DIGITAL TRANSFORMATION OF EDUCATION: SEMIOTIC AND INTERDISCIPLINARY PERSPECTIVES

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The digitization of education is a complex and comprehensive process which is difficult to fit into a single research effort. Therefore, our ambition with this issue of the journal is not comprehensiveness, but rather a combination of different disciplinary approaches. Our hope is to achieve a good example of collaboration which partially took place during the semiotics conference of the same title held in Sozopol at the beginning of September 2022. Digital culture as a subject of scientific research is interdisciplinary in its very essence, much more so than the pre-digital cultural types which preceded it. Its rise has put many of the established disciplinary divisions in crisis, as well as most educational institutions. Another characteristic of digital culture is its unprecedented dynamism. This is something which

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greatly reduces the "shelf life" of our theoretical models, generalizations and results of specific research, especially when considering that the epochal change happened within a generation. The positive side of this enormous complexity is that all research perspectives are now open and there are almost no established scientific hierarchies to stifle the research entrepreneurship of the digital natives.

We cannot introduce this issue of the journal without a brief overview of the main points where digitization has had the most significant impact on education. Although there is no clear boundary between them, I will summarize these influences relevant to the chosen perspective in two groupings: *technological and cultural*.

The most important technological changes in education, resulting from the introduction of new communication technologies and the development of the Internet, are the following:

1. Online learning and distance education: the most obvious and widespread innovations of the educational process concern the possibility of it going beyond the need for the simultaneous physical presence of its participants. This has made education globally more accessible, more flexible for teachers and students, and ultimately more competitive in a new attention economy where the biggest deficit is that of free time. The COVID-19 pandemic has accelerated the adoption of online learning, since universities and colleges have been obliged to adapt to social isolation. Many of the coercive achievements in this regard have since continued to be applied systematically even after the threat has passed.

2. Personalized learning: another organizational innovation with a great impact on higher education, largely imposed by the general context of a hyper-commercialized digital culture, is the possibility of providing each learner with an individual program reflecting his/her specific needs and capabilities. This means that students can access a variety of resources, adapt their learning pace and receive targeted feedback which could lead to more effective learning outcomes and greater value for their time investment.

3. Efficiency and cost reduction: not only learning, but also the entire process of education administration can be optimized, thus reduce the monotony of work for many employees. This could be a qualitatively new level in admissions processing with high levels of free choice, especially with a large number of candidate students. This will also contribute to individual curriculum management throughout the entire period of study, enabling them to move their folders themselves and thus not requiring the mediation of the employees. Not to mention the extraordinary opportunities that

digital platforms provide for the testing and certification process of a large number of students. All this leads to a reduction in costs and, accordingly, the price of education, without compromising on quality.

4. Big Data and analytics: one of the most dynamically developing areas of digital business is the collection and use of consumer data. This process could make a real contribution to universities as well, at all levels of their mission. This is data on the behavior, preferences and achievements of students, guiding the university management to know precisely what to ask of teachers and staff, in order to improve the service (teaching methods, identification of students at risk and optimization of teaching materials, integration of diverse sources of information and forms of assessment).

5. Blended learning: an option which preserves the advantages of real presence and face-to-face contact between teacher and students, but also improves the quality of the exchange with new technological means. Thus, for example, virtual reality has been successfully integrated into many classes in exact sciences and technology. Interactivity in learning can also be deployed, where class discussions are only a small part of it. It can also incorporate gathering of groups of face-to-face and online students which also has huge advantages over just the remote form.

6. Open educational resources (OER): new technologies have helped universities not only to create easily accessible interactive learning resources for their own programs, but also to join forces and create unprecedented volume and quality of materials available to the global world audience. In this way they can democratize education in the most disadvantaged countries of the world.

7. Global collaboration: From those unsuspecting times of what the world wide web would become, its first non-military applications were to link archives with scientific research (ARPANET, BITNET, etc.). Today, digital platforms offer virtually unlimited opportunities for remote scientific and educational collaboration, enabling millions of scholars to experience real-time international academic exchange without having to leave their home or office. In the last decade and especially in the post-COVID-19 years, international education projects have entered a qualitatively new phase.

8. Gamification and EdTech: we also come to those digital innovations which have been specifically developed to modernize the educational process itself, bringing it into tune with the most developed technologies in the entertainment and commercial services industries. This process is only at its beginning, but it holds the greatest potential for development and best fits the semiotic problematic. For many, traditional educational approaches

have lost the battle in the new attention economy, and only with EdTech and gamification can learning be made fun and effective enough to fit into the cognitive formats of the GenZ.

9. Accessibility and inclusion: new digital technologies are now indispensable in improving accessibility for students with disabilities and special needs. Tools such as voice input programs, adaptive keyboards, text-to-speech and voice-to-text programs, and audiobooks make educational content more inclusive. New capabilities are still being developed with virtual and augmented reality technologies.

10. Lifelong learning and professional development: lifelong learning and professional development have become more accessible through online courses and digital resources. This is critical in an age of rapidly evolving skill and knowledge requirements. At the same time, this also hides one of the biggest challenges of the digital revolution: the potential danger of all those who for one reason or another are outside digital literacy or access to technology falling behind at a dramatic pace and being condemned to various forms of marginalization.

As for the *cultural implications* of the digital transformation of higher education, they are profound and multifaceted. They are mostly related to the fundamental change in the values, behavior and norms of the educational institutions and the individuals employed in them.

1. Change in the way of thinking:

– *Adopting a growth mindset*: today's trendsetters have quickly adopted a mindset of continuous learning and adaptability. This means understanding that skills and intelligence must be constantly developed, and that behind every problem there are opportunities for growth and non-standard solutions.

– *Innovation and experimentation*: educational institutions need to promote more risky and permanent educational entrepreneurship in search of constantly renewed teaching methods, tools or strategies. Clearly, not everything will succeed, but a culture of innovation is critical to development.

2. Collaboration and interdisciplinary learning: the digital age has displaced socio-cultural reality in a way that has definitively rendered meaningless the closed disciplinary enclaves which characterized the first centuries of the modern university. The new dynamics of the digital economy have forced all institutions to engage in real-time social reality and compete for increasingly scarce attention, time and audience approval. This stepping one foot into the reality of universities has forced more pragma-

tism and a problem-solving orientation, which naturally brings together capable researchers from different disciplines in meaningful projects. However, it is also leaving the old-fashioned and lazy "barons" to their retirement. In terms of learning, this cultural macro trend has led to curricula developed in collaboration with the private sector, technology firms, and all kinds of for-profit and non-profit organizations. Such programs bring together the most working and up-to-date content from each of many disciplinary teams.

3. A student-centered approach: the new digital environment has also sharpened public sensitivity to the social benefits of educational institutions. This has necessitated a change in the pre-digital concept of education organized around the figure of the professor/researcher and the emergence of a new concept which reorganizes everything around the figure and interests of the student. The educational service now finds itself in the very competitive environment of an overabundance of knowledge and information, pushing universities to offer flexible programs tailored to the individual and social differences of students. Also, the latter are increasingly involved as a single voice in organizing the entire educational process, and in many cases as participants in creating the knowledge that the university offers.

4. Digital literacy and digital citizenship: in addition to skills for the utilitarian use of digital tools, the new era requires the adoption of a comprehensive culture of digital literacy, where students, teachers and employees understand the consequences of their actions in the new technological environment. This means understanding a wide range of ethical issues related to the algorithmic control that platforms give us: the deformation of public information about leading events, the protection of personal data, the artificial polarization of public opinion on social media, and the new digital civil rights, etc.

5. Transparency and openness: with the proliferation of open source resources and open access academic publications, a spirit of greater transparency of academic processes and research has been established. This new culture encompasses the organization of competitions, projects, exams, etc., as well as the maintenance of publicly accessible records of scholars, students, publications, citations, successes and failures of all participants in the educational process.

The list of these highlights is by courtesy of my interlocutor Chat GPT-4, who, given the journal's subject matter, might well join the editorial team. This experiment is not random and represents my first attempt at using artificial intelligence as a significant aid in writing an academic text. The proposed points regarding the technical and cultural consequences for ed-

ucation in the advent of digital technologies are indeed comprehensive, but their exposition was quite superficial. My contribution was to give some depth suitable for to the introductory purposes of this text. Undoubtedly this experiment gives me reason to touch upon the role of Artificial Intelligence for the future of education. There is no doubt in my mind that this is the next "big thing" in this culturally strategic area.

Next comes the part where my interlocutor gives his views on the subject on which I assume he has the most competent perspective, namely the influence of the AI guild on higher education. Here is what he said (without editing):

- **Personalized Learning**: AI can customize learning experiences based on students' needs. Through adaptive learning systems, students can proceed at their own pace, receiving additional resources on topics they struggle with and skipping over material they have already mastered.
- **Learning Analytics**: AI can analyze students' performance and learning habits to predict which students are at risk of falling behind or dropping out. This allows institutions to intervene early, providing necessary support to ensure student success.
- **Automating Administrative Tasks**: From answering frequently asked questions to scheduling and enrolment, AI can automate many administrative tasks, making processes more efficient and allowing staff to focus on more complex tasks.
- **Research**: AI can aid researchers in sifting through vast amounts of data, making predictions, and even suggesting new areas of exploration. This can accelerate discoveries in fields ranging from physics to social sciences.
- **Virtual Assistants and Chatbots**: Many institutions now use AI-driven chatbots and virtual assistants to answer student queries 24/7, aiding in tasks from enrolment questions to campus directions.
- **Smart Content**: AI can help in the creation of customized reading material, study guides, and problem sets for students. For example, digital content can be translated, summarized, or reformatted based on the learner's preferences.
- **Tutoring and Mentorship**: AI-driven tutoring systems can assist students in subjects they find challenging, providing them with additional resources and exercises to enhance their understanding.

- **Language Processing Tools**: Tools like Grammarly or Turnitin use AI to assist students in refining their writing and ensure academic integrity.
- **Exam Proctoring**: AI-driven systems can monitor online exams, using facial recognition and behavior analysis to detect and prevent cheating.
- **Enhanced Accessibility**: AI can assist in transcribing lectures, turning spoken content into written form, or even translating it into different languages, making education more accessible.
- **Campus Safety**: AI-driven surveillance and predictive analytics can help ensure campus safety by monitoring unusual activities or predicting potential security threats.
- **Curriculum Design**: Institutions can use AI to analyze which parts of the curriculum are most and least effective, allowing for continuous improvement.

Challenges:

- **Ethical Concerns**: The use of AI in education raises ethical concerns, especially around privacy, data security, and the potential for bias in AI-driven decisions.
- **Job Displacement**: As with many sectors, there is concern that AI could replace certain administrative roles in higher education.
- **Over-reliance**: There is a risk that over-reliance on AI might lead to reduced critical thinking and problem-solving abilities among students.
- **Infrastructure and Training**: Implementing AI requires significant resources, both in terms of infrastructure and training staff to use and manage the new systems.
- **Equity Issues**: If AI-driven personalized learning becomes the norm, there is a potential that students without access to the latest tech might be left behind." (OpenAI's ChatGPT-4, response to prompt from author, November 5, 2023).

It should be noted that the contributions of AI for its own impact on higher education are logically related to the general panorama of the impact of digital technologies, with each of the points having a more or less significant upgrade. In this reading, AI makes everything better in a user-oriented digitized version of the higher education system. Interestingly, when comparing the available publications in the databases of academic

literature on the subject, as in the previous case, there are no significant discrepancies if they are to be summarized. Naturally, the descriptions of "natural intelligence" in the academic and scientific literature are much more thorough, the statement is infinitely more precise, and everything is organized in such a way as to encourage further research to benefit from what is available. Artificial intelligence seeks completeness. Indeed the implicit understanding of its usefulness is that nothing should be missing, but without going in too deep. Chat GPT does not give references and is very reluctant to mention names, only as a last resort.

Where I found greater differences between the "self-aware" role of AI in the digitization of higher education and the opinions of leading academics on the subject is in the critical perspective. Chat GPT-4 by default ends each answer with one or more "Challenges" paragraphs. Here, as you might expect, the critical notes are rather blunt, and not as comprehensive as the summaries of the positives. Most relevant to me in this regard are the criticisms of Popenici, Harari, Chomsky & Co. These are not scholarly contributions in the literal sense, but the insights of leading experts which stress lines of concern likely to be central themes for the originators of critical thinking as a core mission of higher education for a long time to come. Chomsky (2023) analyzes the structure of human thought and the inability of artificial intelligence to approach it in any way. The more the products of the latter are "sold" in institutions of knowledge instead of those of the former, the more the immune system of society will fall, protecting it from corporate, political and all other abuses. Harari (2023) calls "narrative" the operating system of humanity and sees how with generative media and especially Chat GPT, artificial intelligence is beginning to penetrate it with unpredictable consequences. If until now search engines and all other technologies helped us to keep knowledge at hand without having to remember it, then universal human laziness is now being tempted by the possibility of someone else producing its linguistic product, its most intrinsic and distinctive activity. However, this activity underlies the construction of all socially constructed public institutions, and the fact that one day they could gradually become a creation of artificial intelligence does not bode well. Popenici's (2023) paper addresses a broader range of issues related to uncritical mass enthusiasm for the role of AI in higher education. Although some of them seem to coincide with the "self-aware" challenges of Chat GPT-4, the tone is completely different and the conclusions completely pessimistic: "There is a documented tendency of AI to immensely enhance surveillance and inequality, bias, and discrimination and widen power imbalances." Popenici (2023: 3), previously the research-

er from Charles Darwin University, Australia recalls the sad history of the highly compromised concept of intelligence, which caused enormous ethical damage in the course of the 20th century.

In all of these highly negative predictions about the future of AI in higher education, there is one common denominator that is the most important for this text: the only antidote is a good education, combining deep technical knowledge of the nature of AI with critical thinking techniques developed in the tradition of the humanities and social sciences. It is possible that in the near future, when the university will inevitably lose ground in professional training at the expense of corporate training itself or private, very market-flexible providers of educational services, this *intellectual resistance* will remain its only distinguishing characteristic.

I have emphasized this introduction to AI because it is the great absentee from the collected articles in this issue of the journal. The topic is not one of the most attractive. Interdisciplinarity is undoubtedly a plus for the undertaking, but due to the small number of articles it is also a source of an excessive heterogeneity. Gamification, entrepreneurial education and smartphones are among the most discussed issues. In their article "Gamification in Business and Entrepreneurship Education – Theory and Applications", **Marinov** and **Spasova** analyze the benefits of this new technique in the educational field which they know best. The analysis is based on a well-established and highly articulated model of entrepreneurial skills (EntreComp framework), which helps to determine in which of them gamification has greater educational effects and where less. The second article entitled "Opportunities and Limitations of Digital Educational Tools in Shaping Entrepreneurial Mindset and Competences" by **Kolarov** and **Hadjitchoneva** seems to provide an answer to the first article, based on an empirical study among entrepreneurship students about their propensity to use digital tools during their studies. The answer is that they rather prefer traditional methods, without of course completely denying digital innovation.

There follow two articles which explore digital subjectivity and the digital subject. **Jared Smith** in "Postphenomenology and Education: From Cyborg Students to Immersive Classrooms" explores by means of philosophical speculation the fusion of the self of the new generation of students with technological means (and especially the smartphone), sharing a constructive and optimistic attitude towards the future of digitized education. **Victoria – Delia Bunceanu's** article "New technologies, children and the General data Protection Regulation (GDPR): The Gap between Communication, Infrastructure and the Application of a European Regulation!"

within the framework of Law sciences, and with a rather critical perspective explores the constitution of the "data subject" in the new digitized environment and the inconsistencies when this is applied to children. Her appeal is addressed to policy makers who are invited to take her conclusions seriously.

Dilyana Molerova's article "Building a Fashion Influencer Image on Instagram" is dedicated to an immersion in one of the most successful competitive educational formats: that of influencers. Although the author's main interest is fashion, her summaries are useful in making sense of the entire cultural industry of the influencers, where certain high-quality manifestations of the content offered quite directly shift the focus away from traditional education. **Iokasti-Christina Foundouka's** article "Attempting a Gendered Cultural Semiotic Analysis, through the Transmedial Study of the Myth of Carmen" compares various works inspired by one of the most exciting dramas of the Western tradition – that of Carmen.

The concluding section of the volume showcases two studies that highlight the applied and practical nature of semiotics within the scope of large European digital education initiatives. The first study, conducted by **Giorgos Dimitriadis**, delves into the educational implications of interactive cinema, analyzing it through the lens of student engagement. In the subsequent paper, **Despina Constantinidou** examines the role of language education in equipping students with digital literacy skills, fostering their development as informed and proactive participants in the digital world.

With all these caveats, I wish you pleasant reading of Issue VI of *Digital Age in Semiotics and Communication*!

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