# CHAPTER
# BASICS OF DIGITAL EDUCATIONAL TECHNOLOGIES AS A TOOL FOR FORMING HUMAN CAPITAL FOR THE DIGITAL ECONOMY

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***Summary***

*The study confirms that in the digital economy of 2026, human capital will become the main driver of development, pushing material resources into the background. The results of the analysis indicate a critical need to transition from static learning systems to flexible ecosystems based on AI agents and adaptive technologies. It has been established that the use of intelligent assistants, such as those found on the Duolingo or Khan Academy platforms, increases the effectiveness of learning by 25–60% compared to traditional methods. It has been proven that the digitalisation of education creates "technological immunity" for the state, ensuring the resilience of society to cyberattacks and global crises. The study found a direct correlation between the level of implementation of educational IT tools and countries' positions in global competitiveness rankings. It has been determined that adaptive learning is most effective in foreign language learning, exact sciences, and preparation for professional certifications. At the same time, key barriers were identified: high development costs, the problem of "cold start" algorithms, and the risks of deepening digital inequality between population groups. Based on the data obtained, it was concluded that strategic investment in EdTech is the main tool in the struggle for global technological leadership and economic wealth of the country.*

## Introduction

Today, we are witnessing a complete rewriting of the old rules of success for states, the era when a country's wealth was measured by the number of factories, oil fields or land area is now a thing of the past. In 2026, the struggle for resources has been replaced by a real "intellectual race", where the winner is the one who has managed to create the best conditions for the development of human minds and talents. Now it is people, their digital skills and ability to think outside the box that are the "invisible gold" that guarantees a country's security from external threats and stable economic growth. In essence, human

capital has become the main driver of progress, because in today's world, ideas and technologies are valued much higher than any raw materials. Thus, investment in education and the development of the abilities of every citizen has transformed from a humanitarian task into a matter of survival and leadership for the state in the digital age.

The rapid development of artificial intelligence, quantum computing and blockchain has created a situation where classical education, with its paper textbooks and linear programmes, can no longer keep up with the demands of the real economy. Knowledge becomes obsolete faster than the learning cycle is completed, requiring an immediate rethinking of the very nature of the educational process. That is why digital educational technologies (EdTech) are no longer just auxiliary tools for distance learning.

They have become a powerful strategic mechanism that allows us to scale intelligence and transform human capabilities into the country's main economic driver.

The object of study is how people acquire and develop knowledge, skills, and abilities in the context of the transition to a digital economy. In other words, the focus is on how human capital is formed and changed when society actively transitions to modern digital technologies.

In this article, we will look at which technologies (from online courses to artificial intelligence) actually make student training more effective and how this process works from the inside.

The aim of this work is to show how modern educational IT tools help to train talented specialists, thanks to whom the country becomes more successful and richer.

A wide range of specialists are engaged in researching the relationship between digital education and economic progress, including Nobel laureates Gary Becker [1], who are the founders of human capital theory. The current impact of digitalisation on the labour market and productivity is analysed by global experts Eric Brynjolfsson [2], Lawrence Katz [3] and Klaus Schwab [4], the founder of the Fourth Industrial Revolution concept. In the Ukrainian scientific community, these issues are thoroughly explored by Vasyl Kremen [5] and Valery Bykov [6] (digital transformation of education), as well as Olena Grishnova [7] and Kateryna Boyarinova (human capital economics) [8].

In addition, strategic guidelines on this topic are formulated annually by analytical groups from the World Bank, the OECD and the World Economic Forum.

## 1. Human capital as the foundation of the digital economy and national security

Today, countries compete not only in terms of their economies or resources, but also in terms of who can attract and develop more talented people.

Technology is changing so rapidly that textbooks cannot keep up with the updates. Therefore, education is no longer just important for society – it is becoming the key to national security and economic development.

Modern global civilisation is undergoing a radical change in its economic growth model. Whereas natural resources and physical capital used to be key, intellectual assets are now taking the lead [1, pp. 45–67]. In the digital economy, the main driver of development is human capital – accumulated knowledge, skills, competencies, and creative abilities that are monetised in high-tech sectors [2, pp. 112–138].

New innovations – artificial intelligence, block chain, quantum computing - are emerging so rapidly that the labour market now requires completely different knowledge and skills. Traditional schools and universities simply cannot keep up with these changes. Therefore, we need to seriously rethink how modern digital tools should work in education (EdTech) [3; 5]. Today, digital technologies in education are no longer just auxiliary devices for learning, but a powerful mechanism for transforming human abilities and knowledge into a strategic resource that allows the state to gain advantages in global competition.

At the beginning of 2026, learning management systems (LMS) became a mandatory foundation for any education, from universities to large companies. Although proven platforms such as Moodle and modern solutions from Google and Microsoft lead the market, educators in Ukraine usually do not settle on just one thing, but combine different services. Most often, they combine the Moodle system with Google or Microsoft tools to get the most out of their learning opportunities.

Today, ordinary educational websites are turning into smart assistants. Now, the system not only stores lectures, but also offers each student what they are interested in, automatically checks homework, and even helps teachers create tests in seconds. It's like having a personal tutor who is always on hand on platforms such as TalentLMS or the updated Moodle [6; 10].

In the world of 2026, a higher education diploma is no longer seen as definitive proof of professional competence, as knowledge quickly becomes outdated and needs to be constantly updated. That is why the main advantage of the state is the culture of lifelong learning, where people learn throughout their lives, not just in their youth. The success of a country now directly depends on how easily and comfortably an experienced professional can "restart" their career – master new technologies or even change professions [4, pp. 55–78].

Modern digital platforms make this process as simple and seamless as possible, they allow people to acquire new skills online, without having to leave their jobs or adapt to a rigid lecture schedule. This creates conditions for the continuous intellectual development of the entire nation, transforming it into a flexible and dynamic mechanism. In such a system, every citizen can quickly

adapt to the demands of the times, remaining competitive and successful in the labour market regardless of age.

The digitalisation of education is radically changing the rules of the game in the labour market: we are rapidly moving from the era of “diploma hunting” to a skills-based economy. In today's world, a formal education document is no longer a guarantee of employment, because employers are not interested in the name of your university, but in the specific set of skills that you can apply on your first day at work.

Thanks to the implementation of smart learning management systems (LMS), the qualification verification process has become transparent and automated. Now, the system does not simply issue a paper certificate, but generates a dynamic digital profile of the student's competencies. Artificial intelligence analyses every test you have taken, every project you have completed, and every task you have solved, turning them into a detailed analysis of your real capabilities. This creates a direct “bridge” to a career: AI independently compares your profile with the requirements of the best companies and offers the ideal workplace where your talents will be most useful. This approach makes the path from student to successful professional much shorter, and your first salary much closer.

The transformation of human capital today is also happening because we have finally changed our approach to the learning process itself, making it interesting. Modern educational IT platforms actively use gamification - they turn boring memorisation into an exciting game where, instead of the usual grades, you earn points, unlock new levels, and compete with others in rankings. The use of digital rewards and virtual simulations allows you to fully immerse yourself in the process. For example, instead of just reading about complex mechanisms, you can «assemble» them in a virtual laboratory [8].

This approach radically changes attitudes towards education; learning is no longer perceived as a difficult routine. When the process is based on excitement and instant results, students stay focused and inspired for much longer, even when it comes to studying advanced mathematics or complex programming. This allows them to absorb vast amounts of information without stress, turning the acquisition of knowledge into a natural and enjoyable part of life.

Thanks to Big Data technologies, the state has for the first time been able to see an “X-ray” of the entire education system in real time. It's like having a super-modern digital map that shows what millions of students are studying right now, what they are best at, and where they have difficulties. Such analytics work as a powerful “weather forecast” for the labour market, allowing us to see a year or two in advance that the country will soon face a shortage of, for example, power engineers or cybersecurity specialists.

With this information, the government can change university curricula today, rather than waiting for the problem to become critical. This helps the state to

stay ahead of the curve: we are training the specialists that the economy will need tomorrow, rather than those whose professions are already a thing of the past. As a result, we avoid situations where graduates cannot find work and strategic industries in the country are at a standstill due to a lack of personnel.

## 2. The evolution of educational technologies: from LMS services to adaptive learning with AI

In the coming years, educational platforms will cease to be mere «file repositories» and will transform into a full-fledged digital infrastructure. The main breakthrough will come from AI agents – smart programmes that will act as personal mentors: they will select the pace of learning for each pupil or student and instantly free teachers from paperwork [1, pp. 12–15].

However, there is an important caveat: many old systems cannot simply be "tweaked" – they will have to be rewritten from scratch in order to work fully with new technologies. Therefore, in my opinion, a gradual transition from classic websites to flexible ecosystems is necessary, where everything – from grades to curricula - is updated automatically [2, p. 45].

What exactly will change? In simple terms, to better understand this potential, take a look at these key areas of development:

– Scaling, platforms will become the basic foundation without which it will be impossible to imagine a modern school or university. Learning online will be as natural as using a smartphone.

– Personalisation, While today's platforms only provide access to materials, by 2030 they will become adaptive, with the system analysing your progress and automatically adjusting the complexity of the programme, focusing on the topics that are most difficult for you [3, pp. 88–90].

– Automation of routine processes will allow technical tasks to be delegated to AI, namely checking work, reporting and administration. This will significantly reduce the workload on teachers and help avoid professional burnout.

– AI agents, we are moving to a model of "education without breaks". AI assistants will become reliable guides in learning, available 24/7 and ready to help students understand the material whenever they have a question.

Today, learning adapts to you like a living organism. The system sees in real time where you have stopped or what you have not understood, and instantly changes the plan, giving someone a more difficult task, someone else a short explanatory video instead of a long text, and someone else more hints to help them understand the topic.

So who sets the tone in adaptive education?

– Duolingo is the gold standard for how learning becomes a game. Thanks to AI, the programme instantly understands which words you are forgetting and

throws them at you just when you are ready to learn them. This is true personalisation for millions of people.

– Khan Academy – it used to be just a video library, but now it's a smart tutor. Their AI assistant doesn't give you ready-made answers, but asks leading questions to help you come up with the solution yourself.

– ALEKS and Knewton – these platforms have become indispensable in universities. They work like an "X-ray" for knowledge: they accurately determine what a student knows and what they have missed, and create an individual learning map to fill in the gaps [4].

– Ukrainian projects (EdEra, SmartExpert, Spektr) – our developers are actively catching up with global leaders. For example, EdEra is already integrating elements of adaptivity into its courses, and new startups such as Spektr are creating smart AI solutions that help Ukrainians learn faster and more effectively.

Studies show impressive results: thanks to smart programmes, students learn and remember material 25–60% better than during regular group classes. It works much more effectively because everyone moves at their own pace [5, p. 201].

This technology is most beneficial in language learning and complex exact sciences (such as mathematics or programming), where it is important not to miss a single step. It is also a real lifesaver for exam preparation (NMT or professional certifications) and for company employees who need to quickly master new skills without taking time off work.

Adaptive learning works like a personal tutor, as the system does not waste time on what you already know, but focuses exclusively on your gaps. This allows you to move at your own pace, instantly moving on to new material without waiting for the whole group, and the gradual increase in difficulty adds confidence, as you don't feel stressed by overly difficult tasks.

Despite its significant advantages, the widespread implementation of adaptive learning in 2026 faces several serious challenges. Although these technologies look promising, they are held back by high development costs and the need to collect huge amounts of data for the algorithms to work accurately. There is also the technical problem of a "cold start", where the system simply does not know what to offer a newcomer until it has studied their behaviour. In addition, there are serious ethical questions, how to protect student privacy and ensure that AI does not become biased, mistakenly "labelling" a person's abilities based on dry numbers.

Statistics for 2025–2026 confirm that countries that invest in digital education are becoming leaders in global competitiveness and digital economy rankings. At the same time, this path is not easy – it opens up great opportunities, but also poses serious challenges, especially for countries like Ukraine, where resources are limited and the need for innovation is critical.

In my opinion, digital education gives the state a powerful advantage on the world stage, and here's why:

Firstly, it radically changes the quality of human capital. Thanks to intelligent AI assistants and adaptive programmes, people learn 25–60% more effectively than with the old methods. We are getting masters of their craft who are as effective as possible thanks to modern technologies. Considering that by 2030, digitalisation will cover almost all specialities, such training is the foundation for the country's future success.

Secondly, it is a direct path to economic leadership. The examples of Finland and Sweden prove that the countries that were the first to digitise education now lead the world rankings. Their graduates do not just look for jobs, they themselves create innovations in the field of artificial intelligence and digital technologies, which drives the entire economy of the country forward.

When universities go digital, they become real magnets for money. It's simple: modern education attracts foreign students and investors who are willing to pay for quality and technology. Take the United States, for example, where educational technology is already a huge billion-dollar business, and it will only continue to grow. Even countries such as Kazakhstan have realised this and are upgrading their institutions to raise the country's prestige and attract funding for science. Ultimately, this becomes the state's main commodity. Instead of depending on factories or raw materials, the country begins to prosper simply because its people are smart and know how to use technology.

Digital education today is, so to speak, “immunity” for the entire country. When every student and teacher understands technology, it is much more difficult to “break” the country, whether through cyberattacks or fake news. This makes us ready for any stress. Global experts have long noticed that if a country has a robust online learning system, it does not fall apart during crises, as was the case during the pandemic. Such a country simply flips a switch, adapts quickly and moves on, while others are still trying to understand what happened. In essence, it is insurance: if people know how to use AI and digital tools, the state will survive and win under any conditions [8].

– Countries with powerful online platforms and AI tools are turning knowledge into their main export commodity, earning money from the intellect of their specialists around the world. For example, the US and Britain are making a fortune from this by simply allowing students from other countries to study remotely. But it is also a question of technological leadership. There is currently a real battle of wits going on between superpowers such as the United States and China, with global technological leadership as the main prize. Whoever teaches their students digital skills and programming better today will win the battle for the technologies of the future. In essence, digital education is the main weapon in the fight for who will rule the world tomorrow.

Despite all the cool opportunities, digitalisation is not only about success, but also serious risks that cannot be forgotten:

– The main problem is that technology can make the rich even smarter and the poor even poorer. If a child does not have a laptop or fast internet, they simply fall out of the system. UNESCO warns that in developing countries, half of the population is still left behind, and this is slowing down the development of entire nations.

– We are increasingly relying on Google or Microsoft. This turns education into a purely commercial business («edu-business»), where your personal data can become a commodity and AI algorithms can secretly play into the hands of certain groups. In addition, hackers currently attack online schools more often than banks, so data security is a pressing issue.

– Money is not infinite. When special grants (such as those provided after the pandemic) run out, governments are faced with the choice of where to find the billions needed to support these complex systems. This requires the government to take a very cautious and sensible approach to spending.

– The 2026 Strategic Review of Educational Transformation is an analysis of how digitalisation is transforming learning from a simple process of knowledge transfer into a tool for survival and dominance of states in the modern world. We can see the assessment in Table 1.

The table shows that investments in digital schools or universities pay off handsomely through economic growth and the emergence of super-specialists. However, technology is not a magic wand. If every pupil or student is not given access to the internet and the system is not protected from hackers, the country risks being left behind in global progress, despite all the billion-dollar forecasts for the Ed Tech market.

A significant step in the evolution of education has been the transition to so-called “micro-qualifications”. Today, educational platforms no longer force you to spend years just for one big diploma. Instead, they give you the opportunity to quickly, in a matter of weeks, master a specific and applied skill that is in demand on the market right now – for example, learning how to work professionally with artificial intelligence for marketing.

After completing such a short course, you receive a “digital badge” – a modern analogue of a certificate that automatically appears on your LinkedIn profile or even in government registries. This allows you to update your knowledge in small portions, but do so continuously. As a result, your value as a specialist grows step by step, and employers see your current skills in real time, not just what you studied at university.

In my opinion, today's education has long gone beyond the usual texts on the screen. Thanks to virtual and augmented reality (VR/AR), education has become a real “rehearsal for life”. Now, a future surgeon can perform their first

operation in virtual glasses, and an engineer can take apart a digital engine that looks like the real thing, down to the last screw.

Table 1

**Assessment of digital education potential (Forecast for 2026–2030)**

| What will change (Aspect) | Chances of success (1–10) | Complexity of implementation (1–10) | Who is already doing it | What will happen next |
|---|---|---|---|---|
| Smart people and professionals | 9 | 6 | USA, Sweden | Artificial intelligence will become the main teacher |
| Wealth of the country (GDP) | 8 | 5 | Kazakhstan, Jordan | The educational technology market will grow by 17% annually |
| **What will change (Aspect)** | **Chances of success (1–10)** | **Complexity of implementation (1–10)** | **Who is already doing it** | **What will happen next** |
| New technologies (AI, Eco) | 9 | 7 | European Union | Countries will become leaders in the green economy |
| Power on the world stage | 8 | 8 | Ukraine and developing countries | Victory for those who overcome digital poverty |
| Resilience to crises | 7 | 9 | India | The main focus is on protection from hackers and AI ethics. |

*Source: developed by the author based on [9]*

The main feature here is that students gain real practical experience without any risk. In the virtual world, the price of a mistake is simply pressing the “try again” button, rather than damaged expensive equipment or a threat to life. This allows you to learn much faster, because you don't just listen to theory, you practise the movements with your hands until they become automatic. As a result, when such a specialist comes to a real job, they are no longer a novice – they are a person who has “lived through” these tasks hundreds of times in a digital environment.

To address security and trust issues, modern ecosystems are implementing block chain technology. This allows for the secure storage of a student's academic history, which cannot be falsified or deleted. Thus, every “digital footprint” of knowledge becomes a verified asset, which greatly simplifies the verification of personnel for large international corporations.

Here's how the new role of the teacher can be explained in simple and understandable language: Artificial intelligence is not going to replace the

teacher at all – on the contrary, it is becoming their best assistant. Thanks to technology, teachers are finally getting rid of tedious paperwork and endless test checking. Now they are becoming "directors" of learning and personal mentors.

While AI takes care of the technical details and fact-checking, teachers can focus on what is most important – the person themselves. Their main task now is to teach students to work in teams, think critically, and be leaders. They help develop so-called "soft skills": empathy, ethics, and communication skills. These are the very things that no robot can fully replicate, but which are critical to success in the real world. Teachers become inspirers and supporters, while technology takes care of all the routine tasks.

While AI deals with technical details and provides facts, teachers focus on what is most important: the student's personality. Their main task now is to teach people to work in a team, think critically and make difficult decisions. They help develop what is called "humanity": empathy, ethics, and leadership. These are the very things that no robot can fully replicate, but which are critical to success in life. Teachers become the ones who inspire, while technology simply does its job.

## 3. Strategic advantages, risks and global challenges of educational digitalisation

The digitalisation of education can be a problem for those who are not ready for change. Firstly, there is the so-called "digital divide", some have fast internet and modern devices, while others are left behind due to lack of funds or power outages. Secondly, even when the technology is available, distance learning often boils down to a formality – simply reading from a screen, which does not provide real knowledge. As a result, inequality between people increases and the level of education declines significantly [3, pp. 201–230].

1. Challenges related to the digital divide. The digital divide manifests itself in unequal access to technology, which directly affects the ability to participate in distance learning.

2. Challenges related to the quality of distance learning. Even when access is available, distance learning often suffers from structural problems that reduce its effectiveness compared to traditional learning.

3. Interrelationship between challenges and broader implications. The digital divide directly impairs the quality of distance learning: for example, students without stable internet access cannot fully participate in classes, which leads to them falling behind. Global consequences include growing educational inequality, reduced economic mobility, and employment challenges in the digital economy. Measures such as government device provision programmes, infrastructure development, and digital literacy training are recommended to address these challenges, but they require significant investment.

Today, one of the most serious challenges is the ethics of artificial intelligence in education. Since digital systems now not only store grades but also independently analyse each student's progress, there is a danger of so-called “algorithmic bias” [4]. This is a situation where a computer programme makes conclusions about a person's abilities based solely on dry statistical data. For example, AI may mistakenly label a student as unsuccessful simply because they missed a deadline due to personal circumstances or have a non-standard, creative approach that does not fit into standard code templates.

To avoid such mistakes, the state must establish clear rules for digital transparency. Every student or their parents have the right to know the criteria used by the system to assign grades and the basis on which it gives advice on further education [1]. Education must remain humane: algorithms should only help to find the path to knowledge, not decide a person's fate, ignoring their individuality and life context.

True human development is impossible if we forget about a person's inner state and psychological comfort. Distance learning has one insidious feature: when we study at home, the boundary between the workplace and the recreation area practically disappears. This often leads to people spending the whole day in front of a screen, feeling constant fatigue, which is called “digital burnout” [7].

That is why modern education is not only about knowledge, but also about the ability to “switch off” at the right time. The state strategy should teach us digital hygiene, how to use gadgets properly so that they do not take up all our free time, and how to find a healthy balance between the online world and real life. We must implement tools that help students take breaks and conserve energy, because only a psychologically healthy person can be truly productive and creative in the digital economy [5, pp. 310–335].

To better understand how the educational space is changing, it is worth comparing the traditional teaching methods we are used to with the new digital ecosystem of 2026. This comparison shows that we are gradually moving away from passive information assimilation, where students simply listen and memorise, and towards the active formation of practical skills. In other words, modern technologies make learning more interactive, flexible and focused on real needs, allowing each student or specialist to quickly adapt to changes and remain competitive (see Table 2) [6]:

1. The data presented in the table demonstrates not just a technical update of tools, but a fundamental change in the philosophy of teaching. Let's take a closer look at the key transformations:

2. From “broadcasting” to “moderating” knowledge. Whereas previously teachers spent 80% of their time retelling the textbook (the role of a lecturer), in the digital ecosystem of 2026, this role is taken over by artificial intelligence. Teachers will be freed up for creative and educational work. They will become

“directors” who configure AI agents to the needs of a specific group and help students overcome complex ethical or strategic barriers that algorithms cannot handle.

Table 2

**Comparison of traditional and digital models of education**

| Criterion for comparison | Traditional model (past) | Digital ecosystem (future 2026) |
|---|---|---|
| **Role of the teacher** | Source of information (lecturer) | Coach, mentor and experience architect |
| **Pace of learning** | One for the whole group (linear) | Adaptive (tailored to the student) |
| **Assessment** | Dry marks for exams and tests | Digital skills profile (Skills-first) |
| **Practice** | Theory from textbooks | VR/AR simulations and real projects |
| **Accessibility** | Limited by time and place | 24/7 from anywhere in the world |
| **Key resource** | Paper textbooks and lecture notes | AI agents and big data |

*Source: compiled by the author*

3. Transition to “live” practice (VR/AR). The main weakness of the traditional model is the gap between theory and reality. The use of virtual and augmented reality simulators solves this problem. Students gain not “knowledge about the profession” but “experience in the profession”. This allows the state to save enormous amounts of money on laboratory equipment and minimise the risks of mistakes made by trainees in real production environments.

4. A “skills-first” economy instead of a “diploma culture”. Replacing standard grades with a digital competency profile means that the labour market gains a transparent tool. Employers see not an average score, but a real map of a graduate's skills, how well they program, how they work in a team, and whether they can quickly retrain. This makes human capital “liquid” – a person becomes a ready asset for the economy immediately after completing the course.

5. Accessibility and continuity. The 24/7 format breaks down geographical and social barriers. Education is no longer a privilege for those who can afford to live in big cities. This allows talent from the most remote corners of the country to be attracted to the digital economy, which is critical for national security and the balanced development of regions.

It is important to remember that in 2026, modern education is not just textbooks, but a giant digital repository that stores everything about each student, from their exam results and scientific discoveries to personal data. That is why cybersecurity in education has become a matter of national importance.

If the system is poorly protected, malicious actors can falsify grades, steal valuable ideas, or even manipulate the development of an entire generation.

Investing in the protection of educational platforms today is like building a reliable fortress for the future of the country. We must be sure that our citizens' digital achievements are reliably protected from hacking or external interference. After all, the security of knowledge is the security of the state. When the system is protected, we can study and develop with peace of mind, knowing that our intellectual «gold» is under a reliable lock.

Therefore, the digitisation of education is a powerful tool for strengthening the strategic competitive position of the state, promoting innovation, economic growth and adaptation to global challenges. In 2026, the key trends will be AI governance, resilience to cyber threats and a focus on equity. For Ukraine, with its location in Europe, recommendations include national strategies (such as the OECD Digital Education Outlook), investments in infrastructure, and partnerships with the private sector to avoid falling behind. Fully realising the potential requires a balance between technology and the human factor, with a focus on inclusiveness.

Building quality human capital through digital education technologies is the most effective way for a state to overcome dependence on a raw materials economic model [1, pp. 45–67]. Strategic investments in digital schools and universities today create the foundation for long term competitiveness, ensuring not only macroeconomic stability but also a stronger national currency and higher positions in global rankings tomorrow.

Separately, it is worth paying attention to the serious problem of cognitive safety in the era of digital education. When systems personalize learning too much – pushing the student only what is already easy for him, so-called “information bubbles” arise. The algorithm seems to simplify the task for the student, showing only comfortable content, ignoring growth zones, complex topics, alternative views or challenges that force him to think deeper and broader. As a result, a person does not develop, but only consolidates existing knowledge, habits and prejudices. That is why this is becoming a strategic challenge for Ukraine, we need not just «smart» platforms that quickly select material, but ethical, transparent and responsible systems that specifically stimulate critical thinking, independence, the ability to analyse different points of view and go beyond the comfort zone. That is, algorithms should not only facilitate the path, but also consciously pose “difficult” tasks, offer counterarguments, encourage discussion, and not just automatically feed ready-made content.

Only when high technologies are combined with a human-centric approach – where the focus is not on the efficiency of the algorithm, but on the development of a person, his criticality, creativity, and moral stability, then the digital transformation of education will cease to be just a convenient way to

transfer files and will become a real engine of national revival. Then we will not just learn to use AI, but learn to manage it so that it works for the benefit of society, and not create passive consumers of information.

Investments in digital education are not just a contribution to the development of individual schools or universities, but a strategic policy of the state aimed at the formation of high-quality human capital. It is he who becomes the main resource in the 21st century, allowing the country to overcome dependence on the raw material model of the economy and ensure long-term competitiveness. Thus, digital education becomes the foundation of macroeconomic stability and high positions of the state in world rankings.

## Conclusions

Whereas a country's wealth used to be measured by its natural resources, it is now measured by the knowledge in people's heads. Education today is not just a stamp on a document, but the main driver of the economy. We are seeing the classic school become a thing of the past because it is too slow. It is being replaced by digital ecosystems that help people learn faster than the world around them is changing.

After analysing the topic of my research, I can list the main results of the analysis:

Efficiency through personalisation: instead of being just “digital applications”, modern IT tools and artificial intelligence have become a real catalyst for learning, allowing us to master a profession 25–60% faster by completely abandoning outdated “conveyor belt” methods. The main advantage is that the system (using well-known platforms such as Duolingo or the domestic Spektr as examples) works like an intellectual mirror, instantly identifying your weaknesses and selecting tasks specifically for them, without wasting time on what you already know. This approach radically changes the outcome of education – instead of graduates with theoretical knowledge that often becomes irrelevant before they even receive their diplomas, we get practitioners whose skills are honed to meet the demands of the real labour market. In fact, personalisation transforms the learning process into an individual path to success, where each student moves at their own maximum speed, becoming a valuable specialist in record time.

Education is becoming one of the most valuable “export commodities” today. Countries that invest resources in creating modern online learning platforms are effectively gaining a new tool for attracting funds. They not only sell knowledge on a global scale, but also attract foreign students and investors. Thus, educational technologies are becoming a kind of ‘magnet’ for finance and can bring profits to states and companies comparable to traditional industries such as automotive or energy. In other words, smart educational

software is gradually becoming as strategically important a commodity as material resources or industrial products once were.

A developed digital education system acts as a real protection for the state, as it prepares society for any unexpected turns – from new pandemics and wars to global technical failures. When every student, teacher, or employee is fluent in artificial intelligence and knows how to learn independently via the internet, the country ceases to fear crises, because even if offices or universities close, work and study will not stop for a minute. This is a kind of state insurance that guarantees that people will not be confused, but will be able to instantly adapt to new conditions, quickly master other professions and protect the information space from cyberattacks or fakes.

In fact, “digital immunity” means that a country's viability no longer depends on physical buildings, but on its citizens' ability to flexibly use technology to solve any problems in real time.

And, of course, there are challenges that cannot be ignored, especially in today's world.

Despite its obvious advantages, digitalisation also carries serious hidden threats that need to be discussed openly. The greatest danger today is the emergence of a gap between those who have access to modern technologies and those who do not. If a child in a remote village does not have high-speed internet or a modern laptop, they will find themselves at a disadvantage compared to their peers in large cities, which on a national scale could lead to a division in society: the rich and technologically advanced will develop rapidly, while everyone else will be left behind.

In addition, there is a great risk of education becoming a dry business, where the main goal is not the quality of knowledge, but the collection of personal data. We must closely monitor that students do not become mere ‘digital commodities’ for advertising algorithms, and that their personal successes and mistakes remain protected from prying eyes. Maintaining a balance between technological progress and privacy protection is critical to ensuring that digital schools remain places for personal development, rather than simply data processing conveyors.

The near future belongs to a hybrid model where technology and human connection work in tandem. We must realize that the teacher's role is fundamentally changing; they should no longer be a “living encyclopaedia” who simply recites facts, as AI handles this much faster and more accurately. Instead, the educator becomes a wise mentor and psychologist who helps students navigate the sea of information, inspires critical thinking, and provides support in difficult moments – doing what no software can ever do.

For Ukraine, this transition opens a unique “window of opportunity”. Thanks to our talented IT specialists, who are already creating world-class products, and the remarkable ability of Ukrainians to instantly adapt to the toughest

conditions, we have every chance to become a true digital hub for Europe. If we combine our intellectual drive with cutting-edge educational platforms, we can do more than just catch up with global leaders – we can set the trends for the future of learning.

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