

WHICH TEACHERS SHOULD BE REPLACED BY AI

Predrag Pale

University of Zagreb, Croatia

E-mail: Predrag.Pale@fer.hr

Teaching complex, abstract content is the key foundation of our civilization. Even before Internet there were technologies which thus significantly improved teaching and learning process and accelerated development of human society. With Internet and digital technology a number of new, powerful technologies are available to education. They significantly change the role of the teacher. No teacher can provide data, information, explanation, discussion or advice that cannot be found online nor can do it better than someone already did, or will do online. However, instead trying to do all for all, modern teacher should focus on doing something particular what they excel in for a fraction of students who truly need that teacher. Due to Internet the quantity of that small fraction of students will be larger than ever. Schools also need to transform, both physically and institutionally. Physically they need to provide spaces and resources for collaboration and exploration as well as cohabitation with their teachers. Institutionally they will specialize for some aspect of educational process from creation of new knowledge, its curation to its assessment.

Recently Artificial intelligence (AI) (Kelley, 2023) has created huge attention both in professional and general public. This is not the first time, similar hypes have been raised in '70-ies and late '80-ies but this time, with Internet and wide area of possible applications, many professions are concerned about their future. Teaching is one of them, as well. Thus the question "Which teachers should be replaced by AI?" is neither inappropriate nor inflated.

Use of Technology in Teaching

Ability of human beings to communicate complex thoughts is the foundational building block of our civilization and our ability to subdue all other species and conquer the nature. Our ability to teach others and our offsprings abstract concepts in addition to practical ones differentiates us from all other living species we know and accelerates societal development. We are able to learn from other individuals' experience. Inventing technology which can be used in teaching and learning has additionally enhanced the process of technological and societal development.

Pre-internet Technologies

Literacy is a huge milestone because it enables us to overcome spatial, but even more important, temporal limitations of oral teaching. Printing technology immensely boosted scalability of teaching because written knowledge became available to masses. Schools standardized workforce as a cornerstone for industrialization and mass production.

Internet

Internet has brought dissemination of knowledge almost to its limits. Faster it would be only if we could have direct connection of our brains with this immense storage of mankind's accumulated data, knowledge and experience. Internet enables anyone to access any knowledge, any time, any place thus enabling every individual to boost their performance when and where needed.

But the key property of Internet is that it enables just anyone to contribute to that huge common storage of accumulated civilization's intellectual wealth - knowledge. Everyone can contribute data. Everyone can contribute their interpretation of their own and other peoples' data thus creating information. And everyone can contribute their explanation of causal relationships, rules and logic thus creating knowledge.

Multimedia

Since the advent of civilization humans were using drawings to explain things. Ability to make photographs, movies and record sound have been around for about 100 years and many educators experimented with their use in teaching and learning. However, it is their digital version, ease of production and dissemination over Internet that makes them extremely popular and very useful educational technology.

They are so popular that some educators, rightfully, fear that students will dangerously neglect use of written knowledge. "A picture is worth thousand words" is popular proverb that comes to mind when usage of multimedia in education is planned. However, there is no hierarchy of multimedia elements, not in the sense that one is better than the other in all situations and applications.

It is crucial to understand properties and benefits of each of multimedia components. Written text, spoken words, sounds of nature, artificial sounds, drawings, animations, photographs and video each have their own benefits as well as drawbacks in teaching and learning wide range of topics. Therefore they should be carefully chosen and meticulously applied.

Modelling and Simulations

Fast computing and huge data sets enable better understanding of natural and social phenomena and predict future events and results of human interventions with probability never possible in history of mankind. From meteorology to financial markets, from machine building to agriculture, to epidemics, to taxation it helps in learning, planning and execution of human actions.

Extended Reality

"Extended reality" (XR) is the joint term for "Virtual reality" (VR) and "Augmented reality" (AR) (Limbu, 2020). Virtual reality uses multimedia to depict to the user essential elements of space, time and knowledge in a graphical way with hope to make it easier to comprehend and use.

It enables creating of virtual laboratories, among other applications, furthering the scalability of learning by enabling masses to learn and research anytime, anywhere, in a safe, limitless way without any proportional cost. It also enables creation for spaces not available in reality or anticipated spaces people have yet to reach or discover.

Augmented reality overlays virtual reality elements on video and audio of real world in real time assisting the user in comprehending and manipulating real world. It can tremendously

improve human's performance in mission critical situations like medicine, rescue operations, explorations etc. Extended reality can train and prepare professionals and common people for their future engagement in an unprecedented way significantly reducing risk, mistakes, injuries, reducing cost and boosting their performance.

Artificial Intelligence

Since the advent of computers it seems that the moment of creating a machine as intelligent as a human being is in the reach. Several times in recent history there were media hypes announcing "thinking machines". Recently, a vast range of machine learning algorithms have been developed and tested in use in a variety of applications and now enormous corpus of human knowledge is used to train them in attempt to enable computers to reason the way humans do. Both professionals and layman are arguing whether this new technology is intelligent at all.

It is a fundamental question whether we can create machines comparably intelligent to human beings before we actually know how human mind works (Mitchell, 2021). It is still unclear what role our emotions play in cognitive processes.

However, regardless of these fundamental questions, it is indisputable that a number of cognitive jobs, previously reserved for humans, machines already can or will be able to do in the near future. Everything that can be reduced to a mere logic and/or set of rules can be done by a machine, now or soon. Thus, almost all professions, occupations and jobs rightfully have to think about the future of their job descriptions. Teachers likewise.

It is hoped, at least by the AI enthusiasts, that AI will be able to summarize knowledge, explain it, discuss, even argue. These all used to be essential roles of a teacher. If these projections come true, what remains to be the role of a teacher, if anything?

Teacher`s Role

Teachers exist as long as humans do. First teachers were parents and elderly in a tribe. Teachers as a profession came much later and their role was primarily to give information, especially in the age when teachers were likely to be the only literate person in a local community.

With the dawn of industrial revolution, teachers had to explain knowledge, rules, procedures and train standardized workforce. Their primary role was to form. To form an individual into a standardized, reliable working machine with more or less intelligence.

With machines taking over most physical work, jobs for humans require ever growing intellectual effort, coping with unplanned and unforeseen situations and tasks. Education and teachers have to adjust their role to it. Many argue how well and how promptly they have been and are adapting.

And now, with AI's potential to take over even many of these intellectual jobs, many are confused as to what jobs will be left for humans. It is no wonder that teachers who need to prepare future workforce for those jobs, or so we think, are confused even more.

This is a double dilemma. Do they need teachers at all? And if they do, what and how should teachers teach?

Because, teachers' role and job has not essentially changed from the beginning. Most teachers still do what and how their own teacher did, and teachers of their teachers.

Speaker

Teacher's profession is predominantly associated with giving lectures. And in doing so, most teachers predominantly convey information: data and interpretation of data. Many times this is not even their own, personal interpretation of data but rather somebody else's interpretation.

In the ripe era of Internet, what data can a teacher serve to their students that students cannot find by themselves on the Internet? Find them anytime, anywhere. And diverse data, controversial data. Which interpretation they cannot find? And they can find this data and interpretation in any modality: text, sound, image, video. And use it from the author that suits them most. So why would any student need a lecturer? Especially the assigned, given, predefined one, as opposed to chosen, speaker at the predefined time and place?

The only reason is because the interpretation is either novel or specifically crafted to student's personality, task or state of mind. And even then maybe it should not be in person, both student and teacher being in the same place, but rather remotely. And even then, maybe it should not be conveyed synchronously, student listening while teacher is talking, but rather it could be recorded. In that way teacher's contribution would be available to the student in a way that suits them most, but it would also be available to many students, worldwide and timelessly, forever.

Thus the role of a teacher as lecturer should be to provide a specific information in a specific way, an added value no one else has provided and to offer it in a scalable, timeless form.

Content Creator

Historically, another educational technology was the textbook. A book intended specifically to assist students to acquire knowledge. Sometimes they are created by practicing teachers, but not always. Often they include content intended for students to practice new knowledge as well as to test how well they increased their competence. In other occasions these other, supplemental content was formed as separate publications.

Today technology enables creation of a variety of educational materials: tutorials, explanatory material, exercises, assessment tools etc. (Pale, 2002). Each of them can use most appropriate technology. In addition, each type can be prepared in multiple variations for specific audiences. For example, a textbook teaching programming in a specific programming language for complete novices in programming should be substantially different from a textbook intended for experienced programmers in some other programming language.

Furthermore, there is a vast source of educational content that is "fragmented": not in a form that is complete in a sense of a book or other printed or electronic counterpart. There is a plethora of short explanations, tutorial, exercises, tests etc. in the form of a text, illustration, audio, video or computer program. Modern teacher thus does not need to compete with existing educational materials, but rather be the selector, advisor to students which of the existing materials are most suitable for his students.

If a modern teacher feels competent and attracted to being a content creator, they should carefully define the audience of their content, the desired outcome of usage of their future content and how it will differ from existing content for the same audience and same purpose. Thus they will create a valuable piece for the whole puzzle of educational materials which can become a droplet in a future cocktail created by some other teachers for their students.

The advantage today is that one does not need to create the whole textbook or any other educational material in complete, but can rather create just one chapter, example, illustration, demonstration, section or whatever piece of knowledge or educational content. Thus it can be created on the go, incrementally, at the spur of a moment or inspiration.

Director

Traditionally, students enroll in an educational process based on curricula and individual courses are learned according to a specific syllabus. Both, curriculum and syllabus are created in general, intended for a wide variety of students who will subsequently use the knowledge in

a variety of jobs and situations. But, modern economy requires lifelong learning which requires adjustable learning process, education tailored for the individual, small group or project.

In order to tailor it, the specific outcomes of the education, existing knowledge and gaps of student(s) as well as situation, resources and other factors need to be taken into account when designing the educational process. In this task, emotions, culture, individual and organizational values and other non-subject and non-cultural elements play important role. Thus this is the task only humans are able to complete satisfactorily.

The educational “director” is a kind of new educational profession that might emerge serving individuals, small groups, organizations. In depth understanding of topics that students need to acquire, vast practical experience, broad knowledge and experience are crucial for this job. This role also assumes the role of a mentor: the one in charge of overall development and advancement of future professional as a holistic member of a prospering society.

Supporter

Despite ever growing corpus of educational content and diversity of educational materials available on-line, most of them free, a student will have the need for assistance. Sometimes to choose alternative educational material, sometimes to fully comprehend, sometimes to discuss and challenge opinion, sometimes to understand practical implications and learn from others’ experience.

One way to accomplish that is through conversation with other students, experienced professionals or teachers. There is a plethora of discussion groups and fora on Internet that can be used. One can also engage in one-to-one discussion with willing individuals world-wide. Thus the “classmates” and “faculty” are broadened to the whole living population.

Learning partners, consultants, coaches are all available on-line, immediately, every time and all the time they are needed. This is something no teacher and no school can offer and compete with. Because a physical teacher has a very limited offer: only his own competence and only sometimes.

But this limited, personal offer can be for a never before possible number of students: worldwide population. They can offer their competence, which includes their experience – professional, educational and life experience - to almost unlimited number of people in the whole world.

However, they are going to face a strong and growing competition in the form of artificial intelligence. AI systems will aggressively assume that role. They will integrate every answer, advice, opinion and suggestion anyone ever gave and offer aggregated support to the learner.

It does remain to be seen to what extent students of all sorts will be satisfied with AI service and whether its influence on the competence of future professionals will create significant and possibly worrying “holes” with possible dangerous outcomes in professionals’ products and services.

However, it highly probable that “personal AI” systems might be created. A professional, a teacher, could feed a dedicated AI system with their own knowledge, experience and values in written, spoken, visual form in the hope that such a system would be capable of giving answers as close as his live counterpart, the “father” could. This could become a form of immortality of a teacher. This calls for teachers to leave their legacy in multiple forms and in many details, to “transcribe” themselves in digital format as broad, as deep and as versatile as one cannot even imagine today.

As AI technology will progress, “teacher’s digital transcript” could become THE way of teaching. Instead of trying to be a good teacher to everyone in local audience, teacher’s role should be to become the best teacher to a specific audience, worldwide and forever.

School Role

For a couple of centuries the school was the place to learn. It is where the corpus of knowledge was homed and process of knowledge transfer was occurring. This can no longer satisfy the needs of contemporary and future societies, organizations, economy, students and citizens.

Data and information are homed in Internet. There are many sources of competences today: organizations, individuals, groups. Also, everybody is, in one moment or another, in one form or another a student. Learning has to be available here and now. For student's purpose with student's desired outcome. Thus, a legitimate question becomes: "What is the future role of the school?"

Physical Space

People will utilize on-line and virtual presence to make their learning as efficient as possible. However, for ultimate result, for ultimate learning outcomes and for fruitful, joyful life, learners need each other physically. People are social beings. They need physical presence of other humans. Collaboration is the key element that enabled the creation of such a complex and advanced civilization.

The school is the place to meet these social needs. However, this also means that physical space of schools needs to transform. Large groups of students listening to unidirectional talks in the same room in the same time will become extremely rare. Students need small spaces for their project based collaboration, pleasant environment for their stimulating discussions, cohabitation spaces where they learn tacit knowledge from the masters – their teachers.

Students also need physical spaces for learning and experimenting that cannot be found elsewhere. They need a safe physical "sandbox" to test in real life what they have researched and experimented with in virtual laboratories and virtual spaces. Learning can no longer be a unidirectional process, from teachers and school to students. It became omnidirectional process where not only teachers learn from and with students, but also where school learns from industry and society.

Institutional Role

Learners are everywhere. The need for knowledge transfer is everywhere. There needs to be a focal point. It will be the school. The school needs to be a kind of information clearing house, a referral point, a broker. A first point of reference to find knowledge and educational process, to express needs, the medium to communicate newly created content and services.

This also means that the time of universal schools is mostly gone. Some will be specialized in knowledge assessment and certification, some will focus on curating the knowledge and others will assume roles we cannot even comprehend today. And yes, some schools will be physical spaces while some will be virtual only. And a range of combinations, of course.

Summing-up

Defining one's role as a teacher in the future is an uncertain task. A teacher should clearly and realistically identify their strengths but also their true passion. Be it creating the content, explaining, telling stories, sharing experience, working on projects, assessing competences or else. And then, one should focus on doing it to the best of their ability.

Instead of trying to be a good teacher in everything traditional teacher was doing and to every student, modern teacher needs to excel in what they do the best and focus on those

students needing them most. To be the best teacher only to some. Due to Internet, one can be the best teacher to incomparable number of worldwide students, forever, instead of being satisfactory teacher only to a few local students, now.

Note

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Predrag Pale

PhD, Associate Professor, Faculty of Electrical Engineering and Computing,
University of Zagreb, Unska ul. 3, 10000, Zagreb, Croatia.
E-mail: Predrag.Pale@fer.hr
ORCID: <https://orcid.org/0000-0003-2171-7302>