, greenhouse gases. And they asked the question, what set of variables put into a model will reproduce what we actually see in real life? So here is the real life in black. Here's the model in this light gray, and the answer is a model that includes, it's the answer E on that SAT, all of the above. The only way you can reproduce the observed temperature measurements is with all of these things put together, including greenhouse gases, and in particular you can see that the increase in greenhouse gases tracks this very dramatic increase in temperature over the last 50 years. And so this is why climate scientists say it's not just that we know that climate change is happening, we know that greenhouse gases are a major part of the reason why.

So now because there all these different things that scientists do, the philosopher Paul Feyerabend famously said, "The only principle in science that doesn't inhibit progress is: anything goes." Now this quotation has often been taken out of context, because Feyerabend was not actually saying that in science anything goes. What he was saying was, actually the full quotation is, "If you press me to say what is the method of science, I would have to say: anything goes." What he was trying to say is that scientists do a lot of different things. Scientists are creative.

But then this pushes the question back: If scientists don't use a single method, then how do they decide what's right and what's wrong? And who judges? And the answer is, scientists judge, and they judge by judging evidence. Scientists collect evidence in many different ways, but however they collect it, they have to subject it to scrutiny. And this led the sociologist Robert Merton to focus on this question of how scientists scrutinize data and evidence, and he said they do it in a way he called "organized skepticism." And by that he meant it's organized because they do it collectively, they do it as a group, and skepticism, because they do it from a position of distrust. That is to say, the burden of proof is on the person with a novel claim. And in this sense, science is intrinsically conservative. It's quite hard to persuade the scientific community to say, "Yes, we know something, this is true." So despite the popularity of the concept of paradigm shifts, what we find is that actually, really major changes in scientific thinking are relatively rare in the history of science.

So finally that brings us to one more idea: If scientists judge evidence collectively, this has led historians to focus on the question of consensus, and to say that at the end of the day, what science is, what scientific knowledge is, is the consensus of the scientific experts who through this process of organized scrutiny, collective scrutiny, have judged the evidence and come to a conclusion about it, either yea or nay.

So we can think of scientific knowledge as a consensus of experts. We can also think of science as being a kind of a jury, except it's a very special kind of jury. It's not a jury of your peers, it's a jury of geeks. It's a jury of men and women with Ph.D.s, and unlike a conventional jury, which has only two choices, guilty or not guilty, the scientific jury actually has a number of choices. Scientists can say yes, something's true. Scientists can say no, it's false. Or, they can say, well it might be true but we need to work more and collect more evidence. Or, they can say it might be true, but we don't know how to answer the question and we're going to put it aside and maybe we'll come back to it later. That's what scientists call "intractable."

But this leads us to one final problem: If science is what scientists say it is, then isn't that just an appeal to authority? And weren't we all taught in school that the appeal to authority is a logical fallacy? Well, here's the paradox of modern science, the paradox of the conclusion I think historians and philosophers and sociologists have come to, that actually science is the appeal to authority, but it's not the authority of the individual, no matter how

smart that individual is, like Plato or Socrates or Einstein. It's the authority of the collective community. You can think of it is a kind of wisdom of the crowd, but a very special kind of crowd. Science does appeal to authority, but it's not based on any individual, no matter how smart that individual may be. It's based on the collective wisdom, the collective knowledge, the collective work, of all of the scientists who have worked on a particular problem. Scientists have a kind of culture of collective distrust, this "show me" culture, illustrated by this nice woman here showing her colleagues her evidence. Of course, these people don't really look like scientists, because they're much too happy.

Okay, so that brings me to my final point. Most of us get up in the morning. Most of us trust our cars. Well, see, now I'm thinking, I'm in Manhattan, this is a bad analogy, but most Americans who don't live in Manhattan get up in the morning and get in their cars and turn on that ignition, and their cars work, and they work incredibly well. The modern automobile hardly ever breaks down.

So why is that? Why do cars work so well? It's not because of the genius of Henry Ford or Karl Benz or even Elon Musk. It's because the modern automobile is the product of more than 100 years of work by hundreds and thousands and tens of thousands of people. The modern automobile is the product of the collected work and wisdom and experience of every man and woman who has ever worked on a car, and the reliability of the technology is the result of that accumulated effort. We benefit not just from the genius of Benz and Ford and Musk but from the collective intelligence and hard work of all of the people who have worked on the modern car. And the same is true of science, only science is even older. Our basis for trust in science is actually the same as our basis in trust in technology, and the same as our basis for trust in anything, namely, experience.

But it shouldn't be blind trust any more than we would have blind trust in anything. Our trust in science, like science itself, should be based on evidence, and that means that scientists have to become better communicators. They have to explain to us not just what they know but how they know it, and it means that we have to become better listeners.

Thank you very much.

Harald Haas: A breakthrough new kind of wireless Internet

https://www.ted.com/talks/harald_haas_a_breakthrough_new_kind_of_wireless_internet

I would like to demonstrate for the first time in public that it is possible to transmit a video from a standard off-the-shelf LED lamp to a solar cell with a laptop acting as a receiver. There is no Wi-Fi involved, it's just light. And you may wonder, what's the point? And the point is this: There will be a massive extension of the Internet to close the digital divide, and also to allow for what we call "The Internet of Things" -- tens of billions of devices connected to the Internet.

In my view, such an extension of the Internet can only work if it's almost energy-neutral. This means we need to use existing infrastructure as much as possible. And this is where the solar cell and the LED come in.

I demonstrated for the first time, at TED in 2011, Li-Fi, or Light Fidelity. Li-Fi uses off-the-shelf LEDs to transmit data incredibly fast, and also in a safe and secure manner. Data is transported by the light, encoded in subtle changes of the brightness. If we look around, we have many LEDs around us, so there's a rich infrastructure of Li-Fi transmitters around us. But so far, we have been using special devices -- small photo detectors, to receive the information encoded in the data. I wanted to find a way to also use existing infrastructure to receive data from our Li-Fi lights. And this is why I have been looking into solar cells and solar panels.

A solar cell absorbs light and converts it into electrical energy. This is why we can use a solar cell to charge our mobile phone. But now we need to remember that the data is encoded in subtle changes of the brightness of the LED, so if the incoming light fluctuates, so does the energy harvested from the solar cell. This means we have a principal mechanism in place to receive information from the light and by the solar cell, because the fluctuations of the energy harvested correspond to the data transmitted.

Of course the question is: can we receive very fast and subtle changes of the brightness, such as the ones transmitted by our LED lights? And the answer to that is yes, we can. We have shown in the lab that we can receive up to 50 megabytes per second from a standard, off-the-shelf solar cell. And this is faster than most broadband connections these days.

Now let me show you in practice. In this box is a standard, off-the-shelf LED lamp. This is a standard, off-the-shelf solar cell; it is connected to the laptop. And also we have an instrument here to visualize the energy we harvest from the solar cell. And this instrument shows something at the moment. This is because the solar cell already harvests light from the ambient light.

Now what I would like to do first is switch on the light, and I'll simply, only switch on the light, for a moment, and what you'll notice is that the instrument jumps to the right. So the solar cell, for a moment, is harvesting energy from this artificial light source. If I turn it off, we see it drops. I turn it on ... So we harvest energy with the solar cell.

But next I would like to activate the streaming of the video. And I've done this by pressing this button. So now this LED lamp here is streaming a video by changing the brightness of the LED in a very subtle way, and in a way that you can't recognize with your eye, because the changes are too fast to recognize. But in order to prove the point, I can block the light of the solar cell. So first you notice the energy harvesting drops and the video stops as well. If I remove the blockage, the video will restart.

And I can repeat that. So we stop the transmission of the video and energy harvesting stops as well. So that is to show that the solar cell acts as a receiver.

But now imagine that this LED lamp is a street light, and there's fog. And so I want to simulate fog, and that's why I brought a handkerchief with me.

And let me put the handkerchief over the solar cell. First you notice the energy harvested drops, as expected, but now the video still continues. This means, despite the blockage, there's sufficient light coming through the handkerchief to the solar cell, so that the solar cell is able to decode and stream that information, in this case, a high-definition video.

What's really important here is that a solar cell has become a receiver for high-speed wireless signals encoded in light, while it maintains its primary function as an energy-harvesting device. That's why it is possible to use existing solar cells on the roof of a hut to act as a broadband receiver from a laser station on a close by hill, or indeed, lamp post.

And It really doesn't matter where the beam hits the solar cell. And the same is true for translucent solar cells integrated into windows, solar cells integrated into street furniture, or indeed, solar cells integrated into these billions of devices that will form the Internet of Things. Because simply, we don't want to charge these devices regularly, or worse, replace the batteries every few months.

As I said to you, this is the first time I've shown this in public. It's very much a lab demonstration, a prototype. But my team and I are confident that we can take this to market within the next two to three years. And we hope we will be able to contribute to closing the digital divide, and also contribute to connecting all these billions of devices to the Internet. And all of this without causing a massive explosion of energy consumption -- because of the solar cells, quite the opposite.

Unit 2. Globalization and Science.

https://www.ted.com/talks/chrystia_freeland_the_rise_of_the_new_global_super_rich

Chrystia Freeland: The rise of the new global super-rich

So here's the most important economic fact of our time. We are living in an age of surging income inequality, particularly between those at the very top and everyone else. This shift is the most striking in the U.S. and in the U.K., but it's a global phenomenon. It's happening in communist China, in formerly communist Russia, it's happening in India, in my own native Canada. We're even seeing it in cozy social democracies like Sweden, Finland and Germany.

Let me give you a few numbers to place what's happening. In the 1970s, the One Percent accounted for about 10 percent of the national income in the United States. Today, their share has more than doubled to above 20 percent. But what's even more striking is what's happening at the very tippy top of the income distribution. The 0.1 percent in the U.S.

today account for more than eight percent of the national income. They are where the One Percent was 30 years ago. Let me give you another number to put that in perspective, and this is a figure that was calculated in 2005 by Robert Reich, the Secretary of Labor in the Clinton administration. Reich took the wealth of two admittedly very rich men, Bill Gates and Warren Buffett, and he found that it was equivalent to the wealth of the bottom 40 percent of the U.S. population, 120 million people. Now, as it happens, Warren Buffett is not only himself a plutocrat, he is one of the most astute observers of that phenomenon, and he has his own favorite number. Buffett likes to point out that in 1992, the combined wealth of the people on the Forbes 400 list -- and this is the list of the 400 richest Americans -- was 300 billion dollars. Just think about it. You didn't even need to be a billionaire to get on that list in 1992. Well, today, that figure has more than quintupled to 1.7 trillion, and I probably don't need to tell you that we haven't seen anything similar happen to the middle class, whose wealth has stagnated if not actually decreased.

So we're living in the age of the global plutocracy, but we've been slow to notice it. One of the reasons, I think, is a sort of boiled frog phenomenon. Changes which are slow and gradual can be hard to notice even if their ultimate impact is quite dramatic. Think about what happened, after all, to the poor frog. But I think there's something else going on. Talking about income inequality, even if you're not on the Forbes 400 list, can make us feel uncomfortable. It feels less positive, less optimistic, to talk about how the pie is sliced than to think about how to make the pie bigger. And if you do happen to be on the Forbes 400 list, talking about income distribution, and inevitably its cousin, income redistribution, can be downright threatening.

So we're living in the age of surging income inequality, especially at the top. What's driving it, and what can we do about it?

One set of causes is political: lower taxes, deregulation, particularly of financial services, privatization, weaker legal protections for trade unions, all of these have contributed to more and more income going to the very, very top.

A lot of these political factors can be broadly lumped under the category of "crony capitalism," political changes that benefit a group of well-connected insiders but don't actually do much good for the rest of us. In practice, getting rid of crony capitalism is incredibly difficult. Think of all the years reformers of various stripes have tried to get rid of corruption in Russia, for instance, or how hard it is to re-regulate the banks even after the most profound financial crisis since the Great Depression, or even how difficult it is to get the big multinational companies, including those whose motto might be "don't do evil," to pay taxes at a rate even approaching that paid by the middle class. But while getting rid of crony capitalism in practice is really, really hard, at least intellectually, it's an easy problem. After all, no one is actually in favor of crony capitalism. Indeed, this is one of those rare

issues that unites the left and the right. A critique of crony capitalism is as central to the Tea Party as it is to Occupy Wall Street.

But if crony capitalism is, intellectually at least, the easy part of the problem, things get trickier when you look at the economic drivers of surging income inequality. In and of themselves, these aren't too mysterious. Globalization and the technology revolution, the twin economic transformations which are changing our lives and transforming the global economy, are also powering the rise of the super-rich. Just think about it. For the first time in history, if you are an energetic entrepreneur with a brilliant new idea or a fantastic new product, you have almost instant, almost frictionless access to a global market of more than a billion people. As a result, if you are very, very smart and very, very lucky, you can get very, very rich very, very quickly. The latest poster boy for this phenomenon is David Karp. The 26-year-old founder of Tumblr recently sold his company to Yahoo for 1.1 billion dollars. Think about that for a minute: 1.1 billion dollars, 26 years old. It's easiest to see how the technology revolution and globalization are creating this sort of superstar effect in highly visible fields, like sports and entertainment. We can all watch how a fantastic athlete or a fantastic performer can today leverage his or her skills across the global economy as never before. But today, that superstar effect is happening across the entire economy. We have superstar technologists. We have superstar bankers. We have superstar lawyers and superstar architects. There are superstar cooks and superstar farmers. There are even, and this is my personal favorite example, superstar dentists, the most dazzling exemplar of whom is Bernard Touati, the Frenchman who ministers to the smiles of fellow superstars like Russian oligarch Roman Abramovich or European-born American fashion designer Diane von Furstenberg.

But while it's pretty easy to see how globalization and the technology revolution are creating this global plutocracy, what's a lot harder is figuring out what to think about it. And that's because, in contrast with crony capitalism, so much of what globalization and the technology revolution have done is highly positive. Let's start with technology. I love the Internet. I love my mobile devices. I love the fact that they mean that whoever chooses to will be able to watch this talk far beyond this auditorium. I'm even more of a fan of globalization. This is the transformation which has lifted hundreds of millions of the world's poorest people out of poverty and into the middle class, and if you happen to live in the rich part of the world, it's made many new products affordable -- who do you think built your iPhone? — and things that we've relied on for a long time much cheaper. Think of your dishwasher or your t-shirt.

So what's not to like? Well, a few things. One of the things that worries me is how easily what you might call meritocratic plutocracy can become crony plutocracy. Imagine you're a brilliant entrepreneur who has successfully sold that idea or that product to the global billions and become a billionaire in the process. It gets tempting at that point to use

your economic nous to manipulate the rules of the global political economy in your own favor. And that's no mere hypothetical example. Think about Amazon, Apple, Google, Starbucks. These are among the world's most admired, most beloved, most innovative companies. They also happen to be particularly adept at working the international tax system so as to lower their tax bill very, very significantly. And why stop at just playing the global political and economic system as it exists to your own maximum advantage? Once you have the tremendous economic power that we're seeing at the very, very top of the income distribution and the political power that inevitably entails, it becomes tempting as well to start trying to change the rules of the game in your own favor. Again, this is no mere hypothetical. It's what the Russian oligarchs did in creating the sale-of-the-century privatization of Russia's natural resources. It's one way of describing what happened with deregulation of the financial services in the U.S. and the U.K.

A second thing that worries me is how easily meritocratic plutocracy can become aristocracy. One way of describing the plutocrats is as alpha geeks, and they are people who are acutely aware of how important highly sophisticated analytical and quantitative skills are in today's economy. That's why they are spending unprecedented time and resources educating their own children. The middle class is spending more on schooling too, but in the global educational arms race that starts at nursery school and ends at Harvard, Stanford or MIT, the 99 percent is increasingly outgunned by the One Percent. The result is something that economists Alan Krueger and Miles Corak call the Great Gatsby Curve. As income inequality increases, social mobility decreases. The plutocracy may be a meritocracy, but increasingly you have to be born on the top rung of the ladder to even take part in that race.

The third thing, and this is what worries me the most, is the extent to which those same largely positive forces which are driving the rise of the global plutocracy also happen to be hollowing out the middle class in Western industrialized economies. Let's start with technology. Those same forces that are creating billionaires are also devouring many traditional middle-class jobs. When's the last time you used a travel agent? And in contrast with the industrial revolution, the titans of our new economy aren't creating that many new jobs. At its zenith, G.M. employed hundreds of thousands, Facebook fewer than 10,000. The same is true of globalization. For all that it is raising hundreds of millions of people out of poverty in the emerging markets, it's also outsourcing a lot of jobs from the developed Western economies. The terrifying reality is that there is no economic rule which automatically translates increased economic growth into widely shared prosperity. That's shown in what I consider to be the most scary economic statistic of our time. Since the late 1990s, increases in productivity have been decoupled from increases in wages and employment. That means that our countries are getting richer, our companies are getting more efficient, but we're not creating more jobs and we're not paying people, as a whole, more.

One scary conclusion you could draw from all of this is to worry about structural unemployment. What worries me more is a different nightmare scenario. After all, in a totally free labor market, we could find jobs for pretty much everyone. The dystopia that worries me is a universe in which a few geniuses invent Google and its ilk and the rest of us are employed giving them massages.

So when I get really depressed about all of this, I comfort myself in thinking about the Industrial Revolution. After all, for all its grim, satanic mills, it worked out pretty well, didn't it? After all, all of us here are richer, healthier, taller -- well, there are a few exceptions — and live longer than our ancestors in the early 19th century. But it's important to remember that before we learned how to share the fruits of the Industrial Revolution with the broad swathes of society, we had to go through two depressions, the Great Depression of the 1930s, the Long Depression of the 1870s, two world wars, communist revolutions in Russia and in China, and an era of tremendous social and political upheaval in the West. We also, not coincidentally, went through an era of tremendous social and political inventions. We created the modern welfare state. We created public education. We created public health care. We created public pensions. We created unions.

Today, we are living through an era of economic transformation comparable in its scale and its scope to the Industrial Revolution. To be sure that this new economy benefits us all and not just the plutocrats, we need to embark on an era of comparably ambitious social and political change. We need a new New Deal.

Unit 3. Labour Market and Researchers in Global Science and Engineering

https://www.ted.com/talks/wingham_rowan_a_new_kind_of_job_market

Wingham Rowan: A new kind of job market

This is about a hidden corner of the labor market. It's the world of people who need to work ultra-flexibly, if they're to work at all. So think, for instance, of someone who has a recurring but unpredictable medical condition, or somebody who's caring for a dependent adult, or a parent with complex child care needs. Their availability for work can be such that it's, "A few hours today. Maybe I can work tomorrow, but I don't know if and when yet." And it's extraordinarily difficult for these people to find the work that they so often need very badly. Which is a tragedy because there are employers who can use pools of very flexible local people booked completely ad hoc around when that person wants to work.

Imagine that you run a cafe. It's mid-morning, the place is filling up. You're going to have a busy lunchtime rush. If you could get two extra workers for 90 minutes to start in an hour's time, you'd do it, but they'd have to be reliable, inducted in how your cafe works. They'd have to be available at very competitive rates. They'd have to be bookable in about the next minute. In reality, no recruitment agency wants to handle that sort of business, so you are going to muddle by, understaffed. And it's not just caterers, it's hoteliers, it's retailers,

it's anyone who provides services to the public or businesses. There's all sorts of organizations that can use these pools of very flexible people, possibly already once they've been inducted.

At this level of the labor market, what you need is a marketplace for spare hours. They do exist. Here's how they work. So in this example, a distribution company has said, we've got a rush order that we've got to get out of the warehouse tomorrow morning. Show us everyone who's available. It's found 31 workers. Everybody on this screen is genuinely available at those specific hours tomorrow. They're all contactable in time for this booking. They've all defined the terms on which they will accept bookings. And this booking is within all the parameters for each individual. And they would all be legally compliant by doing this booking. Of course, they're all trained to work in warehouses. You can select as many of them as you want. They're from multiple agencies. It's calculated the charge rate for each person for this specific booking. And it's monitoring their reliability. The people on the top row are the provenly reliable ones. They're likely to be more expensive. In an alternative view of this pool of local, very flexible people, here's a market research company, and it's inducted maybe 25 local people in how to do street interviewing. And they've got a new campaign. They want to run it next week. And they're looking at how many of the people they've inducted are available each hour next week. And they'll then decide when to do their street interviews.

But is there more that could be done for this corner of the labor market? Because right now there are so many people who need whatever economic opportunity they can get. Let's make it personal. Imagine that a young woman -- base of the economic pyramid, very little prospect of getting a job -- what economic activity could she theoretically engage in? Well, she might be willing to work odd hours in a call center, in a reception area, in a mail room. She may be interested in providing local services to her community: babysitting, local deliveries, pet care. She may have possessions that she would like to trade at times she doesn't need them. So she might have a sofa bed in her front room that she would like to let out. She might have a bike, a video games console she only uses occasionally. And you're probably thinking -- because you're all very web-aware -- yes, and we're in the era of collaborative consumption, so she can go online and do all this. She can go to Airbnb to list her sofa bed, she can go to TaskRabbit.com and say, "I want to do local deliveries," and so on.

These are good sites, but I believe we can go a step further. And the key to that is a philosophy that we call modern markets for all. Markets have changed beyond recognition in the last 20 years, but only for organizations at the top of the economy. If you're a Wall Street trader, you now take it for granted that you sell your financial assets in a system of markets that identifies the most profitable opportunities for you in real time, executes on that in microseconds within the boundaries you've set. It analyzes supply and demand and

pricing and tells you where your next wave of opportunities are coming from. It manages counterparty risk in incredibly sophisticated ways. It's all extremely low overhead. What have we gained at the bottom of the economy in terms of markets in the last 20 years? Basically classified adverts with a search facility.

So why do we have this disparity between these incredibly sophisticated markets at the top of the economy that are increasingly sucking more and more activity and resource out of the main economy into this rarefied level of trading, and what the rest of us have? A modern market is more than a website; it's a web of interoperable marketplaces, back office mechanisms, regulatory regimes, settlement mechanisms, liquidity sources and so on. And when a Wall Street trader comes into work in the morning, she does not write a listing for every financial derivative she wants to sell today and then post that listing on multiple websites and wait for potential buyers to get in touch and start negotiating the terms on which she might trade.

In the early days of this modern markets technology, the financial institutions worked out how they could leverage their buying power, their back office processes, their relationships, their networks to shape these new markets that would create all this new activity. They asked governments for supporting regulatory regimes, and in a lot of cases they got it.

But throughout the economy, there are facilities that could likewise leverage a new generation of markets for the benefit of all of us. And those facilities -- I'm talking about things like the mechanisms that prove our identity, the licensing authorities that know what each of us is allowed to do legally at any given time, the processes by which we resolve disputes through official channels. These mechanisms, these facilities are not in the gift of Craigslist or Gumtree or Yahoo, they're controlled by the state. And the policymakers who sit on top of them are, I suggest, simply not thinking about how those facilities could be used to underpin a whole new era of markets.

Like everyone else, those policymakers are taking it for granted that modern markets are the preserve of organizations powerful enough to create them for themselves. Suppose we stopped taking that for granted. Suppose tomorrow morning the prime minister of Britain or the president of the U.S., or the leader of any other developed nation, woke up and said, "I'm never going to be able to create all the jobs I need in the current climate. I have got to focus on whatever economic opportunity I can get to my citizens. And for that they have to be able to access state-of-the-art markets. How do I make that happen?"

And I think I can see a few eyes rolling. Politicians in a big, complex, sophisticated I.T. project? Oh, that's going to be a disaster waiting to happen. Not necessarily. There is a precedent for technology-enabled service that has been initiated by politicians in multiple countries and has been hugely successful: national lotteries.

Let's take Britain as an example. Our government didn't design the national lottery, it didn't fund the national lottery, it doesn't operate the national lottery. It simply passed the National Lottery Act and this is what followed. This act defines what a national lottery will look like. It specifies certain benefits that the state can uniquely bestow on the operators. And it puts some obligations on those operators. In terms of spreading gambling activity to the masses, this was an unqualified success.

But let's suppose that our aim is to bring new economic activity to the base of the pyramid. Could we use the same model? I believe we could. So imagine that policymakers outlined a facility. Let's call it national e-markets, NEMs for short. Think of it as a regulated public utility. So it's on a par with the water supply or the road network. And it's a series of markets for low-level trade that can be fulfilled by a person or a small company. And government has certain benefits it can uniquely bestow on these markets. It's about public spending going through these markets to buy public services at the local level. It's about interfacing these markets direct into the highest official channels in the land. It's about enshrining government's role as a publicist for these markets. It's about deregulating some sectors so that local people can enter them.

So, taxi journeys might be one example. And there are certain obligations that should go with those benefits to be placed on the operators, and the key one is, of course, that the operators pay for everything, including all the interfacing into the public sector. So imagine that the operators make their return by building a percentage markup into each transaction. Imagine that there's a concession period defined of maybe 15 years in which they can take all these benefits and run with them. And imagine that the consortia who bid to run it are told, whoever comes in at the lowest percentage markup on each transaction to fund the whole thing will get the deal.

So government then exits the frame. This is now in the hands of the consortium. Either they are going to unlock an awful lot of economic opportunity and make a percentage on all of it or it's all going to crash and burn, which is tough on their shareholders. It doesn't bother the taxpayer necessarily. And there would be no constraints on alternative markets. So this would just be one more choice among millions of Internet forums. But it could be very different, because having access to those state-backed facilities could incentivize this consortium to seriously invest in the service. Because they would have to get a lot of these small transactions going to start making their return.

So we're talking about sectors like home hair care, the hire of toys, farm work, hire of clothes even, meals delivered to your door, services for tourists, home care. This would be a world of very small trades, but very well-informed, because national e-markets will deliver data.

So this is a local person potentially deciding whether to enter the babysitting market. And they might be aware that they would have to fund vetting and training if they wanted

to go into that market. They'd have to do assessment interviews with local parents who wanted a pool of babysitters. Is it worth their while? Should they be looking at other sectors? Should they be moving to another part of the country where there's a shortage of babysitters? This kind of data can become routine. And this data can be used by investors. So if there's a problem with a shortage of babysitters in some parts of the country and the problem is nobody can afford the vetting and training, an investor can pay for it and the system will tithe back the enhanced earnings of the individuals for maybe the next two years.

This is a world of atomized capitalism. So it's small trades by small people, but it's very informed, safe, convenient, low-overhead and immediate. Some rough research suggests this could unlock around 100 million pounds' worth a day of new economic activity in a country the size of the U.K.

Does that sound improbable to you? That's what a lot of people said about turbo trading in financial exchanges 20 years ago. Do not underestimate the transformative power of truly modern markets.

Thank you.

https://www.ted.com/talks/andrew_mcafee_what_will_future_jobs_look_like

Andrew McAfee: What will future jobs look like?

The writer George Eliot cautioned us that, among all forms of mistake, prophesy is the most gratuitous. The person that we would all acknowledge as her 20th-century counterpart, Yogi Berra, agreed. He said, "It's tough to make predictions, especially about the future."

I'm going to ignore their cautions and make one very specific forecast. In the world that we are creating very quickly, we're going to see more and more things that look like science fiction, and fewer and fewer things that look like jobs. Our cars are very quickly going to start driving themselves, which means we're going to need fewer truck drivers. We're going to hook Siri up to Watson and use that to automate a lot of the work that's currently done by customer service reps and troubleshooters and diagnosers, and we're already taking R2D2, painting him orange, and putting him to work carrying shelves around warehouses, which means we need a lot fewer people to be walking up and down those aisles.

Now, for about 200 years, people have been saying exactly what I'm telling you -- the age of technological unemployment is at hand — starting with the Luddites smashing looms in Britain just about two centuries ago, and they have been wrong. Our economies in the developed world have coasted along on something pretty close to full employment.

Which brings up a critical question: Why is this time different, if it really is? The reason it's different is that, just in the past few years, our machines have started demonstrating skills they have never, ever had before: understanding, speaking, hearing,

seeing, answering, writing, and they're still acquiring new skills. For example, mobile humanoid robots are still incredibly primitive, but the research arm of the Defense Department just launched a competition to have them do things like this, and if the track record is any guide, this competition is going to be successful. So when I look around, I think the day is not too far off at all when we're going to have androids doing a lot of the work that we are doing right now. And we're creating a world where there is going to be more and more technology and fewer and fewer jobs. It's a world that Erik Brynjolfsson and I are calling "the new machine age."

The thing to keep in mind is that this is absolutely great news. This is the best economic news on the planet these days. Not that there's a lot of competition, right? This is the best economic news we have these days for two main reasons. The first is, technological progress is what allows us to continue this amazing recent run that we're on where output goes up over time, while at the same time, prices go down, and volume and quality just continue to explode. Now, some people look at this and talk about shallow materialism, but that's absolutely the wrong way to look at it. This is abundance, which is exactly what we want our economic system to provide. The second reason that the new machine age is such great news is that, once the androids start doing jobs, we don't have to do them anymore, and we get freed up from drudgery and toil.

Now, when I talk about this with my friends in Cambridge and Silicon Valley, they say, "Fantastic. No more drudgery, no more toil. This gives us the chance to imagine an entirely different kind of society, a society where the creators and the discoverers and the performers and the innovators come together with their patrons and their financiers to talk about issues, entertain, enlighten, provoke each other." It's a society really, that looks a lot like the TED Conference. And there's actually a huge amount of truth here. We are seeing an amazing flourishing taking place. In a world where it is just about as easy to generate an object as it is to print a document, we have amazing new possibilities. The people who used to be craftsmen and hobbyists are now makers, and they're responsible for massive amounts of innovation. And artists who were formerly constrained can now do things that were never, ever possible for them before. So this is a time of great flourishing, and the more I look around, the more convinced I become that this quote, from the physicist Freeman Dyson, is not hyperbole at all. This is just a plain statement of the facts. We are in the middle of an astonishing period.

["Technology is a gift of God. After the gift of life it is perhaps the greatest of God's gifts. It is the mother of civilizations, of arts and of sciences." — Freeman Dyson]

Which brings up another great question: What could possibly go wrong in this new machine age? Right? Great, hang up, flourish, go home. We're going to face two really thorny sets of challenges as we head deeper into the future that we're creating.

The first are economic, and they're really nicely summarized in an apocryphal story about a back-and-forth between Henry Ford II and Walter Reuther, who was the head of the auto workers union. They were touring one of the new modern factories, and Ford playfully turns to Reuther and says, "Hey Walter, how are you going to get these robots to pay union dues?" And Reuther shoots back, "Hey Henry, how are you going to get them to buy cars?"

Reuther's problem in that anecdote is that it is tough to offer your labor to an economy that's full of machines, and we see this very clearly in the statistics. If you look over the past couple decades at the returns to capital -- in other words, corporate profits -- we see them going up, and we see that they're now at an all-time high. If we look at the returns to labor, in other words total wages paid out in the economy, we see them at an all-time low and heading very quickly in the opposite direction.

So this is clearly bad news for Reuther. It looks like it might be great news for Ford, but it's actually not. If you want to sell huge volumes of somewhat expensive goods to people, you really want a large, stable, prosperous middle class. We have had one of those in America for just about the entire postwar period. But the middle class is clearly under huge threat right now. We all know a lot of the statistics, but just to repeat one of them, median income in America has actually gone down over the past 15 years, and we're in danger of getting trapped in some vicious cycle where inequality and polarization continue to go up over time.

The societal challenges that come along with that kind of inequality deserve some attention. There are a set of societal challenges that I'm actually not that worried about, and they're captured by images like this. This is not the kind of societal problem that I am concerned about. There is no shortage of dystopian visions about what happens when our machines become self-aware, and they decide to rise up and coordinate attacks against us. I'm going to start worrying about those the day my computer becomes aware of my printer.

So this is not the set of challenges we really need to worry about. To tell you the kinds of societal challenges that are going to come up in the new machine age, I want to tell a story about two stereotypical American workers. And to make them really stereotypical, let's make them both white guys. And the first one is a college-educated professional, creative type, manager, engineer, doctor, lawyer, that kind of worker. We're going to call him "Ted." He's at the top of the American middle class. His counterpart is not college-educated and works as a laborer, works as a clerk, does low-level white collar or blue collar work in the economy. We're going to call that guy "Bill."

And if you go back about 50 years, Bill and Ted were leading remarkably similar lives. For example, in 1960 they were both very likely to have full-time jobs, working at least 40 hours a week. But as the social researcher Charles Murray has documented, as we started to automate the economy, and 1960 is just about when computers started to be used by businesses, as we started to progressively inject technology and automation and digital

stuff into the economy, the fortunes of Bill and Ted diverged a lot. Over this time frame, Ted has continued to hold a full-time job. Bill hasn't. In many cases, Bill has left the economy entirely, and Ted very rarely has. Over time, Ted's marriage has stayed quite happy. Bill's hasn't. And Ted's kids have grown up in a two-parent home, while Bill's absolutely have not over time. Other ways that Bill is dropping out of society? He's decreased his voting in presidential elections, and he's started to go to prison a lot more often. So I cannot tell a happy story about these social trends, and they don't show any signs of reversing themselves. They're also true no matter which ethnic group or demographic group we look at, and they're actually getting so severe that they're in danger of overwhelming even the amazing progress we made with the Civil Rights Movement.

And what my friends in Silicon Valley and Cambridge are overlooking is that they're Ted. They're living these amazingly busy, productive lives, and they've got all the benefits to show from that, while Bill is leading a very different life. They're actually both proof of how right Voltaire was when he talked about the benefits of work, and the fact that it saves us from not one but three great evils.

["Work saves a man from three great evils: boredom, vice and need." — Voltaire]

So with these challenges, what do we do about them?

The economic playbook is surprisingly clear, surprisingly straightforward, in the short term especially. The robots are not going to take all of our jobs in the next year or two, so the classic Econ 101 playbook is going to work just fine: Encourage entrepreneurship, double down on infrastructure, and make sure we're turning out people from our educational system with the appropriate skills.

But over the longer term, if we are moving into an economy that's heavy on technology and light on labor, and we are, then we have to consider some more radical interventions, for example, something like a guaranteed minimum income. Now, that's probably making some folk in this room uncomfortable, because that idea is associated with the extreme left wing and with fairly radical schemes for redistributing wealth. I did a little bit of research on this notion, and it might calm some folk down to know that the idea of a net guaranteed minimum income has been championed by those frothing-at-the-mouth socialists Friedrich Hayek, Richard Nixon and Milton Friedman. And if you find yourself worried that something like a guaranteed income is going to stifle our drive to succeed and make us kind of complacent, you might be interested to know that social mobility, one of the things we really pride ourselves on in the United States, is now lower than it is in the northern European countries that have these very generous social safety nets. So the economic playbook is actually pretty straightforward.

The societal one is a lot more challenging. I don't know what the playbook is for getting Bill to engage and stay engaged throughout life.

I do know that education is a huge part of it. I witnessed this firsthand. I was a Montessori kid for the first few years of my education, and what that education taught me is that the world is an interesting place and my job is to go explore it. The school stopped in third grade, so then I entered the public school system, and it felt like I had been sent to the Gulag. With the benefit of hindsight, I now know the job was to prepare me for life as a clerk or a laborer, but at the time it felt like the job was to kind of bore me into some submission with what was going on around me. We have to do better than this. We cannot keep turning out Bills.

So we see some green shoots that things are getting better. We see technology deeply impacting education and engaging people, from our youngest learners up to our oldest ones. We see very prominent business voices telling us we need to rethink some of the things that we've been holding dear for a while. And we see very serious and sustained and data-driven efforts to understand how to intervene in some of the most troubled communities that we have.

So the green shoots are out there. I don't want to pretend for a minute that what we have is going to be enough. We're facing very tough challenges. To give just one example, there are about five million Americans who have been unemployed for at least six months. We're not going to fix things for them by sending them back to Montessori. And my biggest worry is that we're creating a world where we're going to have glittering technologies embedded in kind of a shabby society and supported by an economy that generates inequality instead of opportunity.

But I actually don't think that's what we're going to do. I think we're going to do something a lot better for one very straightforward reason: The facts are getting out there. The realities of this new machine age and the change in the economy are becoming more widely known. If we wanted to accelerate that process, we could do things like have our best economists and policymakers play "Jeopardy!" against Watson. We could send Congress on an autonomous car road trip. And if we do enough of these kinds of things, the awareness is going to sink in that things are going to be different. And then we're off to the races, because I don't believe for a second that we have forgotten how to solve tough challenges or that we have become too apathetic or hard-hearted to even try.

I started my talk with quotes from wordsmiths who were separated by an ocean and a century. Let me end it with words from politicians who were similarly distant.

Winston Churchill came to my home of MIT in 1949, and he said, "If we are to bring the broad masses of the people in every land to the table of abundance, it can only be by the tireless improvement of all of our means of technical production."

Abraham Lincoln realized there was one other ingredient. He said, "I am a firm believer in the people. If given the truth, they can be depended upon to meet any national crisis. The great point is to give them the plain facts."

So the optimistic note, great point that I want to leave you with is that the plain facts of the machine age are becoming clear, and I have every confidence that we're going to use them to chart a good course into the challenging, abundant economy that we're creating.

Thank you very much.

Unit 4. University Education in Russia and Abroad

https://www.youtube.com/watch?v=FuuBXIiaMnQ

World University Rankings 2015-2016 results. World's top 10 universities.

http://tedxtalks.ted.com/video/Higher-education-is-not-about-ge

Higher education is not about getting a job: Fred D'Agostino

https://www.youtube.com/watch?v=UF8uR6Z6KLc

Steve Jobs' 2005 Stanford Commencement Address

I am honored to be with you today at your commencement from one of the finest universities in the world. I never graduated from college. Truth be told, this is the closest I've ever gotten to a college graduation. Today I want to tell you three stories from my life. That's it. No big deal. Just three stories.

The first story is about connecting the dots.

I dropped out of Reed College after the first 6 months, but then stayed around as a drop-in for another 18 months or so before I really quit. So why did I drop out?

It started before I was born. My biological mother was a young, unwed college graduate student, and she decided to put me up for adoption. She felt very strongly that I should be adopted by college graduates, so everything was all set for me to be adopted at birth by a lawyer and his wife. Except that when I popped out they decided at the last minute that they really wanted a girl. So my parents, who were on a waiting list, got a call in the middle of the night asking: "We have an unexpected baby boy; do you want him?" They said: "Of course." My biological mother later found out that my mother had never graduated from college and that my father had never graduated from high school. She refused to sign the final adoption papers. She only relented a few months later when my parents promised that I would someday go to college.

And 17 years later I did go to college. But I naively chose a college that was almost as expensive as Stanford, and all of my working-class parents' savings were being spent on my college tuition. After six months, I couldn't see the value in it. I had no idea what I wanted to do with my life and no idea how college was going to help me figure it out. And here I was spending all of the money my parents had saved their entire life. So I decided to drop out and trust that it would all work out OK. It was pretty scary at the time, but looking back it was one of the best decisions I ever made. The minute I dropped out I could stop

taking the required classes that didn't interest me, and begin dropping in on the ones that looked interesting.

It wasn't all romantic. I didn't have a dorm room, so I slept on the floor in friends' rooms, I returned Coke bottles for the 5¢ deposits to buy food with, and I would walk the 7 miles across town every Sunday night to get one good meal a week at the Hare Krishna temple. I loved it. And much of what I stumbled into by following my curiosity and intuition turned out to be priceless later on. Let me give you one example:

Reed College at that time offered perhaps the best calligraphy instruction in the country. Throughout the campus every poster, every label on every drawer, was beautifully hand calligraphed. Because I had dropped out and didn't have to take the normal classes, I decided to take a calligraphy class to learn how to do this. I learned about serif and sans serif typefaces, about varying the amount of space between different letter combinations, about what makes great typography great. It was beautiful, historical, artistically subtle in a way that science can't capture, and I found it fascinating.

None of this had even a hope of any practical application in my life. But 10 years later, when we were designing the first Macintosh computer, it all came back to me. And we designed it all into the Mac. It was the first computer with beautiful typography. If I had never dropped in on that single course in college, the Mac would have never had multiple typefaces or proportionally spaced fonts. And since Windows just copied the Mac, it's likely that no personal computer would have them. If I had never dropped out, I would have never dropped in on this calligraphy class, and personal computers might not have the wonderful typography that they do. Of course it was impossible to connect the dots looking forward when I was in college. But it was very, very clear looking backward 10 years later.

Again, you can't connect the dots looking forward; you can only connect them looking backward. So you have to trust that the dots will somehow connect in your future. You have to trust in something — your gut, destiny, life, karma, whatever. This approach has never let me down, and it has made all the difference in my life.

My second story is about love and loss.

I was lucky — I found what I loved to do early in life. Woz and I started Apple in my parents' garage when I was 20. We worked hard, and in 10 years Apple had grown from just the two of us in a garage into a $2 billion company with over 4,000 employees. We had just released our finest creation — the Macintosh — a year earlier, and I had just turned 30. And then I got fired. How can you get fired from a company you started? Well, as Apple grew we hired someone who I thought was very talented to run the company with me, and for the first year or so things went well. But then our visions of the future began to diverge and eventually we had a falling out. When we did, our Board of Directors sided with him. So at 30 I was out. And very publicly out. What had been the focus of my entire adult life was gone, and it was devastating.

I really didn't know what to do for a few months. I felt that I had let the previous generation of entrepreneurs down — that I had dropped the baton as it was being passed to me. I met with David Packard and Bob Noyce and tried to apologize for screwing up so badly. I was a very public failure, and I even thought about running away from the valley. But something slowly began to dawn on me — I still loved what I did. The turn of events at Apple had not changed that one bit. I had been rejected, but I was still in love. And so I decided to start over.

I didn't see it then, but it turned out that getting fired from Apple was the best thing that could have ever happened to me. The heaviness of being successful was replaced by the lightness of being a beginner again, less sure about everything. It freed me to enter one of the most creative periods of my life.

During the next five years, I started a company named NeXT, another company named Pixar, and fell in love with an amazing woman who would become my wife. Pixar went on to create the world's first computer animated feature film, Toy Story, and is now the most successful animation studio in the world. In a remarkable turn of events, Apple bought NeXT, I returned to Apple, and the technology we developed at NeXT is at the heart of Apple's current renaissance. And Laurene and I have a wonderful family together.

I'm pretty sure none of this would have happened if I hadn't been fired from Apple. It was awful tasting medicine, but I guess the patient needed it. Sometimes life hits you in the head with a brick. Don't lose faith. I'm convinced that the only thing that kept me going was that I loved what I did. You've got to find what you love. And that is as true for your work as it is for your lovers. Your work is going to fill a large part of your life, and the only way to be truly satisfied is to do what you believe is great work. And the only way to do great work is to love what you do. If you haven't found it yet, keep looking. Don't settle. As with all matters of the heart, you'll know when you find it. And, like any great relationship, it just gets better and better as the years roll on. So keep looking until you find it. Don't settle.

My third story is about death.

When I was 17, I read a quote that went something like: "If you live each day as if it was your last, someday you'll most certainly be right." It made an impression on me, and since then, for the past 33 years, I have looked in the mirror every morning and asked myself: "If today were the last day of my life, would I want to do what I am about to do today?" And whenever the answer has been "No" for too many days in a row, I know I need to change something.

Remembering that I'll be dead soon is the most important tool I've ever encountered to help me make the big choices in life. Because almost everything — all external expectations, all pride, all fear of embarrassment or failure — these things just fall away in the face of death, leaving only what is truly important. Remembering that you are going to

die is the best way I know to avoid the trap of thinking you have something to lose. You are already naked. There is no reason not to follow your heart.

About a year ago I was diagnosed with cancer. I had a scan at 7:30 in the morning, and it clearly showed a tumor on my pancreas. I didn't even know what a pancreas was. The doctors told me this was almost certainly a type of cancer that is incurable, and that I should expect to live no longer than three to six months. My doctor advised me to go home and get my affairs in order, which is doctor's code for prepare to die. It means to try to tell your kids everything you thought you'd have the next 10 years to tell them in just a few months. It means to make sure everything is buttoned up so that it will be as easy as possible for your family. It means to say your goodbyes.

I lived with that diagnosis all day. Later that evening I had a biopsy, where they stuck an endoscope down my throat, through my stomach and into my intestines, put a needle into my pancreas and got a few cells from the tumor. I was sedated, but my wife, who was there, told me that when they viewed the cells under a microscope the doctors started crying because it turned out to be a very rare form of pancreatic cancer that is curable with surgery. I had the surgery and I'm fine now.

This was the closest I've been to facing death, and I hope it's the closest I get for a few more decades. Having lived through it, I can now say this to you with a bit more certainty than when death was a useful but purely intellectual concept:

No one wants to die. Even people who want to go to heaven don't want to die to get there. And yet death is the destination we all share. No one has ever escaped it. And that is as it should be, because Death is very likely the single best invention of Life. It is Life's change agent. It clears out the old to make way for the new. Right now the new is you, but someday not too long from now, you will gradually become the old and be cleared away. Sorry to be so dramatic, but it is quite true.

Your time is limited, so don't waste it living someone else's life. Don't be trapped by dogma — which is living with the results of other people's thinking. Don't let the noise of others' opinions drown out your own inner voice. And most important, have the courage to follow your heart and intuition. They somehow already know what you truly want to become. Everything else is secondary.

When I was young, there was an amazing publication called The Whole Earth Catalog, which was one of the bibles of my generation. It was created by a fellow named Stewart Brand not far from here in Menlo Park, and he brought it to life with his poetic touch. This was in the late 1960s, before personal computers and desktop publishing, so it was all made with typewriters, scissors and Polaroid cameras. It was sort of like Google in paperback form, 35 years before Google came along: It was idealistic, and overflowing with neat tools and great notions.

Stewart and his team put out several issues of The Whole Earth Catalog, and then when it had run its course, they put out a final issue. It was the mid-1970s, and I was your age. On the back cover of their final issue was a photograph of an early morning country road, the kind you might find yourself hitchhiking on if you were so adventurous. Beneath it were the words: "Stay Hungry. Stay Foolish." It was their farewell message as they signed off. Stay Hungry. Stay Foolish. And I have always wished that for myself. And now, as you graduate to begin anew, I wish that for you.

Stay Hungry. Stay Foolish.

Thank you all very much.

Unit 5. Education via Modern technology

https://www.ted.com/talks/daphne_koller_what_we_re_learning_from_online_education

Daphne Koller: What we're learning from online education

Like many of you, I'm one of the lucky people. I was born to a family where education was pervasive. I'm a third-generation PhD, a daughter of two academics. In my childhood, I played around in my father's university lab. So it was taken for granted that I attend some of the best universities, which in turn opened the door to a world of opportunity.

Unfortunately, most of the people in the world are not so lucky. In some parts of the world, for example, South Africa, education is just not readily accessible. In South Africa, the educational system was constructed in the days of apartheid for the white minority. And as a consequence, today there is just not enough spots for the many more people who want and deserve a high quality education. That scarcity led to a crisis in January of this year at the University of Johannesburg. There were a handful of positions left open from the standard admissions process, and the night before they were supposed to open that for registration, thousands of people lined up outside the gate in a line a mile long, hoping to be first in line to get one of those positions. When the gates opened, there was a stampede, and 20 people were injured and one woman died. She was a mother who gave her life trying to get her son a chance at a better life.

But even in parts of the world like the United States where education is available, it might not be within reach. There has been much discussed in the last few years about the rising cost of health care. What might not be quite as obvious to people is that during that same period the cost of higher education tuition has been increasing at almost twice the rate, for a total of 559 percent since 1985. This makes education unaffordable for many people.

Finally, even for those who do manage to get the higher education, the doors of opportunity might not open. Only a little over half of recent college graduates in the United States who get a higher education actually are working in jobs that require that education. This, of course, is not true for the students who graduate from the top institutions, but for many others, they do not get the value for their time and their effort.

Tom Friedman, in his recent New York Times article, captured, in the way that no one else could, the spirit behind our effort. He said the big breakthroughs are what happen when what is suddenly possible meets what is desperately necessary. I've talked about what's desperately necessary. Let's talk about what's suddenly possible.

What's suddenly possible was demonstrated by three big Stanford classes, each of which had an enrollment of 100,000 people or more. So to understand this, let's look at one of those classes, the Machine Learning class offered by my colleague and cofounder Andrew Ng. Andrew teaches one of the bigger Stanford classes. It's a Machine Learning class, and it has 400 people enrolled every time it's offered. When Andrew taught the Machine Learning class to the general public, it had 100,000 people registered. So to put that number in perspective, for Andrew to reach that same size audience by teaching a Stanford class, he would have to do that for 250 years. Of course, he'd get really bored.

So, having seen the impact of this, Andrew and I decided that we needed to really try and scale this up, to bring the best quality education to as many people as we could. So we formed Coursera, whose goal is to take the best courses from the best instructors at the best universities and provide it to everyone around the world for free. We currently have 43 courses on the platform from four universities across a range of disciplines, and let me show you a little bit of an overview of what that looks like.

(Video) Robert Ghrist: Welcome to Calculus.

Ezekiel Emanuel: Fifty million people are uninsured.

Scott Page: Models help us design more effective institutions and policies. We get unbelievable segregation.

Scott Klemmer: So Bush imagined that in the future, you'd wear a camera right in the center of your head.

Mitchell Duneier: Mills wants the student of sociology to develop the quality of mind ...

RG: Hanging cable takes on the form of a hyperbolic cosine.

Nick Parlante: For each pixel in the image, set the red to zero.

Paul Offit: ... Vaccine allowed us to eliminate polio virus.

Dan Jurafsky: Does Lufthansa serve breakfast and San Jose? Well, that sounds funny.

Daphne Koller: So this is which coin you pick, and this is the two tosses.

Andrew Ng: So in large-scale machine learning, we'd like to come up with computational ...

DK: It turns out, maybe not surprisingly, that students like getting the best content from the best universities for free. Since we opened the website in February, we now have 640,000 students from 190 countries. We have 1.5 million enrollments, 6 million quizzes in the 15 classes that have launched so far have been submitted, and 14 million videos have been viewed.

But it's not just about the numbers, it's also about the people. Whether it's Akash, who comes from a small town in India and would never have access in this case to a Stanford-quality course and would never be able to afford it. Or Jenny, who is a single mother of two and wants to hone her skills so that she can go back and complete her master's degree. Or Ryan, who can't go to school, because his immune deficient daughter can't be risked to have germs come into the house, so he couldn't leave the house. I'm really glad to say -- recently, we've been in correspondence with Ryan -- that this story had a happy ending. Baby Shannon -- you can see her on the left -- is doing much better now, and Ryan got a job by taking some of our courses.

So what made these courses so different? After all, online course content has been available for a while. What made it different was that this was real course experience. It started on a given day, and then the students would watch videos on a weekly basis and do homework assignments. And these would be real homework assignments for a real grade, with a real deadline. You can see the deadlines and the usage graph. These are the spikes showing that procrastination is global phenomenon.

At the end of the course, the students got a certificate. They could present that certificate to a prospective employer and get a better job, and we know many students who did. Some students took their certificate and presented this to an educational institution at which they were enrolled for actual college credit. So these students were really getting something meaningful for their investment of time and effort.

Let's talk a little bit about some of the components that go into these courses. The first component is that when you move away from the constraints of a physical classroom and design content explicitly for an online format, you can break away from, for example, the monolithic one-hour lecture. You can break up the material, for example, into these short, modular units of eight to 12 minutes, each of which represents a coherent concept. Students can traverse this material in different ways, depending on their background, their skills or their interests. So, for example, some students might benefit from a little bit of preparatory material that other students might already have. Other students might be interested in a particular enrichment topic that they want to pursue individually. So this format allows us to break away from the one-size-fits-all model of education, and allows students to follow a much more personalized curriculum.

Of course, we all know as educators that students don't learn by sitting and passively watching videos. Perhaps one of the biggest components of this effort is that we need to have students who practice with the material in order to really understand it. There's been a range of studies that demonstrate the importance of this. This one that appeared in Science last year, for example, demonstrates that even simple retrieval practice, where students are just supposed to repeat what they already learned gives considerably improved results on various achievement tests down the line than many other educational interventions.

We've tried to build in retrieval practice into the platform, as well as other forms of practice in many ways. For example, even our videos are not just videos. Every few minutes, the video pauses and the students get asked a question.

(Video) SP: ... These four things. Prospect theory, hyperbolic discounting, status quo bias, base rate bias. They're all well documented. So they're all well documented deviations from rational behavior.

DK: So here the video pauses, and the student types in the answer into the box and submits. Obviously they weren't paying attention.

So they get to try again, and this time they got it right. There's an optional explanation if they want. And now the video moves on to the next part of the lecture. This is a kind of simple question that I as an instructor might ask in class, but when I ask that kind of a question in class, 80 percent of the students are still scribbling the last thing I said, 15 percent are zoned out on Facebook, and then there's the smarty pants in the front row who blurts out the answer before anyone else has had a chance to think about it, and I as the instructor am terribly gratified that somebody actually knew the answer. And so the lecture moves on before, really, most of the students have even noticed that a question had been asked. Here, every single student has to engage with the material.

And of course these simple retrieval questions are not the end of the story. One needs to build in much more meaningful practice questions, and one also needs to provide the students with feedback on those questions. Now, how do you grade the work of 100,000 students if you do not have 10,000 TAs? The answer is, you need to use technology to do it for you. Now, fortunately, technology has come a long way, and we can now grade a range of interesting types of homework. In addition to multiple choice and the kinds of short answer questions that you saw in the video, we can also grade math, mathematical expressions as well as mathematical derivations. We can grade models, whether it's financial models in a business class or physical models in a science or engineering class and we can grade some pretty sophisticated programming assignments.

Let me show you one that's actually pretty simple but fairly visual. This is from Stanford's Computer Science 101 class, and the students are supposed to color-correct that blurry red image. They're typing their program into the browser, and you can see they didn't get it quite right, Lady Liberty is still seasick. And so, the student tries again, and now they got it right, and they're told that, and they can move on to the next assignment. This ability to interact actively with the material and be told when you're right or wrong is really essential to student learning.

Now, of course we cannot yet grade the range of work that one needs for all courses. Specifically, what's lacking is the kind of critical thinking work that is so essential in such disciplines as the humanities, the social sciences, business and others. So we tried to

convince, for example, some of our humanities faculty that multiple choice was not such a bad strategy. That didn't go over really well.

So we had to come up with a different solution. And the solution we ended up using is peer grading. It turns out that previous studies show, like this one by Saddler and Good, that peer grading is a surprisingly effective strategy for providing reproducible grades. It was tried only in small classes, but there it showed, for example, that these student-assigned grades on the y-axis are actually very well correlated with the teacher-assigned grade on the x-axis. What's even more surprising is that self-grades, where the students grade their own work critically -- so long as you incentivize them properly so they can't give themselves a perfect score -- are actually even better correlated with the teacher grades. And so this is an effective strategy that can be used for grading at scale, and is also a useful learning strategy for the students, because they actually learn from the experience. So we now have the largest peer-grading pipeline ever devised, where tens of thousands of students are grading each other's work, and quite successfully, I have to say.

But this is not just about students sitting alone in their living room working through problems. Around each one of our courses, a community of students had formed, a global community of people around a shared intellectual endeavor. What you see here is a self-generated map from students in our Princeton Sociology 101 course, where they have put themselves on a world map, and you can really see the global reach of this kind of effort.

Students collaborated in these courses in a variety of different ways. First of all, there was a question and answer forum, where students would pose questions, and other students would answer those questions. And the really amazing thing is, because there were so many students, it means that even if a student posed a question at 3 o'clock in the morning, somewhere around the world, there would be somebody who was awake and working on the same problem. And so, in many of our courses, the median response time for a question on the question and answer forum was 22 minutes. Which is not a level of service I have ever offered to my Stanford students.

And you can see from the student testimonials that students actually find that because of this large online community, they got to interact with each other in many ways that were deeper than they did in the context of the physical classroom. Students also self-assembled, without any kind of intervention from us, into small study groups. Some of these were physical study groups along geographical constraints and met on a weekly basis to work through problem sets. This is the San Francisco study group, but there were ones all over the world. Others were virtual study groups, sometimes along language lines or along cultural lines, and on the bottom left there, you see our multicultural universal study group where people explicitly wanted to connect with people from other cultures.

There are some tremendous opportunities to be had from this kind of framework. The first is that it has the potential of giving us a completely unprecedented look into

understanding human learning. Because the data that we can collect here is unique. You can collect every click, every homework submission, every forum post from tens of thousands of students. So you can turn the study of human learning from the hypothesis-driven mode to the data-driven mode, a transformation that, for example, has revolutionized biology. You can use these data to understand fundamental questions like, what are good learning strategies that are effective versus ones that are not? And in the context of particular courses, you can ask questions like, what are some of the misconceptions that are more common and how do we help students fix them?

So here's an example of that, also from Andrew's Machine Learning class. This is a distribution of wrong answers to one of Andrew's assignments. The answers happen to be pairs of numbers, so you can draw them on this two-dimensional plot. Each of the little crosses that you see is a different wrong answer. The big cross at the top left is where 2,000 students gave the exact same wrong answer. Now, if two students in a class of 100 give the same wrong answer, you would never notice. But when 2,000 students give the same wrong answer, it's kind of hard to miss. So Andrew and his students went in, looked at some of those assignments, understood the root cause of the misconception, and then they produced a targeted error message that would be provided to every student whose answer fell into that bucket, which means that students who made that same mistake would now get personalized feedback telling them how to fix their misconception much more effectively.

So this personalization is something that one can then build by having the virtue of large numbers. Personalization is perhaps one of the biggest opportunities here as well, because it provides us with the potential of solving a 30-year-old problem. Educational researcher Benjamin Bloom, in 1984, posed what's called the 2 sigma problem, which he observed by studying three populations. The first is the population that studied in a lecture-based classroom. The second is a population of students that studied using a standard lecture-based classroom, but with a mastery-based approach, so the students couldn't move on to the next topic before demonstrating mastery of the previous one. And finally, there was a population of students that were taught in a one-on-one instruction using a tutor. The mastery-based population was a full standard deviation, or sigma, in achievement scores better than the standard lecture-based class, and the individual tutoring gives you 2 sigma improvement in performance.

To understand what that means, let's look at the lecture-based classroom, and let's pick the median performance as a threshold. So in a lecture-based class, half the students are above that level and half are below. In the individual tutoring instruction, 98 percent of the students are going to be above that threshold. Imagine if we could teach so that 98 percent of our students would be above average. Hence, the 2 sigma problem.

Because we cannot afford, as a society, to provide every student with an individual human tutor. But maybe we can afford to provide each student with a computer or a

smartphone. So the question is, how can we use technology to push from the left side of the graph, from the blue curve, to the right side with the green curve? Mastery is easy to achieve using a computer, because a computer doesn't get tired of showing you the same video five times. And it doesn't even get tired of grading the same work multiple times, we've seen that in many of the examples that I've shown you. And even personalization is something that we're starting to see the beginnings of, whether it's via the personalized trajectory through the curriculum or some of the personalized feedback that we've shown you. So the goal here is to try and push, and see how far we can get towards the green curve.

So, if this is so great, are universities now obsolete? Well, Mark Twain certainly thought so. He said that, "College is a place where a professor's lecture notes go straight to the students' lecture notes, without passing through the brains of either."

I beg to differ with Mark Twain, though. I think what he was complaining about is not universities but rather the lecture-based format that so many universities spend so much time on. So let's go back even further, to Plutarch, who said that, "The mind is not a vessel that needs filling, but wood that needs igniting." And maybe we should spend less time at universities filling our students' minds with content by lecturing at them, and more time igniting their creativity, their imagination and their problem-solving skills by actually talking with them.

So how do we do that? We do that by doing active learning in the classroom. So there's been many studies, including this one, that show that if you use active learning, interacting with your students in the classroom, performance improves on every single metric -- on attendance, on engagement and on learning as measured by a standardized test. You can see, for example, that the achievement score almost doubles in this particular experiment. So maybe this is how we should spend our time at universities.

So to summarize, if we could offer a top quality education to everyone around the world for free, what would that do? Three things. First it would establish education as a fundamental human right, where anyone around the world with the ability and the motivation could get the skills that they need to make a better life for themselves, their families and their communities.

Second, it would enable lifelong learning. It's a shame that for so many people, learning stops when we finish high school or when we finish college. By having this amazing content be available, we would be able to learn something new every time we wanted, whether it's just to expand our minds or it's to change our lives.

And finally, this would enable a wave of innovation, because amazing talent can be found anywhere. Maybe the next Albert Einstein or the next Steve Jobs is living somewhere in a remote village in Africa. And if we could offer that person an education, they would be able to come up with the next big idea and make the world a better place for all of us.

Thank you very much.

Unit 6. Scientific Communication

Bruce Thompson: Writing for Publication

http://www.youtube.com/watch?v=lO-c668Qecw

I don't think I've ever told anyone this before; I'll share a little secret in my academic background. I published my first article when I was an undergraduate student , and I published a book chapter when I was a masters degree student. So, I've been at this a long time, and it is, I think, a very critical aspect of graduate life. And obviously, I'm preaching to the choir in saying the business of publishing is a very critical ingredient in graduate work, and ultimately, for those of you who go on into the academy for employment after you graduate, in keeping your job and getting raises and things like that.

I really think the single most critical ingredient in you getting articles published is you submitting manuscripts that are well written. I'm convinced that no matter how life changing, how earth shaking, what you have to say is, if you write the article poorly, the article is not well written, I think you will have a very difficult time getting the article published. Or, conversely, I'm convinced that you can probably get just about anything published if the article is well written. It may not be in the best journal if the work is not particularly scholarly or makes a real contribution, but I think you can find a home for pretty much all of your work if the work is well written.

Recently, an editor of a journal took all of the files of the journal and did a study of what things predicted the success of manuscripts submitted to that journal, for the history of that journal, which was a relatively young journal, about ten or twelve years old. The largest predictor of the success of manuscripts being accepted for publication was writing quality. Every review form I've ever seen for any journal, each journal has its own reviewer rating form, and, of course, the bulk of the review is actually open ended comments, but every journal has rating criteria. They vary fairly widely across journals. By the way, one good thing for you to do when you are submitting to a journal, you can often find the rating form on the web for that journal, and it's not a bad idea to go check that out and see what they are going to be looking at. But I've never seen a rating form without writing as one of the criteria. This editor I was referring to found that manuscripts on a 1-5 scale that were rated 3 or lower, with lower being not good, were 15 times more likely to be rejected than manuscripts rated higher in writing quality. Of all the things they looked at that predicted acceptance versus rejection that was the single most important thing. Now, I'll mention a few other ones, but clearly, writing quality is very important.

The key to good writing is revision. There's a saying, "few people write well, many people revise well." I've published a lot. This has been critical to my success. I can't emphasize enough how important it is to revise your work many times before you submit the work. First impressions count in your social life. They count also in your professional

life when you are submitting manuscripts. Don't think, "gosh, I'll get something on paper and maybe it won't be my best work, but the editor will tell me how to fix it." To some extent, maybe the editor will, but the editor also may just tell you, "this is not fixable" when the manuscript could enjoy a happier story if, in fact, the manuscript was better written. One thing I find very useful with respect to revision is I like to work on a manuscript, write the manuscript, and then I often will put the manuscript aside for days or maybe a couple of weeks because when you are working on something you are passionate, you're engaged, you're focused, you're connected with that work. You will lose sight of what was said in the article because you will remember the process of putting your ideas on paper and you'll remember what you wanted to say, and that will interfere with you reading what you have said. You'll be thinking what you meant rather than what you actually said. So, you'll see things you completely missed that you will otherwise not see, you'll see those things if you put the work aside for a bit and come back to the work.

I will also tell you that probably there is no limit to the potential improvement in a manuscript. You can revise and revise and revise infinitely, many times, probably finding something each time that you could have made better, maybe only a word or a sentence.

Another thing I will say about writing is people in academic disciplines sometimes think that their writing needs to be very formal, objective, and sterile. I will tell you that that is a very naïve idea. You need to develop your own voice, your own tone, that is unique to you, and your personality needs to come through in the work that you do, maybe not bled all over the page in every sentence, but there should be places where some of your passion, some of your humor, some of your cleverness, whatever your personality may be, comes out. Most journals use blind review where the reviewers don't know the author and the author doesn't know the reviewers, but partly because people will know my voice, they know a Bruce Thompson article whenever they see it. Of course, one clue is that I always cite myself shamelessly, they see here are 15 citations to Thompson.

One thing that people say about my writing, and about my teaching, is "he is so clear. He is often wrong, but always clear." I think that is one of the major hallmarks of good writing and academic scholarship. I'm a big believer in short, active sentences, with the noun first, then the verb, active voice. I hate pronouns, especially "it".

[Select Target Journals before Writing] I strongly recommend that you select the journals, plural, that will be your target places for a given research project or writing project before you start writing. There are many reasons for this. First, it's possible that the work you're doing will not fit with a journal. There may not be a journal that is a suitable outlet, that's focused on what you're doing. You could do a study or write an article that may be a great article but maybe there's not a journal that that piece belongs to. Or, at the other extreme, there may be a lot of journals that would love to have that work, that fits clearly within the scope of the journals.

Prioritize. There are three journals I think this will fit in, or there are 5, and have a rank ordering of them and think about them. I'm going to go to this journal first, and if that's not successful I'll go to this journal second and so forth. The kind of things you want to think about, once you say that these journals are all fits, the kind of issues you want to think about in selecting the journal are acceptance rates. Some journals are particularly difficult to get published in, other journals accept a larger percentage of manuscripts. You have to make a decision about that.

Many academic journals are rated. They get an academic impact factor by a service that looks at journals and journal articles and who is citing the journals, who is citing particular articles. Top-tier journals will have impact factors. I will tell you that impact factors are somewhat discipline specific, like the medical journals have much higher impact factors than the education journals, for example. So, you can't really compare impact factors across disciplines. That probably won't be an issue for you because you are probably going to be working in your own discipline only, but if you happen to be comparing impact factors across disciplines, you'll want to remember that they can't be compared very readily apples to apples. Also, you might want to think of things related to impact, like how many people get the journal, how many libraries are subscribed, how many individuals are subscribed to the journal, those kind of considerations. Different journals may have different tones a little bit. You want to write in the tone of the journal that you want to submit your manuscript to. Don't assume that will be the same for every journal. The tone may vary some at different journals, and make sure that you check that out before you get into writing.

There's a good resource called Cabell's Directory of Publishing Opportunities. He has an online service I believe you can subscribe to, or there may be some free access to it on the web. Just google it, you'll find the website. He tells you things like where do you send the manuscript. Do you send paper copies, how many? Do you send them electronically? Who do you send this stuff to? What's the rejection rate? What's the turnaround time? Author guidelines. Do not only assume you only need to know ,for example, APA style for social scientists. Each journal may have its own and often will have its own author guidelines that say certain things that are not part of the style guide that you really need to pay attention to. There's no point in submitting a manuscript where the editor has said that if you don't have x, I'm not going to accept your manuscript. All you're doing is sending in a manuscript that doesn't have x, so you can get a rejection letter to prove to yourself the editor meant it. What's the point of that? The editors are busy and why put them through the screening of you manuscript to find that you haven't even met the basic criteria specified within the author guidelines. Look for the author guidelines. Pay attention to them.

Remember, I mentioned an author that did a study of the rejected and accepted manuscripts. He found in that study, manuscripts with 3 or more style errors in the references were 8 times more likely to be rejected than the other manuscripts. That is not a causal

statement. It may mean that people who do bad work, write poorly and make a lot of style errors. But, still, you are sending a message to the editor and the referees that you can't be bothered with the style stuff. So, learn the style in your discipline. Some people like to write query letters to the editor or email the editor or call the editor and say, "I have a manuscript about whatever. Would you be interested in this manuscript?" If the manuscript is clearly not within the scope of the journal's mission, you ought to know that without having to do a query. If the work fits within the scope of the journal, as the editor, all I can say reasonably to you is, "send me your manuscript," because I don't want to lose a potentially magnificent piece of work, and I can't really make this judgment without the manuscript. So, there's no value added from doing a query in the context of if you know the manuscript is within the scope of the journal. Believe the editor.

I want to make clear to you that what you want to pay attention to when you get an action letter from the editor is what the editor says, not what the reviewers say. This process of getting published is not a voting process. The referees' input is only advisory to the editor. It's my [the editor] name on the masthead, it's my responsibility to make that decision. Listen to what the editor says to do in the revision. By the way, a lot of people when they first started this stuff think, "well, the editor said I can revise, but they probably just say that to everybody." No, that is not right. The editor will not ask you or allow you to do a revision if they do not believe that there is a reasonable possibility that your manuscript, through revision, might be publishable. Now, in some cases you might end up making more than one round of revisions, but once the editor makes a decision, at whatever point the editor makes this decision, that the manuscript is never going to be revised successfully, the editor will cut you off. Now, almost always, they will give you blinded copies of the referees' comments, and they will give you their own letter. If the editor says fix these 5 things and the referees have a lot of things they want changed that the editor doesn't mention, the editor is telling you, "don't change those things, unless you want to maybe." Don't think you have to make everybody happy, but pay attention to what the editor says, not to what the referees say.

Another thing when you are doing revisions, take every point the editor said need to be revised, list it, number it. [directed to editor] "Number one, you wanted this, I wrote two new paragraphs in the middle of page 10. You wanted this, I added 3 citations on that." Say exactly what they wanted and say exactly what you did and exactly where it is. In some cases I will even submit a revision with an extra copy where I've put paper clips on areas of the manuscript that I've changed and highlight so they can see exactly where the changes are, and I'll put the number of the revision. "This is revision request number 3," in big read letters. Make it very clear what you are doing and what you've done has been done. Now, you do not have to do everything an editor asks you to do. If the editor is asking for stuff you think is wrong or will make things incorrect, don't do them because if you are right that

they're wrong that will not be in the journal's interest, the editor's interest, or your interest. The literature is archival. You don't want to publish something that's wrong in some respect that will be there forever. Be respectful but be direct and make your case for why you didn't do [what the editor asked].

By the way, the key thing in the article is that you're not making inferential leaps. One way I say this is if you justify everything explicitly, there ought to be a lot of the word 'because' or some synonym. Justify everything, including… I'm a quantitative researcher…including the analyses you do and have citations in the results section. Don't just say I did this analysis or that analysis. Have citations that explain or justify those analytical choices. There probably shouldn't be too many things that you just refuse to do [that the editor asked for]. Or if there is something basically wrong, it may be that you need to submit to another journal rather than resubmitting the manuscript.

I'll say here that the only thing the editor will lie about is turnaround times. In my experience, typically the journals will tell you their turnaround times, "if you submit, we'll let you know the decision in 2 months" or whatever. I usually roughly double or maybe a little more, 2 and half times what they say. I usually wait considerably passed the published time before I start contacting the editor about what happened to my manuscript, what's going on. You do want to follow up at some point when that time has passed because manuscripts do get lost. Things happen. You don't want to wait 5 years and then write the editor. [Editor] "Oh, gosh, that got misfiled. I didn't realize it. Sorry." So, follow up, but wait a while passed the announced time, and have a lot longer than what they say will be the time as your expectation.

If your article is accepted, you will be given some kind of proof copy, sometimes called a galley copy, and there will be a copy editor's queries, like "hey I noticed your references don't exactly match, in one place this is Jones, A. and over here it seems to be Jones, R., what's the story?" or there is a missing reference or the copy editors will suggest wording changes. When you get the proof copy, you're not supposed to make any changes except to deal with copy editing issues. You can't say, "gosh, I want to rewrite that paragraph. I could have written it better." Sometimes they will let you do that, but they may well charge you money for that. Their expectation is that they don't want you to make those changes. One consideration is, if you change what was accepted through the review mechanism, then you are putting stuff in that manuscript that the editor and referees didn't have any chance to look at, and there are some real issues with that.

And one last thing I'll mention here, a lot of students think, "ok, my article has been published and now I'll just sit back and wait for the congratulatory emails or when I go to the conference people will doubtlessly be buying me cocktails." You need to promote your work once it's published. Don't just publish it. Even the world's premier experts can't keep up with all of the literature and know all of the research that's being done. It means you

can’t assume that when you write your article that the earth will move, the ground will shake. You need to do things to make your work be read and recognized. Send a pdf file, send a paper copy. Who do you send it to? The people you think are the movers and shakers in the discipline, the people that you cited. Hey, people like to be cited. In a lot of universities, when you go up for tenure, they don’t just look at how many articles you have or sometimes pay much attention at all to how many articles you have. They look at how many citations you have because that’s trackable. You can go into google scholar or you can go onto the library webpage and find out how many times this article has been cited, by whom, and people pay attention to that. People do like to be cited, and they are legitimately interested in that area if you cited them in your references, and they may well read your work and they may well cite your work.

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