




# Digital Transformation in Primary and Secondary Education in Bulgaria

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**Abstract.** In Bulgaria, many efforts have been taken in the last few years to support the schools to adapt to the new requirements of the Digital Society, and to equip future generations with the required skills and knowledge. The paper aims to provide an overview of the trends in Bulgaria for digital transformation of schools. It follows the methodology agreed by the partners of ERASMUS+ project DigiLEAD. Initially, the national environment for digitization of schools is presented. A deep analysis is made of the trends towards digital transformation of schools – considering the school leadership, the teaching and learning practices, the infrastructure and equipment, the development of action plans and monitoring, and the readiness and support to human resources.

**Keywords:** Digital Transformation · School Education · Trends in Bulgaria

## 1 Introduction

In Bulgaria, many efforts have been taken in the last few years to support the schools to adapt to the new requirements of the Digital Society, and to equip future generations with the required skills and knowledge. The COVID pandemic, in particular, had a triggering effect on the rapid introduction of online classes in schools. However, many challenges still remain. In the centre is the lack of digital leadership, complementarity and synergy in most actions. This motivated the authors to join the project DigiLEAD, which acknowledged the strong need to reform European schools by upskilling the competences of school leadership teams to develop and implement digital strategies in their schools. In the project were undertaken several actions to investigate the state-of-the-art in the participating countries, to collect good practices and prepare recommendations for policy makers.

During the desk research completed within the DigiLEAD project the authors made efforts to collect data on:

- the state-of-the-art of the digital skills of the schools staff (school leaders and teachers) in Bulgaria;

- examples of projects/national reports that focus on school approaches and the needs of school leaders;
- best practices implemented in primary and secondary schools related to digital education & learning;
- challenges school leaders face in promoting digital transformation.

To limit the results and choose the appropriate studies, the authors collected resources published between 2015–2023, coming from recognized national sources, published in journals or conference proceedings, etc. In addition, the authors organized a session on “Building the digital transformation strategy in schools” during the XIII International Pedagogic Forum held in resort Albena from 22 to 25 June 2023. During the session a round-table discussion was held focused on the experience of Bulgarian schools for digital transformation, and the challenges in front of them. Some of the issues raised at the round-table were:

- Is there specific support for teachers and specialized digital tools for different disciplines?
- How is ensured the training and support for teachers in the process of digital transformation of schools?
- How school strategies have been developed?
- Is there an assessment of digital skills and the use of new methods and ICT in education?

Following the experience in DigiLEAD project, the paper aims to provide an overview of the trends and challenges in Bulgaria for digital transformation of schools. Initially, the national environment for digitization of schools is presented. Next are considered specific topics: school leadership, teaching and learning practices, infrastructure and equipment, development of action plans and monitoring, and readiness and support to human resources.

## 2 Policy Background

In Bulgaria, the progress toward digital transformation and digitalization of the economy and society is significantly behind the other European Union (EU) member states. As it can be observed in the EU Digital Economy and Society Index (DESI) [1], the country ranks on last positions for most of the categories. Especially in the public sector, the efforts toward digital transformation are not prioritized, and often lacks understanding how public institutions can benefit and improve their services by adoption of new digital technologies.

In the same time, Bulgaria has long traditions with the Information and Communication Technologies (ICT), and presently the ICT sector is considered as economic priority sector [2]. The ICT business sector in the country has consolidated over the last few years and its turnovers significantly increased even after the Covid-19 pandemic. However, the ICT companies work mainly for export, providing competitive salaries and attracting most of the ICT talents. This significantly deteriorates the situation on the labor market for finding and retaining competent ICT experts in the public sector and in the secondary education, in particular.

The demand for professional digital competences was behind an agreement signed between the Ministry of Education and Science (MES) with ICT branch organizations in 2016, and several follow-up joint educational activities. Subsequently, the “Strategy for effective implementation of ICT in education and science 2014–2020” provided a framework for well-directed measures for digitization of Bulgarian schools, and for increasing the students’ interest and motivation through the use of innovative methods based on ICT solutions [3]. In line with the recent technology trends, the Ministry outlined some ideas for use of artificial intelligence in education and science [4].

The National Strategy “Digital Transformation of Bulgaria for the period 2020–2030” targeted the development of digital skills and the provision of software education [5]. The priorities set on digital transformation in education focus on technology aspects (broadband connectivity, adoption of cloud infrastructure and digital services), adoption of appropriate policies and legal framework, work on digital learning content and ICT framework for the competencies of teachers at all levels of education and training, and corresponding to the EU digital competence framework.

The Preschool and School Education Act (PSEA), adopted by the Bulgarian Parliament [6], provided a legal framework for the implementation of the educational strategies and ensured a coherence with the social and economic goals of the state policy. Moreover, the legal act facilitated the interaction with parents, social partners, employers and citizens, in order to make education policies as recognizable and supported as possible. Significant support for the reforms has been provided through the European Structural and Investment Funds [7].

School directors in Bulgaria have essential role in improving the quality of education and teachers’ management. Their responsibilities include: recruiting, promoting, monitoring and evaluating teachers; supporting them for improving their competencies; assessing the overall school performance; managing the school budget; presenting the school to educational and other authorities, and maintaining students’ discipline [8].

The training of teachers, their qualification and competences are considered to be a milestone for ensuring high-quality education in the “National strategy for development of pedagogical personnel 2014–2020” [9], which has launched a process of deep changes in the organization and provision of educational qualification of teachers, as well as ensuring their professional development and continuing qualification. For the full implementation of the model of teaching and learning based on the competence approach have been carried out reforms of the education in pedagogical specialties at universities, and measures have been taken to sustainably provide the educational system with pedagogical specialists, as well as to overcome the uneven distribution of teachers in the country.

The “Strategic framework for the development of education, training and learning in the Republic of Bulgaria 2021–2030” adopted by the Council of Ministers in 2021 [10] set a vision for provision of contemporary competencies to youth. Among the priority areas of the Strategy can be noted competences and talents, motivated and creative teachers, cohesive school communities and systematic work with parents, educational innovation, digital transformation and sustainable development.

### 3 Digital Transformation in Secondary and Primary Education

#### 3.1 School Leadership

School leaders motivate teachers, facilitate their capacity building and ensure appropriate working conditions. Directors have many roles in their schools: managerial, policy-related, institutional, and human resource-related. In particular, they play a crucial role in improving students' learning and the quality of education [8]. The status of the school leadership in Bulgaria is thoroughly investigated in [11]. The author makes an overview of the legal regulations, education and training practices, concerning the school leadership in the country. As outlined in the paper, the main leadership competences are defined as: academic, organizational, human resource management, communication, and administrative.

According to the PSEA [6], any pedagogical specialist with at least 5 years of experience as a teacher can apply for a position of director or leading teacher. Thus, the background of educational leaders can vary as they need to have a formal higher education degree as Bachelor, Master or Doctor and additional qualification to teach, which can be obtained in a separate qualification module. No official requirements are in place for Master degree in Educational management, which creates a problem as directors are responsible for financial management of their school, human resources (HR) management, as well as management of the teaching and learning processes. These responsibilities require managerial skills and leadership potential. While a dedicated training is available for gaining management skills and knowledge, the leadership capabilities are personal attributes, relating to an individual, and hardly could be built by a training [11].

School leadership training is provided using different channels. For example, the Master degree "Educational management" is offered in several universities: Sofia University "St. Kliment Ohridski", "Paisij Hilendarski" University of Plovdiv, Southwest University, and "St. St. Kiril and Methodij" University of Veliko Tarnovo. Among the courses thought can be noticed Educational management, HR management, Strategic management and Innovation Management, Financial Management in Education, ICT in educational management, etc. According to MES data, more than 178 approved training programs address leadership and leaders in education, but only few courses focus on digital transformation in education:

- A model for complete digital transformation of the learning process (32 h program, 2 ECST, Sofia);
- Information technologies for the digital transformation (32 h program, 2 ECST, Sofia), including topics like Operating Systems, Word processing, Spreadsheets, Presentations, Internet and Internet communication, Real-time communication, Copyright on the Internet, Creating an electronic product for educational purposes.

As noted in [12], in 2019 MES announced 76 million BGN for funding of 17 national programs for the modernization of education. Other educational initiatives are also in place, however, a general problem is the lack of awareness, as well as lack of proactivity from the side of directors and teachers.

The National program "Qualification of pedagogical specialists" covers the needs of both newly appointed teachers for their adaptation in the school educational environment,

as well as updating knowledge, skills, attitudes and acquisition of new competences by pedagogical specialists in accordance with the dynamic processes taking place in the modern world. A specific activity of the National program focuses on increasing the competences for management of educational institutions for effective organization of school activities and coordination of pedagogical teams. Within this activity was ensured support and training related to:

- Strategic planning in the management of the educational institution.
- The role of the director in the implementation of the competence approach in the educational institution.
- The role of the director in the implementation of approaches to the development of logical, creative and critical thinking and the transition from teaching knowledge to building key competences.
- Leadership skills for conflict resolution, increasing management competencies and communication with parents.
- Attestation as an evaluation process.
- Management of the educational institution in the conditions of crisis.
- Practical trainings for newly appointed directors.
- Tracking the realization of graduates of vocational education and training.
- School leadership. Creation of a professional learning community in the educational institution.

In the last few years, the National Center for Improvement of the Qualification of the Pedagogical Specialists (NCIQPS) launched specific training on the topic: “The role of the director in applying the competence approach in the educational institution” [13]. The program focused on the competence approach in modern educational systems, making the trainees also acquaint with the European Reference Frameworks for Lifelong Learning, for Entrepreneurship, as well as for Digital Competences. Special emphasis was made on the role of leaders in the application of the competence approach in the educational institution, and providing them knowledge and skills how to build a full and supportive environment and to facilitate the work of teachers for applying the competence approach. In 2023, the Center conducted in-person training for 411 directors from the school education system on the topic “Strategic planning in the management of the educational institution”. In the last two years more than 9000 teachers and more than 2400 directors were trained by the Centre and obtained opportunities to gain new knowledge and skills in order to better adapt to the changing school environment, and raise the quality of education by using new teaching methods and digital technologies.

### **3.2 Teaching and Learning Practices**

Bulgarian policy is in line with the modern educational trends, and supports building skills for independent and critical thinking, teamwork and personal development. The PSEA identifies important learning principles, and focuses on changes in the educational process to ensure “*orientation to the individual interests and motivation of students, equal access and inclusion, innovations in pedagogical practices, transparency in governance and autonomy in the implementation of educational policies, self-government and decentralization*”. The new training orientation towards acquisition of a set of key

competencies is related to a change in the role of teachers – from a source of information to a partner and mentor, as well as requires application of new methods and approaches to make learning more attractive and practical and to build attitudes towards lifelong learning.

The PSEA created conditions for establishment of schools with the status of “innovative school”, which improve the educational results by innovative elements in the organization and content of education. The MES launched a 7-years program “Innovative Schools” (2017–2024), aimed to support innovation practices in school. Schools can apply with a project, covering a large pool of innovation [14]. As stated in the presentation of the program [15]: “Innovative Schools” program is a model for building a new educational paradigm through which students can improve their educational outcomes and enhance their critical thinking and creativity. Innovative educational processes, teaching methods, school leadership, and learning strategies are vital components of this new model. In order to be considered innovative, schools have to show that they have improved the quality of their education by introducing innovative elements, redeveloping the curriculum, and/or introducing new programs. The creation of networks of innovative schools is supported since 2019, and the MES data show that 510 Bulgarian schools were selected and approved as “innovative schools” by 2022.

Support to schools with potential to develop innovations in science, technology, engineering and mathematics (STEM) has been provided by another national program “Building a STEM environment in schools” [16]. It aims at creating new school centers – an integrated set of specially equipped learning spaces with a focus on the study and application of competencies in the field of natural sciences in Bulgarian schools. Each school center includes the following new elements: physical environment (improvement of interior architecture and furnishing of existing spaces), technology, learning content, teaching methods and management of the educational process. The program impacts on motivating students to study science, mathematics and technology, increasing educational outcomes, acquiring a comprehensive knowledge, key skills and attitudes, as well as attracting talents to STEM careers.

During the XIII International Pedagogic Forum (2023) many school leaders and teachers shared their good practices which were collected later and published as a special issue of “Pedagogical Forum” (<https://en.dipkusz-forum.net/>), an electronic scientific and methodological journal of the Trakia University Press – Department for Information and In-Service Teacher Training (DIITT). Some of the good practices shared by the participants focused on:

- project-based learning and use of cross-curricular connections by assigning projects to students from foreign language classes in philosophy classes;
- use of neuro-pedagogy approaches and neuro-technologies in STEM-based education;
- inspiration and motivation of teachers after training at Trakia university DIITT, and application of the new teaching techniques learned in the classroom;
- inquiry approach in computer modelling instruction;
- STEM experiments and experiences in schools and their impact on children knowledge and skills;

- innovative pedagogical work with children with special educational needs, including games, and specific pedagogical situations.

### 3.3 Infrastructure and Equipment

The digitalization of the learning process optimizes it, increases its efficiency and supports the ICT-based innovations. Many modern educational services rely on multimedia content, real-time collaboration, voice and video streaming, and sharing of educational resources. In Bulgaria, these services have been consumed by 90,000 pedagogical specialists and 960,000 students in 4,200 schools and kindergartens. Statistics for recent years show that no more than 40% of schools have enough ICT equipment. Therefore, the National Program “ICT in the system of preschool and school education” set activities to provide modern technologies for access to educational resources and training in the school system, as well as sustainable development of the network infrastructure with the possibility of future expansion and phased coverage of each educational institution [17].

As pointed out in [10], more than 20,000 personal computers, laptops and tablets were delivered to educational organizations in the last 5 years. Around 4,000 classrooms were equipped with modern high-tech visualization technologies – interactive whiteboards and displays with built-in computer modules and Internet access. In the period 2018–2021, significant investments were made in secure wireless networks, including new generation firewalls and access points, in all state and municipal schools. These internal networks provide full coverage and high speed of information exchange according to modern standards and allow the use of any type of device from any point of the school with high level of security. The MES focuses on the completion of Wi-Fi networks and zones, including design of centers for special educational needs, as well as centers for personal development support, which will encourage the use of personal mobile devices in accordance with the “Strategy for effective implementation of ICT in education and science” [3]. Furthermore, steps have also been taken towards digitalization of the management of schools, which supports the process of interaction with parents. The electronic content and software for vocational training is also significantly supported in the school education system. The schools have an opportunity to use appropriate educational content and software, for which the MES provides appropriate recommendations.

The digitalization measures provided an opportunity for continuation of the educational process during the COVID pandemic, and allowed the educational system to successfully switch to remote operation. In 2020 were made changes in the PSEA in order to regulate distance learning in an electronic environment and guarantee the continuous education of children and students in extraordinary circumstances [18].

An example of a good initiative is the project “Education for tomorrow”, funded by the Operational Program “Science and Education for Smart Growth” (OP SESG) 2014–2020 and co-financed by the European Structural and Investment Funds [19]. The project supported the digitization of the national education system by using cloud technologies, providing access to open educational resources, as well as using digital technologies for personalized learning and providing more accurate and effective approaches to increase students motivation, self-learning and self-assessment.

During the XIII International Pedagogic Forum (2023) it became clear that the widely used resources by Bulgarian teachers in the classroom are:

- Educational sites and applications providing video lessons, tests, interactive practical tools, simulations, educational games, etc. Some examples are Ucha.se, Kahoot, LiveWorksheets, LearningApps;
- Web 2.0 technologies for sharing, e.g. YouTube, SlideShare, etc.;
- Specialized educational software like Envision, Jumpido, etc.;
- Software for creation of educational resources, mainly nonspecialized software like PowerPoint, Google Slides, Word, etc.
- For evaluation of the results are used different technologies – “Kahoot!”, “Quizzes”, Google forms, etc.

### 3.4 Action Plans and Monitoring

Despite the efforts of the authors no evidences were found on digital transformation strategies and action plans in schools. Generally, the top-down approach dominates and the digitization depends on the MES activities and funding ensured. However, in many cases proactive school leaders and teachers decide upon technologies to be used in the learning process. For example, the digitalization policy of the First Private Mathematical High School (FPMHS) is set by the school board, composed of management members (principal and vice principals), head teachers and parents. The Pedagogical union approves the Rules for safe, legal and ethical usage of the internet and the local computer network and devices. The rules are uploaded in the school intranet space. The school board takes a decision regarding computer hardware and networking equipment, as well communication tools, and software supporting the learning and teaching processes. It takes decisions also for teachers training and support, and learning resources sharing [20].

In a report of the World Bank Group [21] is indicated that no evidence exists for follow-up support of classroom performance and monitoring by the MES, which can ensure better understanding of progress and ongoing challenges needed for further improving the teachers training and continuous qualification process. Besides, the educational system does not have the capacity to monitor and to support the development of modern and innovative teaching practices. It is recommended adaptation and pilot usage of existing monitoring tools in the classroom in order to provide information to the Ministry and the Regional Educational Inspectorates (REI) required to identify and address teacher needs.

A standardized monitoring platform in the classroom – TEACH, translated into Bulgarian, offers to the MES an integrated digital solution for data collection and analysis. The TEACH tool has been used to develop and test classroom monitoring in order to provide information on initial teacher training and continuous improvement of qualifications, especially after the introduction of new approaches, content, learning objectives [18].

Debrenlieva – Koutsouki [22] points out that the process of assessment of teachers in Bulgaria was launched in 2016. Teachers assessment considers the professional profile, supported by the relevant professional portfolio and the results achieved in the education of students while the personal assessments of each of them serve to:

- *“Career development;*
- *Encouragement of the pedagogical specialists, who received the highest marks in the attestation, with excellence and awards;*
- *Guidance on raising the qualification of pedagogical specialists in order to update, supplement or extend their professional competence;*
- *Provision of methodological and/or organizational support and provision of a mentor.”*

As a basic remark to the assessment, [22] notes the serious danger of subjectivism and influence of informal groups in a team on the individual assessment of each individual teacher can be noted.

### 3.5 Readiness and Support to Human Resources

The investments in the development and qualification of pedagogical specialists are priority in the education system. The goal is to increase the status of the teaching profession in the medium and long term. It is essential to provide the system with trained and motivated teachers. Among the measures undertaken in the last 5 years may be noted [8, 10]:

- The state requirements for acquiring the professional qualification “teacher” regarding the increased practical training of future teachers were changed;
- The curricula of higher education institutions were updated in order to introduce the competence approach in the training of students in pedagogical specialties.
- Courses such as “Competence approach and innovation in education”, “Inclusive education”, “ICT in teaching and working in a digital environment” were introduced.
- Some measures aimed to increase the competencies of lecturers from public universities involved in training of future teachers.
- The interest in pedagogical professional fields and specialties in higher education was stimulated by offering more places, better funding, granting additional scholarships and exemption from fees for the entire course.
- In order to motivate young people to choose the teaching profession, the government approved measures to gradually increase the teachers salaries.

Mizova et al. [23] present the results of a survey on the development of teachers’ digital competences in a five-years period. It is interesting to note that 82.93% of the teachers who responded to the survey (total 1002) participated in 5 or more training courses, 43.71% in 10 or more courses, whereas 32.93% in more than 10 trainings. The focus areas of the training included: modern approaches in digital technologies implementation, innovative methods of teaching and pre-qualification training for improving the teachers’ specific methodological competences. As indicted in the survey, the teachers training related to the digital competences focused on [23]:

- *“planning the use of digital media and ICTs in the learning process;*
- *orienting teaching to learner experience, including digital experience;*
- *planning learning and teaching process oriented towards key competences specified in SER, including digital competences;*

- *ICT use for attainment of specific goals according to the teaching-learning subject and for ensuring interdisciplinarity;*
- *personalization of learning activities and tasks, and student support by means of ICT;*
- *selection of textbooks, and digital resources;*
- *analyzing student achievement by means of digital tools.*”

In parallel, within a nation-wide project “Education for tomorrow” was ensured training of pedagogical specialists (teachers, principals, vice-principals, etc. with teaching employment) from 2000 state schools to support the digital transformation in their school and use of the new cloud environment established within the project [20]:

- Training in digital skills to create digital content for the learning process;
- Teacher training to teach digital literacy knowledge and skills – key digital skills – basic and advanced, new technologies, products and programs, media literacy, online content and behaviour, etc. to increase the digital competence of learners;
- Teacher trainings on programming/coding, cyber security, intellectual property protection, etc.;
- Training of teachers to work with digital resources and the implemented platform for educational services and content in order to introduce innovative teaching methods through modern ICT.

Within the National program “Qualification”, the NCIQPS conducted a series of qualification courses, in which participated in 2020 more than 3000 pedagogical specialists from the whole country [24], and in 2021 more than 4400 [25]. The training activities responded to the training needs identified and focused on teaching new curricula and in specific subjects. Due attention was paid also to leadership in education and to the continuing qualification of pedagogical specialists, psychologists and pedagogical advisors [25]:

- With the aim of improving the training of teachers for the formation of key competencies and implementation of new curricula, training on creation of e-learning content was provided, and for organization and management of the educational process;
- In order to support teachers in specific subjects, training in profiling subjects was offered, e.g. Physics and Astronomy, Computer Science, Biology and Health, Chemistry and Environmental protection, Information Technology, Entrepreneurship, Mathematics, Geography and Economics, History and Civilizations, Bulgarian language and Literature, etc.;
- With the aim of improving the qualification of pedagogical specialists with managerial functions, practical training for directors of educational institutions was offered, and a specialized course on “Motivation, Teamwork, Leadership”;
- Among the courses offered to teachers can be noted also: “Development and implementation of standard curricula, for vocational schools and national examination programs”; “Development of tests for diagnosis and assessment of knowledge, skills and competencies in vocational training”.

It is acknowledged by the Bulgarian government [10] that ensuring more attractive and better education requires effective school communities, united by a common system of educational values. Therefore, specific efforts have been made to establish and deepen

the links and interaction in the school community between all participants in the educational process (children and students, teachers and other professionals and parents), with local authorities and the local community, as well as with institutions and civic organizations attitude to the educational and personal development of children. At the heart of these policies will be the establishment of a sustainable, positive school climate, an atmosphere of trust, respect and care for others, a sense of community and a pursuit of better achievement.

## 4 Conclusions

While a number of actions have been taken in the last few years to facilitate the digital transformation in Bulgarian schools, and to equip students with contemporary skills, more efforts are needed to overcome the digital divide. As pointed out in [12], the digital divide in Bulgaria is multifaceted: It is linked to the different educational opportunities offered in large cities and in remote areas, the outdated skills of teachers, the availability of modern devices and high-speed connectivity in schools, etc. Therefore, investments in up-to-date ICT infrastructure in schools, advanced training for digital competencies is a way to overcome of the digital divide. Additional measures are required to overcome generation differences and socio-cultural barriers. The fast changing environment of life, work and education faces teacher with the need to adapt fast and gain new competences beyond their specific subject area. Teachers need to overcome students resistance and motivate them by using new teaching methods and advanced educational tools.

Most funding programs and initiatives are not well coordinated, and the top-down approach does not ensure the support required by teachers. Besides, the specific learning and teaching objectives should be monitored, analyzed and reported. It should be considered that each school is specific: according to its teachers and students, as well as location. High achievements and development of an educational institution are possible only when teachers work in harmony and the director is a leader who can lead them on the path of success. Providing teachers with autonomy, creative environment and contemporary tools is the biggest challenge that school leaders face. Besides, school leader should carefully consider how to implement the necessary changes taking appropriate measures of aligning teaching and learning processes with technologies and the needs and competencies of teachers.

As highlighted by the World Bank Group [8], the school director should have a vision for the school, along with competencies to support teachers and guide the school towards achieving the learning goals. School leaders should participate in the management of the learning process and the school in order to improve the overall school performance. They take responsibility for a widening range of activities: education, school culture, governance, strategic development, micro-politics, HR and external development. Subsequently, there is a need to facilitate the process of building leadership competencies, and ensure shared school leadership in the digital era.

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