THE INEVITABLE TRANSITION FROM SCHOLASTICISM TO A GAMIFICATION

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Abstract: *Scholastic method of teaching is part of the history of education. It becomes evermore unadequate in the fast-changing World and fades away. Gaming is the most common way of transferring skills, knowledge and qualification from the older generation to the younger. Throughout history it has been used for evermore demanding tasks and eventually (rather sooner than later) it all came to using games for educating managers and decision makers.*

This article is intended as a "Lecture on the LECTURE and what's next." In its original presentation, the article contains a significant amount of audio & video (and suggests use of multimedia), which is not possible to reflect in the outdated text format of this book. Therefore, the presented written material is rather a short illustrated history of the leading educational paradigms from the time of the first universities until now, supplemented by the opinion of the authors on some of the trends for the future.

WRITE!

In the Middle Ages, the institution that preserved education in Europe was mainly the Church, and in particular the monasteries, which were generally distanced (including in a geographical sense) from the main centers of population.

The only approach to knowledge retention known at that time was the (literal) hand-writing of a book. This activity was carried out by specially trained teams of monks in the large monasteries. And despite the advent of new technologies for papermaking and bookbinding, it took a monk working in the scriptorium years to produce a handwritten, illustrated, and bound book. In FIG. 1 is an excellently recreated workplace, equipped for copying and copying.

FIG. 1: Portrait of Jean Mielo in his scriptorium, author Jean Le Tavernier [1, pp. 216-217]

Due to the nature of their production, the books were very expensive - they took five, ten or more man-years of highly intellectual work to produce one book (for comparison, this is an amount of 200,000 -300,000 BGN in Bulgaria today). In general, the possession of several books was comparable to a royal fortune, and quite logically the first libraries were royal property.

The economic progress of cities in Europe in the Middle Ages was complemented by the intellectual revival in the arts, natural sciences and philosophy. Monasteries were no longer the only significant cultural and educational center, and the emerging economic relations provoke the need for educational institutions in the cities. Thus, quite logically, the new secular public schools appeared, which would soon be called universities.

The first universities encountered a problem from the very beginning: How to reproduce knowledge relatively faster and relatively cheaper than the hitherto known method?

Teaching technology was formed, now called the "scholastic method of teaching" (scholasticism, scholasticism), which dominated academic teaching in medieval universities in Europe from about 1100 to about 1500. Scholasticism began as a continuation of the schools in Christian monasteries, gradually changing some elements in it to reflect the emerging needs [2].

Thus, scholastic schools have two main forms of teaching. The first is the so-called "lectio", the teacher reads from a text, while during this time the learners write down literally what they hear on the sheet, which are then bound in special personalized volumes. Under no circumstances is it allowed to ask questions - students sit and write in complete silence without any "distractions".

The second form of teaching is the so-called "disputatio", used in two forms - "quaestio" and "quadliberal". The quaestio was conducted with the students presenting a list of questions in advance, which, after being approved by the teacher and he has time to prepare answers, are answered. Quadliberal was much rarer without previously submitted and approved questions. In both cases, the teacher responded by imposing his authority by quoting texts from existing books.

In his painting "University Class" (Fig. 2) Laurentius de Voltolina reflects the most important moments and moods of the scholastic method of teaching. Some important moments in the picture:

- the lecturer dictates from an expensive volume or book.
- he is above all a repeater of the knowledge written before him, and at best is a systematizer of knowledge, if he is the author of the book.

- some of the learners listen and write (first rows).
- other learners are late and may distract those present, others "wander", talk, are asleep (maybe coming straight from the “disco place”).

FIG. 2: "University Class", Laurentius de Voltolina (1350s).

In short - the then scholastic lecture has all the typical characteristics of a "modern" lecture. The command to the students is "Write!". It is completely justified, and scholasticism is the right solution for learning in the existing technological conditions. The production of copies of books takes place simultaneously with the teaching, and the producers of the books are the most interested - those who after years and decades will use the copies made as the only source of knowledge as a priest, teacher, or doctor in the village, without easy access to Knowledge and News.

READ!

The first cracks of the scholastic method appeared with the invention of a goldsmith of noble origin Johannes Gutenberg. The invention of the printing press around 1440 marks the introduction of the book in the industrial era. The book was no longer a unique source of information in Europe, written and copied by hand. We

can already talk about publishing a book as a company that requires capital for investment and a distribution market. The cost of producing each individual issue of a book (within ever-increasing circulations) was falling sharply. Which in turn allows for the expansion of the distribution market. In short, thanks to the printing press, book editions were becoming more, more accessible and cheaper.

FIG. 3: Portrait of Johannes Gensfleisch zur Laden zum Gutenberg, taken after his death

A typical printing press is shown in Figure 4. In the foreground on the right, a worker removes the printed page from the press and another inks a template. Behind them, the composers arrange pages for printing. Workers on the left are in the process of printing the next page. Behind them, the editor controls the print quality. Two things stand out - the presence of an organized flow production process and the number of already printed copies. The technology of the printing press was improved, and it became possible to print illustrations, helping to make the content even more informative (see Fig. 5).

FIG. 4: 16th century printing press in Germany [3]

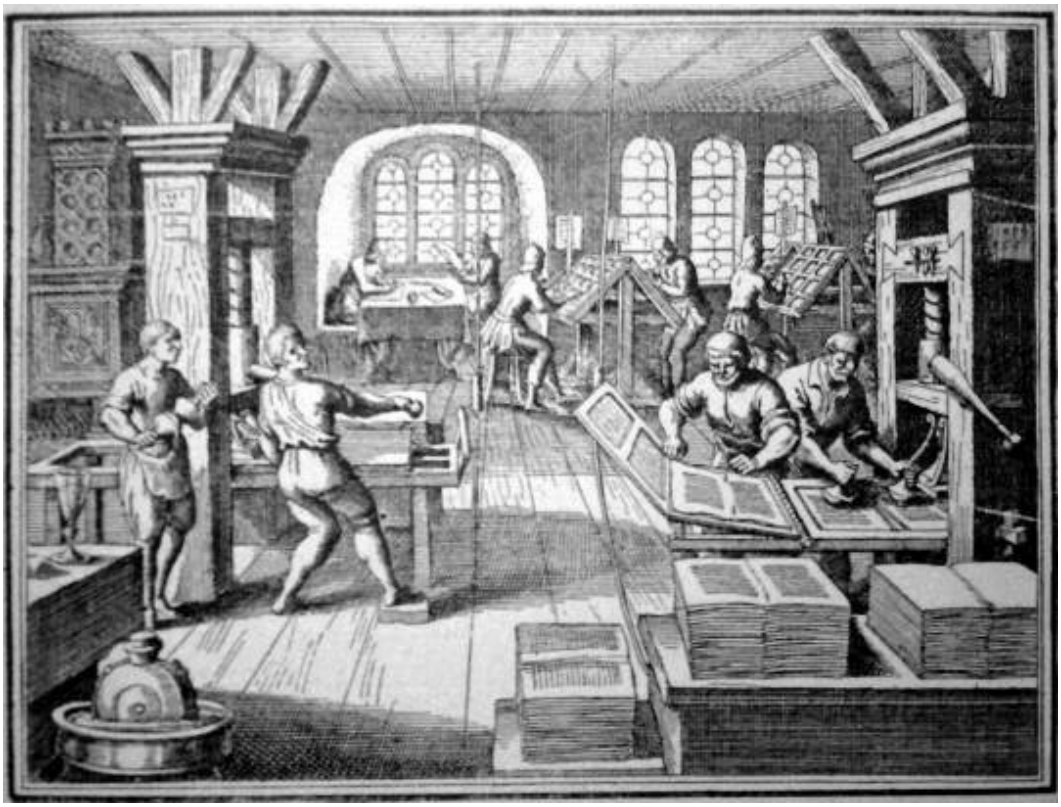


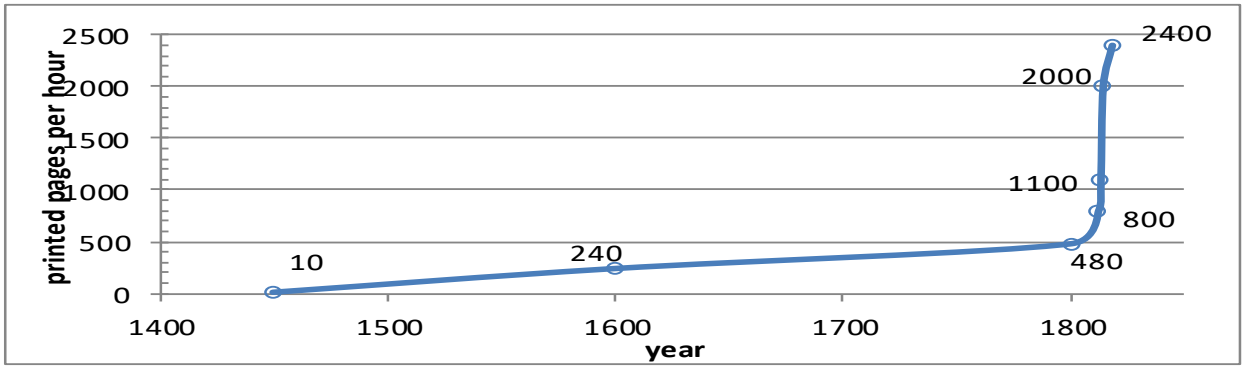
FIG. 5 Excerpt from Ptolemy's Geographia, printed in 1482 [4]

The invention of the printing press consolidates and expands the phenomenon of applied knowledge generated by the industrial revolution, providing the first mass type of good, the first production line and the first mass production [5, p. 124]. Thanks to the mechanization of book production, the capacity of a printing press from the Renaissance period reached 3,600 pages per working day [6, p. 67]. For comparison, in Gutenberg's time two printers could print only 10 pages per hour [7, p. 238], and handwriting produced one or two [8, p. 12]. The steam engine is of great importance for the improvement of the production capacity. To illustrate production progress, see Figure 6, Table 1.

Table 1. Maximum capacity for different presses (pages per 1 hour)

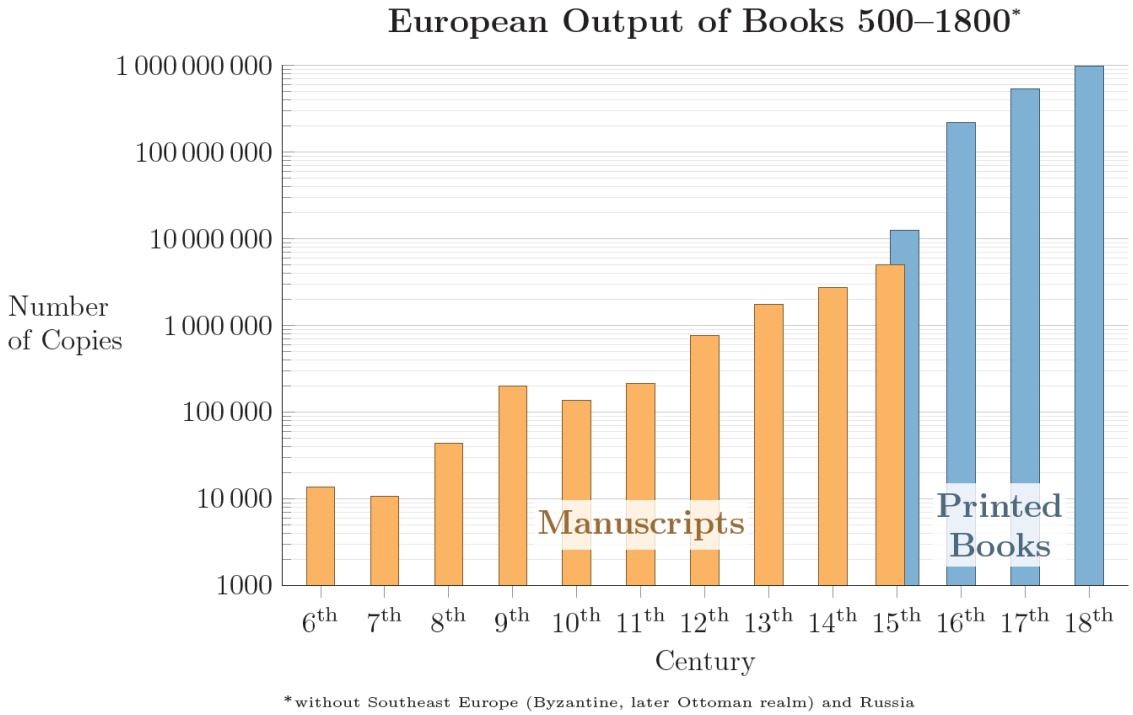
	Manual presses			Steam-powered presses			
construction	Gutenberg type around 1450	Gutenberg type around 1600	Stanhope type about 1800	Type Koenig 1812	Type Koenig 1813	Type Koenig 1814	Type Koenig 1818
Printed pages in 1 hour	10 [7, pp. 238]	240 [6, pp. 67]	480 [9, pp. 80]	800 [9, pp. 83]	1,100 [9, pp. 87]	2,000 [9, pp. 88]	2,400 [9, pp. 88]

FIG. 6 Capacity development of printing technology



Quite naturally, the developed capacity leads to an exponential increase in the number of published books. In FIG. 7 presents an estimate of the approximate number of Manuscripts and Printed books produced in Europe for the period from about 500 to about 1800). The data do not include Russia and Byzantium (later the Ottoman Empire) and the authors [10] estimate that a book consists of at least 50 pages. Three dependences are clear from the figure: first of all - the already mentioned exponential growth; secondly, printed books are superior to manuscripts by several orders of magnitude; thirdly, the growth rate of printed books is significantly faster than that of manuscripts before it.

FIG. 7. Approximate number of manuscripts and printed books produced in Europe for the period from about 500 to about 1800.



Printing technologies are reaching their peak in our time. Millions of titles are published annually in billions of total circulations [i.e., see 11]. As a result, for the last 500 years "Read!" is the new team to students. During the Renaissance, publishing a book was already a relatively easy task, while the number of books in a domain of knowledge was huge. A form of division of labor in education is required - some ("teachers") invest time to study, filter and systematize the essential information sources, and others ("learners") to use the obtained information synthesis from existing sources to learn. The teacher takes on the role of a systematizer of knowledge and it is considered that in order to be able to teach there must be a textbook written by him systematizing a fixed set of knowledge that must be passed on to students.

In the absence of the possibility for easy search and synthesis by the students, such a division of labor, which arose during the Renaissance, is justified. It can be said that after the advent of printed books, scholasticism was still the leading educational paradigm, albeit greatly changed. The teacher authoritatively and authoritarianly presents the learners and requires them to learn (after they have purchased) the “only correct” textbook, presenting the only version of the truth. The practice (for the last 500 years) is even for the teacher to organize the distribution of his textbooks, including with repressive methods.

The main disadvantages of such an approach are that:

- learners are not encouraged to take the initiative in research and are seen as a production product that needs to cross the assembly line.
- since the textbook contains everything necessary and it is already distributed among the students, there is almost no sense in attending lectures of the classical type, but they are still considered the main form of education.

FIG. 8 Typical classroom around 1910

CLICK!

Only 10 years ago, this section of the text would not have been convincing and, moreover, it would not have been written. But due to the exponential development of scientific and technological progress, the widely used technologies and the resulting social effects, with each passing period of time the World in which we live is changing more and more rapidly. Historically, these changes have been relatively slow and unnoticeable within a human life. Thus, people have been left with the misconception of the stationary nature of the environment, when in fact it has gradually become turbulent. While in the 17th and 18th centuries there were no noticeable improvements in the quality of life within conscious human life caused by scientific achievements, in the 19th century people have already witnessed 2-3 major achievements of civilization within their lives. In the 20th century, people regularly find themselves in a situation to compare the present with the past state of life, progress, comfort, etc.

In this respect, the last 20 years can be illustrated with the motto "We live in exponential times" [12], as well as with the next few figures. Figure 9 shows that the pace of implementation of widely applicable technologies, measured in years to reach ¼ of the US population, is accelerating exponentially [13, p. 50]. Figure 10 illustrates Moore's law, according to which the computing power of computers doubles every three years [13, p. 67]. The number of computers connected to the Internet is growing even faster (Fig. 11) [14].

FIG. 9 Accelerate the introduction of widely used technologies (years to reach ¼ of the US population)

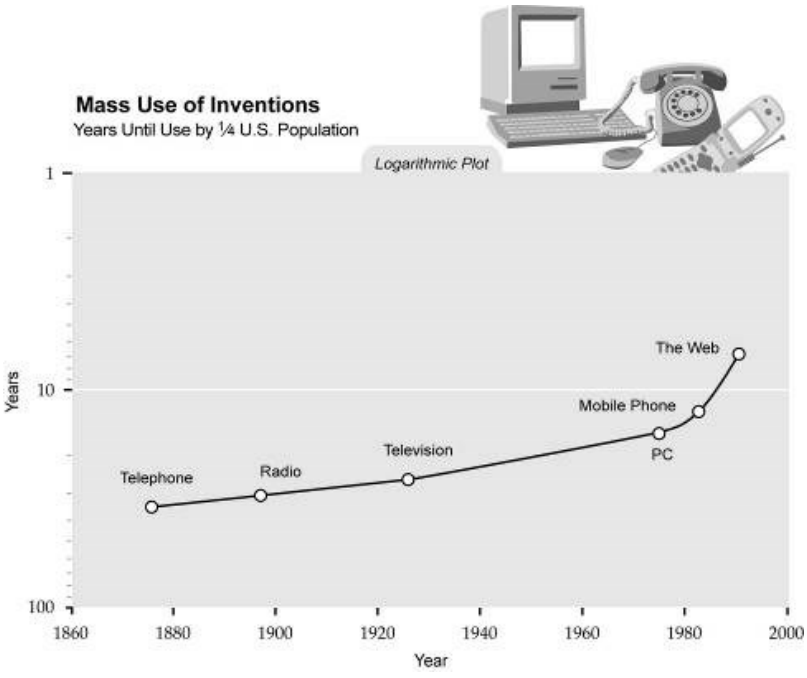


FIG. 10. Moore's Law - increase in computing power (calculations per second for $ 1000, adjusting for inflation)

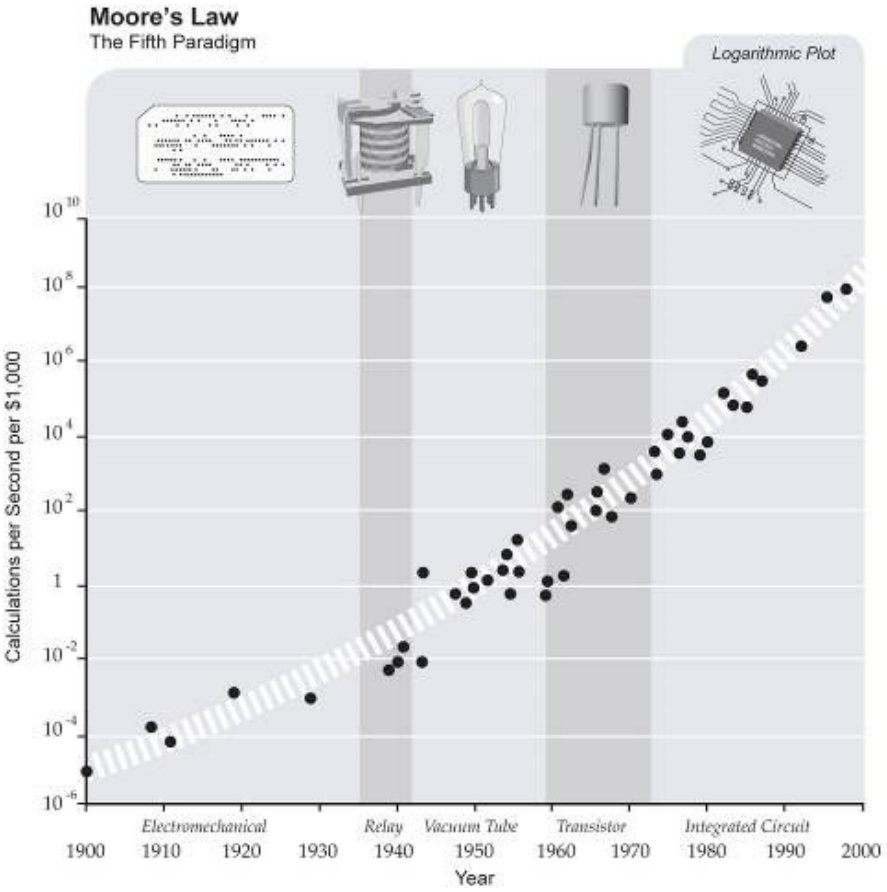
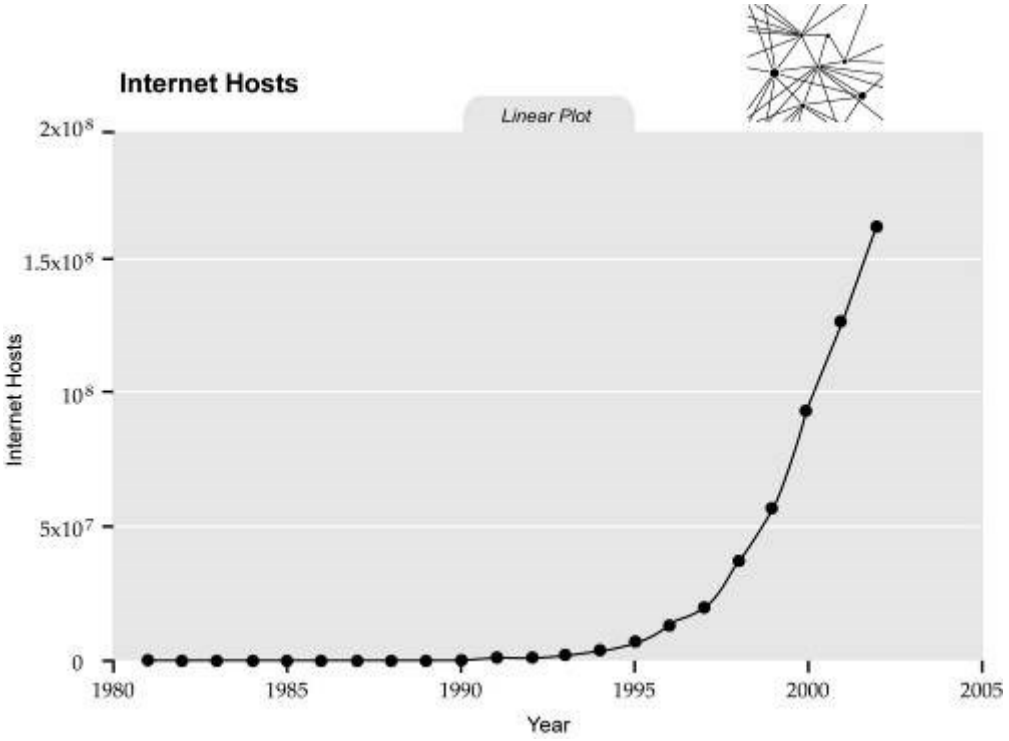


FIG. 11. Computers connected to the Internet



As a result of the exponential changes in the environment, many social dependencies are changing, including those related to the learners:

1) Rapid job turnover - the current 18-year-old will change the nature of his work 10 to 14 times before the age of 38 [15], and the ten most sought-after occupations in 2010 did not exist in 2004 [16].

2) Rapid growth of new information - in 2012 the newly created information is expected to be $4x10^{19}$ bytes (more than in the previous 5000 years in total), and the growth rate is 100% in two years [17].

3) Rapid pace of renewal of mass products and markets - for example, sales of iPhone and iPad represent 72% of the turnover of the tenth most market capitalized company in the United States, and both products did not exist in 2007.

All this means that at the moment students have to be prepared for professions that do not yet exist, to use technologies that have not yet been invented to solve problems that have not yet been formulated. Provided that the technological time for publishing and printing a new textbook is longer than the time for which the textbook would become obsolete.

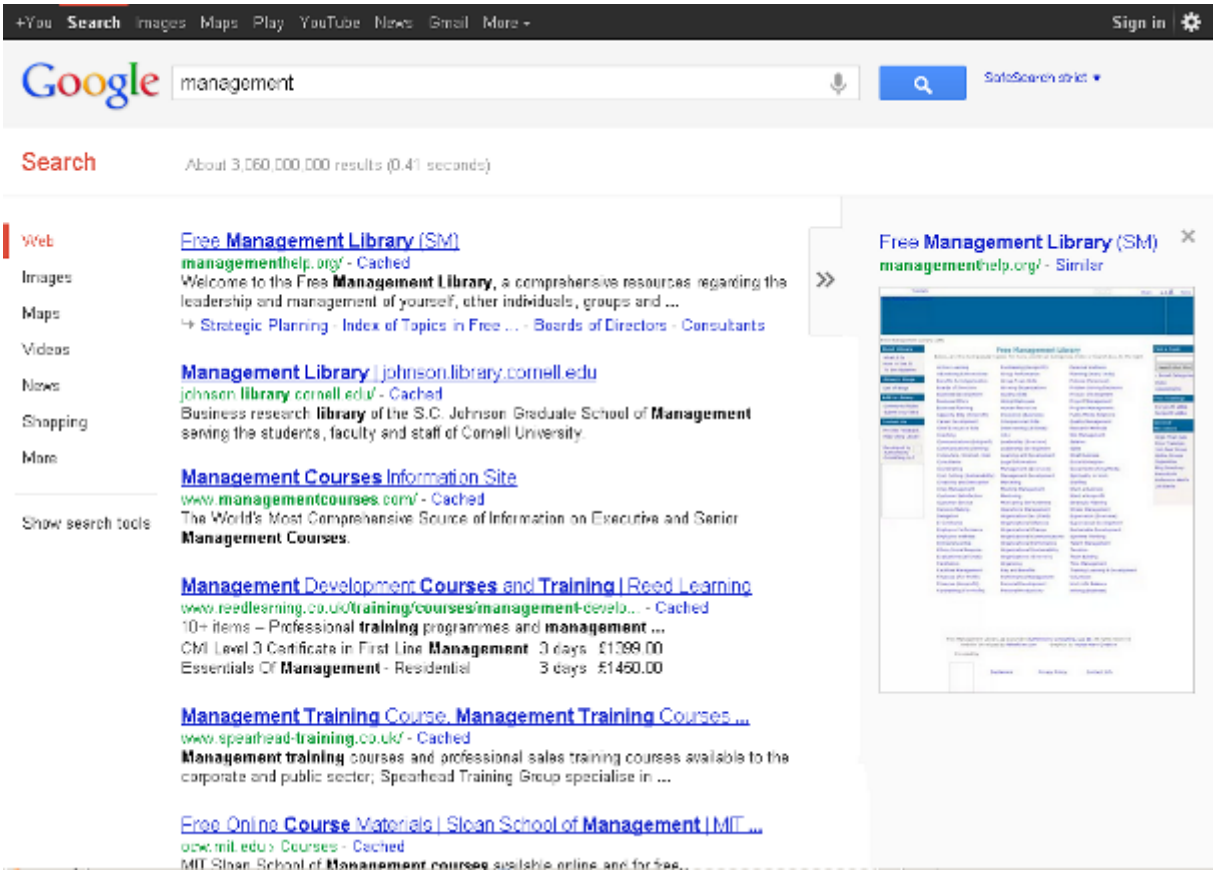
FIG. 12: The Inventors of the Google Search Engine [18]

On the other hand, there is easy access to a huge amount of information via the Internet with the ability to search, synthesize and develop information. The invention of the Google search engine (along with its specialized tools) by Larry Page and Sergey Brin (Fig. 12), as well as Wikipedia by Jimmy Wells (Fig. 13), give a significant boost to educational opportunities on the Internet.

FIG. 13: The inventor of Wikipedia [19]

For example, a Google search for the keyword “management” (Fig. 14) yielded over 3 million results (!), With most of the first 300 results containing ready-made teaching and research material on the subject. But even if you look only at the first page of the search results, you come across the "Free management library", where in practice there is more than the necessary materials for each point of each curriculum in each discipline of the business administration curriculum. The content is illustrated not only with figures, but also with sound and video; updated every day; growing in volume and diversity.

FIG. 14. Search by keyword "management" in Google

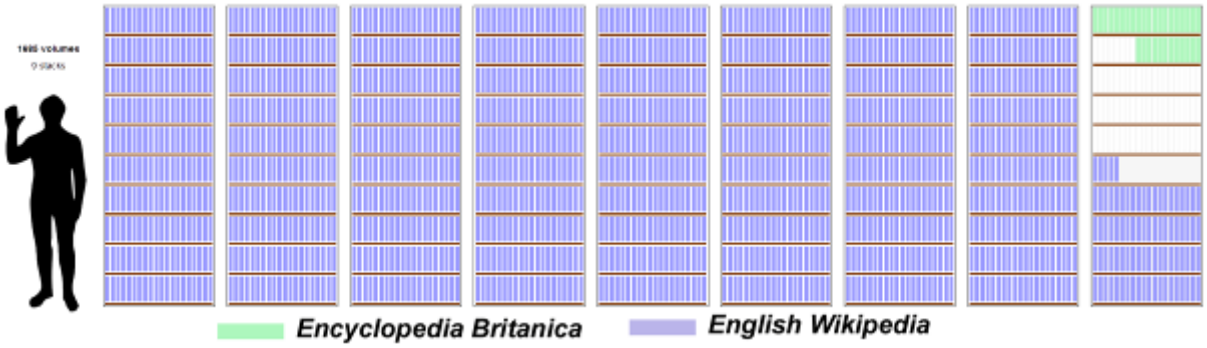


Another example: currently the English part of Wikipedia contains almost 4 million articles, and in total the articles in all 270 languages are about five times more. This means that the English part of Wikipedia would be printed in 1685 volumes the size of the volumes of the Encyclopedia Britanica (the next largest English-language encyclopedia). the ratio is almost 53: 1 in favor of Wikipedia.

Nowadays, the learner quickly realizes that the Truth is multifaceted, in order to prepare well for the demands of the rapidly changing labor market, a variety of sources must be used, compared, filtered, and selected faster than the changing environment. Lecture time (including travel time) is better invested in internet reading. "Click!" is the new command because all human knowledge is a click away. In fact,

what is happening is that the younger generation is adapting to the changed conditions better than the previous ones.

FIG. 15 Figurative comparison between the volume of the English part of Wikipedia and the Encyclopedia Britanica [20]



In this situation, what is the role of the teacher? Today's teachers have been systematizers of information all their lives and have already put a lot of work into writing the most appropriate textbook and preparing a system of lectures. In education there is a cultural clash: "Digital students, analog teachers!", Very well illustrated in [21] and to some extent presented in Table 2.

Table 2: Typical quotes from a scholastic teacher and typical student responses (according to Wesh's experiment [21])

	Teacher - scholastic	Student at the end of 2010s
1	"The younger generation doesn't read books!"	"I read 8 books a year and 3600 web pages"
2	"The younger generation doesn't read my textbook!"	"I find only 26% of my reading assignments useful"
3	"The young generation does not write!"	"I write 42 pages of text for semester assignments and more than 500 pages of e-mails"
4	"The young generation is illiterate! They don't follow the grammar rules! "	Language is a living system that is constantly evolving and what is now a grammatical error is tomorrow's grammatical norm.[1]
5	"No paper sources were used in the development of the assignment"	"All traditional information sources are gradually being transferred to the Internet - either under a Public License or as a recreated wiki article.… Searching for the necessary information on the Internet is incomparably easier… There are also many useful audio and video materials."
6	"During a lecture, they use laptops to take notes."	"I carry a computer in class, but I mainly use it for social networks or to check if what the lecturer says is true."
7	"The younger generation cannot focus on one task!"	"I sleep an average of 7 hours a day, watch TV for 1.5 hours, spend 3.5 hours on the Internet, listen to music for 2.5 hours, talk on a mobile phone for 2 hours, I'm in class for 3 hours, eat for 20 hours, work for 2 hours, 3 hours of study… Only upto here are a total of 26.5 hours - I'm a multitasker - I have to be…"

[1] **Expressed opinion of the authors**

Today's learner watches and listens incomparably more, perceives, and learns much more per unit of time and needs a scholastic teacher less and less for his training. But (in response to a question) today's learner needs guidance and persuasion about what the important areas of knowledge in an intensive information environment are. The education needs a teacher-motivator, who must arouse interest in the given educational field.

PLAY!

Computer players are part of a generation defined as Millennials, born after 1980, for whom digital technologies, i.e. The Internet, computer games, e-mail, mobile phones and chat are woven into almost every activity of their daily lives. They are characterized as items with computers and technology. As a result, they are and are often called the Net Generation, the Gamer Generation, or the Digital Natives because they have learned to speak the language of digital computers, video games and the Internet [31, p.1].

By the age of 21, the typical representative of the current young generation has played 10,000 hours of games. This number is interesting for two reasons [20]:

1) 10000 hours are equal to the hours of junior high school and high school in total, e.g., time is invested in them as a whole is a parallel education.

2) According to [30, pp. 35-69] performing an activity for 10,000 hours before the age of 21, makes the performer a virtuoso in the activity.

So, at the moment when the young person is in the stage of his higher education, he has a parallel specialty and a virtuoso in it - but what is it? What is the common skill that all games develop? The general skill is to solve problems of different complexity and with different degrees of structuring.

According to Jane McGonigal, gamers get the following skills and benefits from the time they spend playing games:

- "Optimism under pressure" - the ability to self-motivate to perform a task with a reasonable chance of ultimate success.
- "Close social structure" - the ability to rely on a partner who, like you, devotes effort and time to play together, as well as to rely on an opponent to comply with the intended regulations. These abilities build a network of trust and improve communication.
- "Blissful productivity" - gamers prefer to be challenged constantly to get positive results than to be inactive.
- "Epic context" - gamers like the presence of a common plot and are inspired by the feeling of a spectacular mission.

Figure 16 shows a portrait of a player on the verge of a state called "epic win". An epic win is a result that is so incredibly positive for the player that it seems impossible before it is achieved. Epic win is beyond imagination and when he achieves it, the player is shocked to discover what he is capable of. This is a classic game emotion:

FIG. 16. The face of “Epic win”

- feeling of tension,
- a little fear,
- intense concentration,
- deep focus on solving a really difficult task,
- curves of the eyes up and around the mouth are a sign of optimism,
- raised eyebrows show surprise.

This is the person that it is desirable for every learner who decides to achieve learning tasks. The face of a human who, against all expectations, is on the verge of achieving great success.

Seth Priebatsch [23] (founder of SCVNGR) called the phenomenon a gaming layer of the World by analogy with Vladimir Vernadsky's theory of the spheres of the Earth. Seth Priibach's name refers to a layer of game influences and participants in games, as an upgrade of the social structure of relationships, but so that the game layer is acceptable and productive in the future.

Currently, the average player is 37 years old, which is not much more than the average age of the population (thirty-five). People in their thirties make up the largest proportion of players, six times the number of teenagers who play and three times the number of students between the ages of 18 and 22. [26]

About 80% of players in online multiplayer games are men, although other studies of gaming generally show that more than a third of gamers are female [27], [26]. About 60% of registered users are men, and 60% of the most active users are women (or at least use female avatars) [28]. However, there is also some evidence that the percentage of women in some places may be declining [29].

Contrary to expectations, people under 18 play the least (only 22 hours a week). As the years go by, the number of hours played also increases. People over the age of 40 play about 30 hours a week [25, p.993-1018].

Considering the data and demographics of the industry, the opposite of the stereotype for young players who are not well educated and economically poor is noticeable. Players in the category of mass multiplayer games are probably closer to the average age than to high school, most have higher education and earn about $ 25,000 a year, which is above the national average [24, p.22].

Jane McGonigal calls the younger generation of gamers "super empowered, promising individuals." This is exactly the new type of learners. Each succeeding generation is more and more playful, and the learners have mastered the language and the means of expression of the game perfectly. The approach with the greatest prospects for the future in education is gamification, and the function of the teacher is the organizer of the educational gaming process, monitoring the observance of the established regulations and creator of the high-intensive information environment necessary for each learning game.

The game is the most natural way to transfer skills, knowledge, and qualifications from the old generation to the young. Throughout history, the game has been used for increasingly complex tasks, and eventually the time has come to use the game to train senior professionals and executives.

A quick Google search for the word "Simulation" returned many results, with approximately two-thirds of them in the sense of "psychological simulation" (an organized experiment with the behavior of people in a group or individuals in controlled laboratory conditions), and about a third in the meaning of "computer simulation" (experiment with software modeling certain real situations and scenarios). In gaming, the word simulation is used significantly in both senses.

The full concept of "games and simulations" is associated with a set of approaches and methods for reconstructing realistic situations so that under-experiment individuals receive new information from the interaction within an experiment.

Games and simulations are widely used in the training of senior staff and professionals. All of them have well-defined characteristics such as: teamwork, simulation models, instructional team, combination of different pedagogical methods, integrative nature, computerization, and the Internet.

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