Art, Social and Culture Education Supported by Artificial Intelligence Tools

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Abstract. The use of tools, based on AI, will become a regular practice in education due to the dynamic social development. The role of the artificial intelligence in social sciences, arts and culture is key to the achievement of emotional empathy of people in view of the future symbiosis of man and machine.

1.   Introduction

In recent years, the artificial intelligence (AI) has been increasingly mentioned as a universal cure for everything concerning the achievement by the mankind of the stage of the so-called "knowledge economy" – from the development of autonomous transport systems to the new discoveries in nanoscience and biotechnology, the fight against climate change or the realization of the concept of "smart cities". Education, as one of the main drivers of the knowledge economy, can not neglect this process. Of course, at the present stage of technological development, we are not talking about replacing teachers with computers, but artificial intelligence can be a valuable tool for illustrating the rationality of the learning process, a powerful engine for analysis and a catalyst for the development of critical thinking among students from a very early age. Moreover, the potential of AI, contrary to the regular expectations, lays far beyond the field of mathematics and natural sciences, but it can also be applied adequately in the social sciences, art and culture. For example, the capabilities of computers to compare and analyze various artifacts are much larger than those of the most experienced researcher, culturalologist, or expert in medieval painting. Taking advantage of the computing power of the machines, we can compare different designs, ornaments, colors and shades, sounds or harmonies in seconds, to find the degree of similarity between different works of art, or even to discover cultural and historical ties between seemingly isolated cultures and events, embracing a rich variety of mathematical models that are not normally present in the arsenal of the culturologist.

Artificial intelligence, however, is not burdened like people with different emotional dogmas, self-assessments and personal feelings for the "spirituality" or the "holiness"

of art, religion, or cultural identity. It is often able to search for and find interconnections, which we normally would never thought exist, but the fact that self-teaching computers are already successfully winning over world champions of chess (New York Times, 1996) or the game GO (CNBC, 2017) is a clear indication, that the rationality of the machine intelligence is now able, in a number of situations, to oppose to the best among people. And to beat them in a way that often seems unthinkable to us, but obviously works.

It is clear that in the quest for knowledge, the winning strategy is not to oppose to the machines but to try to understand what the positives are from using their capabilities to shape our own living philosophy by taking the best of the two worlds – the one of the computers and that of people. Obviously, in purely scientific analysis, which should be based primarily on facts, people tend to miss details that may prove to be significant on a later stage. In the pursuit of internal harmony, we often tend to perceive many things for granted, while at the same time they are not undeniable. And while we usually claim that doubt is the basis of scientific progress, we often tend to "trust" certain authorities without being sure of the rationality of the facts, supporting their hypotheses.

Building of what we now call critical thinking, with the help of tools and models typical for AI, among contemporary school and university students is a key issue for the future of modern science. That is presumably because overcoming the status quo generates the progress, and the need for fresh "breakthrough" ideas is becoming increasingly critical in the ever-complicating social and economic interactions that determine the world agenda.

2. Transformation of Learning through Introducing New Approaches Based on Innovation and Critical Thinking

The emergence of innovation is directly related to the ability for development of critical thinking. The traditional education is based on authority. For centuries, knowledge has been transferred in a certain sequence - from teacher to student, into a kind of copy-paste mode where rarely anyone dared to object or challenge the reputation or knowledge of his teacher. Yes, knowledge has often been upgraded and enriched, but in a number of cases science has been literally stuck before someone dares to show that the foundation that lays beneath is wrong - for instance, for thousands of years, people thought the Earth was flat and it was not easy to be convinced otherwise. It was not until the Middle Ages that Nicholas Copernicus, with his heliocentric system, proved another, nowadays well-known fact, namely that the Earth revolves around the Sun and not the other way round. Opposing to the centuries-old dogma has led to violent resistance on behalf of the official church, and about a century later the Italian Giordano Bruno was burned at the stake for developing further the Copernicus's ideas and daring to endanger the authority of the religion that at that time was still the foundament of the state power.

In the rapidly invading economy of knowledge during the 21st century, this traditional model, based on authority, is dramatically changing. Now knowledge is everywhere, it's just enough to stretch out a hand, and Google, Facebook, CNN,

Bloomberg or whatever you could think of, is piling us with tons of information, and obviously knowledge itself is no longer a monopoly to anyone, but truth reaches first the fastest keyboard and mouse operator. Logically traditional respect for the teacher gradually gives way to critical thinking - now the teacher is not the sole "master of knowledge," and it is possible in the dynamics of the information avalanche the students to learn about a certain novelty even before their teacher, which can obviously affect his reputaion. Countries, more advanced in education, as a rule encourage critical thinking and creative debate in the lecture halls, in order to maintain the high competitiveness of cognitive processes and training. Respectively, the most respected teachers are no longer those who know the most, but those who are most inclined to jump over the barrier towards the students and to embark on a process of discovery together with them, motivating them to new heights in knowledge. Or, as the researcher Anisa Zulfiqar says in one of her articles. "Critical thinking is not just a "nice to have" skill in the 21st century, it is essential ..." (Zulfiqar, 2017)

2.1.   Information vs. knowledge and the role of critical thinking

It is not important to know a lot, it is important to know enough and this is the essential difference between information and knowledge – presumably the knowledge is a type of an organized information that gives you opportunity to achieve a specific measurable goal. In the 21st century, with information flooding us daily and everywhere, obviously the need for a flexible filtering of the things, that are really important for us, is a key competence for every competitive individual, and in this aspect, critical thinking is invaluable. It helps us not to behave like slaves of various authorities and blindly following premade templates, but to be real innovators in our day-to-day activities, taking dozens of decisions that are not based on routine but on sound logic and adaptive thinking that helps us to keep at the top of the information avalanche. Changes happen all the time - from transport schedule that is prone to congestion, to political news, financial markets or social life that one single terrorist attack can dramatically change in minutes. All this requires rational judgment, adaptive logic, and critical thinking, so the true leaders of the new age are usually among the people who have best mastered these life lessons, one of the most important of which is to avoid taking anything for granted. The technology is the key to the modern science and education, but it is also important the way we use it to come up to certain conclusions and discoveries, and that is precisely where our creative talents and research flair are manifested.

2.2.   Changing the pedagogical approach and analysis of the successful teacher

If the traditional education is based on the idea that in class the teacher speaks, and the pupils listen, in modern reality the teacher should be able to listen as well. What's more important - he has to do whatever is necessary to make his students relax and talk, which, for logical reasons, could never happen if he takes the floor all the time.

We have heard a lot about the classroom of the future. For the general public, this is presumably a huge, spacious solar-powered room that comes in with smart cards or iris

identification. It is probably with ultramodern lighting, filled with futuristic technologies, 3D reality and holographic wall maps that can be flexibly transformed into multimedia screens and, like the most advanced IMAX cinemas, involve us in various educational scenarios. This is quite possible, but the true classroom of the future will be, above all, virtual. Cloud technologies now allow the collection and deployment of all the necessary educational information, somewhere in the cloud, so that it is permanently available and instantly accessible as long as the student has a suitable terminal device and a reliable online connection to take advantage of it. If we add stereo headsets and 3D glasses for virtual reality experience, this room can safely follow us everywhere, and thus technological development will not prevent our prerecorded lectures from running in asymmetric mode, while in case we need to have live sessions with the teacher or our colleagues, this can easily be accomplished with the available communication tools and the dozens of friendly teamwork environments.

The learning of the material itself should be gradual, with a consistent and purposeful engagement of the students with the problem because the actual work in the learning process is not accomplished by the teacher **but by the student's brain** - the good educator must find the necessary levers to engage the mind of the learner, and he will do the rest on his own.

2.3. Learning at various speeds - a major lever of educational transformation

We all wear different clothes that fit our dimensions, shapes and preferences, while at the same time we somehow accept that all children should learn the same things in the same way, with the clear consciousness that these are different people and their brains perceive things strictly individually. This kind of cognitive "blindness" is extremely primitive and short-sighted, and yet, for centuries, training has been done precisely following this conveyor model because no other has been known or invented. In fact, differences in thinking, perceptions, and sensitivity are often much more important than physical differences, and in this aspect we have to make it clear - **all children are different people/personalities**. **Consequently, there is no logic in learning the same things** beyond what is absolutely necessary, which is far from enough even to justify the weight of the school bags. Yes, the information that is available to us, grows dramatically with every day and hour. However, the essential elements of it, which can directly affect our existence and future, do not follow the same trend and we do not need to take proportionate efforts every time we face the information avalanche, we simply need to learn to filter the really important things and that is where technology can be of major help to us.

We can talk a lot for learning at various speeds, but in simple woring - this is just a denial of the equalizing that has governed the educational process for centuries. We have already mentioned that pupils are different, as are different their capabilities, interests and even perceptions. Equally different is their potential for development in one or another educational or scientific field, and by passing them through the filter of "equality" typical for the classical educational systems, we lose the essence of their individuality, creativity and interests, subordinating them to some socially acceptable

vision for "the necessary sufficiency" of knowledge, which often turns out to be inadequate both in terms of their needs and their potential for future development and personal prosperity. The paradox in this case is that thinking that we are protecting the "community good" in the field of education, we actually deprive our children of an adequate future, and society – of an innovative thinking and future development. As the world-known educational researcher Sir Ken Robinson says in his most popular speech at the TED Forum "Now, I don't mean to say that being wrong is the same thing as being creative. What we do know is, if you're not prepared to be wrong, you'll never come up with anything original — if you're not prepared to be wrong. And by the time they get to be adults, most kids have lost that capacity. They have become frightened of being wrong…" (Robinson, 2006)

3. Opportunities for Application of Elements of Artificial Intelligence in Educational Pedagogy and Education in Social Sciences, Culture and Arts

According to modern educational experts, education must be more oriented towards the "things of life" and information should reach the students with minimum ideological, religious, nationalistic and other influences. This is especially true for the social sphere, because the spirituality of the individual is extremely vulnerable to subjective influence and that is where the presence of a relatively objective metrics is of key importance. If students are taught not just to follow already filled templates but have the opportunity to "reach" the truth through experimentation and personal engagement, their development will be much more fulfilled with creativity and enthusiasm, and their empathy with the process will allow them to preserve and promote a lasting interest in the respective subject, which may even predifine their future development. Obviously, technology, and artificial intelligence in particular, can play a vital role, as they will give students the necessary tools for such analyzes and the confidence that they can deal with them.

3.1. Rise of the machines

One of the upcoming trends of the new millennium is the job automation. According to Laura Tyson, "... Advances in artificial intelligence and robotics are powering a new wave of automation, with machines matching or outperforming humans in a fast-growing range of tasks..." (Tyson, 2017). Obviously, the acquisition of a certain knowledge proves to be decisive for personal competitiveness and even if we temporary ignore the artificial intelligence as a phenomenon, it is obvious that in a knowledge-based economy, more educated individuals are likely to succeed. Proves can be seen even in statistics - for example, the level of education of individuals is a key factor in self-assessment of long-term labor market constraints due to disability (Eurostat, 2013), which means that even with a certain degree of disability, people with higher education level feel more competitive. So what to say about a self-taught computer that can load virtually unlimited programs in its memory and perform them without interruption 24/7

365 days a year? Soon it would be obvious to everyone that in order to prosper, we must necessarily break the stereotype and open our minds to the new educational challenges because only they can guarantee our personal competitiveness in the long run. People can not learn to compute or work with huge information databases faster than machines, but they can still make better decisions in a number of situations if they can find the optimal combination of computing power of computers and their personally rational perception. Yes, people often make mistakes or take irrational, stupid and even tragic decisions when they do not have time or are pressed by the circumstances, but if we find a way to remove the limitations and one can fully use the capacity of the artificial intelligence in every moment, it is quite likely that the results would be very different.

3.2. The balance of technology, methodology and engagement - a solid pre-requisite for a successful learning

We already mentioned that the involvement of information technology in no way completes the modern education, and being too concentrated just on the technology can even lead to a blockage of the educational process (for example, the school says - we have no money for technology, so we will not train in a modern way and think innovative). In fact, it's just as silly as to declare that the sun should not rise because we do not see it from our window. Obviously, technologies become cheaper over time, and ways to get them into the classroom are growing with unprecedented speed, so the lack of basic technical capabilities (such as the availability of an internet connection) could no longer be an excuse for anyone. For various reasons, individual governments or regimes are still trying to limit the use of ICT because they can reveal unpleasant truths, but this is a battle that has been lost long ago, so by the middle of the century we could confirm with reasonable assurance that there will be no man on the planet lacking access to technology and it will depend entirely on him how he will be able to benefit from it.

With the advantage of technology in the 21st century, the opportunities for personalized education are growing dramatically. The availability of intelligent training systems that could in just a couple of minutes take into account the personality, determine the language level or the sphere of interest and abilities of a student and generate flexible individualized curricula is far from fiction and will soon become a common practice. The role of the teacher, though key, will not concentrate on the daily broadcast type of lectures, typical of the past (a recorded video would cover this and many modern educational institutions already record their lectures as a regular practice, namely to be able to use them repeatedly) but to the ability to provoke students and to participate in debates that reveal in depth the true beauty and challenge of the particular subject.

The management theory teaches that if we can not measure something, we can not effectively manage it. In the end, when we talk about educational achievements, it is imperative to put some limits of rationality on the truths that we would like to learn, otherwise we would not be able to assess whether we are successful. In the live sciences, things are relatively easy - if we have solved a task and obtained the expected result,

we have obviously succeeded, whereas for example in literature, philosophy, painting or even music, things are much more subjective and fuzzy, and generally rely on community perceptions of one or another group of people (for example, literature experts, or just people with musical talents).

The fact is that the truth is usually born in the dispute, but while it is much easier to talk about objectivity in most fundamental scientific discoveries that rest on relatively constant natural laws, social science or art usually reside on the need for consensus between often irreconcilable points of view and finally prevails the position, defended by the majority at that particular moment. For example, different styles in architecture dominate throughout the centuries, the artists find impressionism, the fashion designers change their major concepts every few years, and so on, thus no one sees anything wrong in the fact that people's ideas of ugly and beautiful evolve constantly over time.

3.3. The human-machine relationship and boundaries of the rationality in the cognitive process

According to many futurists, people can no longer rely on the purely evolutionary development opportunities in order to integrate adequately into the increasingly dynamic reality, which requires new senses or means for environmental interaction and an increasingly serious development of the so-called human-machine interface. Even if we ignore the achievements of the military industry and the concept of ultra-light exoskeletons, breathable fabrics, and self-regenerating alloys, the introduction of artificial bones, synthetic blood, built-in and self-adjusting lenses, or even brain implants are just a matter of time and money. With the mass introduction of such technologies, they will logically become cheaper, and probably by the middle of the century modern people will enjoy swinging limbs, rejuvenation of tissues or even the ability to bring their minds into a new organism or even machine. Perceiving such "heresy" is not always easy for man's traditional perceptions of the world, and direct interference with his "divine" nature will be the subject of an increasingly common debate in the society, which should be initiated by the education. The artificial intelligence can be perceived as a threat only by the people who are not ready to embrace it and merge with it in the future. Even nowadays we face dozens of situations where AI already take critical decisions for us (such as an airplane autopilots, robots performing medical surgery, etc.), but we just need to gradually overcome our fears and prejudices, and that's where the good teacher could help us, especially in the sphere of social sciences, culture and art. "... In this digital era, teachers' role has shifted from mere preacher to the manager of students social and emotions behaviours; mentor for their learning and over- all development as a balanced citizen.. " (Amin, 2016).

Educational transformation is not a hardware but a software problem, and the basic idea is to learn to think in a new way, without necessarily linking it to a change of everything that existed before. The artificial intelligence is not meant to replace the natural one, it only has to support it, and for many people the difference is not obvious and this should be carefully communicated with children at a very early age, before it becomes too late.

4. Conclusions

From the beginning of the 21st century, the education is at an important crossroad. On one hand, the mankind's information tools and capabilities have grown substantially in the last 2-3 decades, while education systems around the world have somehow "slept over" this dynamics and now need to make rapid strides. The presence of competitive education is key not only for the development of the individual and society, but also for the survival of the mankind and its harmonious integration into what we now call „knowledge economy".

The use of artificial intelligence tools and systems to support and improve the learning process is an essential element of the educational transformation as the information avalanche has long made the traditional educational practices inadequate to the needs of the modern society. The inclusion of critical thinking elements in the classroom and the rational perception of AI's intervention in art, culture, and social science education make possible the "peaceful" cohabitation of man and computer and the future development of mankind in a modern, dynamic and friendly world. The essence of the future symbiosis of man and machine is the understanding that by acquiring the positives of the artificial intelligence, the man does not betray his identity but simply acquires new qualities and capabilities, so his emotional empathy in the process is quite important.

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