Н. С. Уланова

Перспективные планы и практическое использование ИКТ в образовании: опыт стран Африки южнее Сахары

Введение. Внедрение информационно-коммуникативных технологий (ИКТ) в образование стало необратимой реальностью для всех стран мира. Именно цифровизацию называют приоритетным направлением развития образования в странах Африки южнее Сахары, где показатели распространения и эффективности школьного обучения остаются низкими. Для стран региона характерна быстрая смена парадигм развития образовательных систем, и внедрение ИКТ считают центральным условием развития результативных педагогических программ.

Материалы и методы. Исследование проводилось с использованием общенаучных методов и сравнительного анализа на основании широкого спектра источников, включая последние научные исследования, образовательные программы и платформы, экспертные оценки.

Результаты исследования. Проанализированы общие проблемы внедрения ИКТ в сфере образования в регионе в целом, и реализация конкретных программ на национальном уровне на примерах Уганды и Кении. Представленные данные о развитии ситуации в этом уникальном и активно развивающимся регионе мира позволили оценить значимость взвешенного подхода к цифровой реформе школьного образования.

Выводы. Внедрение ИКТ не может стать определяющим фактором организации эффективного процесса обучения без учета поведенческих и социокультурных особенностей и не снимает необходимости развития полноценных учебных программ. Именно поэтому работа будет интересна не только экспертам в области образования и африканистики, но и широкому кругу специалистов, сталкивающихся с применением ИКТ в педагогической практике.

Ключевые слова: информационно-коммуникативные технологии, цифровое образование, образование в Африке южнее Сахары, школьное обучение, реформа школьного образования

Ссылка для цитирования:
Promising plans and practical use of ICT in education: Sub-Saharan Africa perspectives

**Introduction.** Information and communication technologies (ICT) in the field of education have become indispensable for many countries. Digital transformation of school has conquered the minds of many educationists in Sub-Saharan Africa which long suffered from low attendance rates and lack of qualified teachers. This is a developing region with unstable educational opportunities and ICT use is believed to be a central form solution for the future effective functioning of learning programmes.

**Materials and methods.** General scientific theoretical methods and comparative analysis were used to analyze actual statistical data, take insight into existing online learning platforms, expert's accounts.

**Results.** Both the general problems of ICT application in education and its functioning in the context of national educational systems in such countries as Uganda and Kenya were analyzed. Unique evidence from this rapidly developing region underscores the need of a balanced and comprehensive approach to the strategies of the digital education reforms at school.

**Conclusions.** ICT introduction risks not to be an effective factor in the management of educational process without taking into account behavioral and sociocultural context as well as without thorough development of all levels of educational system. Though the article is addressed to the experts in the field of education and African studies, it will be of considerable interest to all practitioners concerned with the implementation of ICT in teaching practice.

**Keywords:** information and communication technologies, digital education, education in Sub-Saharan Africa, teaching at school, school education transformation

**For Reference:**
Information and communication technologies (ICT) are increasingly considered as a major tool for the transformation of modern school education. Digital transformation of all spheres of modern human society has become an integral part of all world countries. Implementation of ICT in education is believed to be a new stage in the development of more effective school education programmes aimed at training competitive specialists. However, digital revolution is a real challenge to the traditional forms of education and raises an issue whether the use of ICT could be a priority for positive changes in the field of education? To find a balanced and comprehensive answer, it is important to focus not only on the process of digital transformation of education in the most developed countries with a long history of comparatively good school systems. Still such systems are used as a prototype for similar innovations in the educational systems of developing countries. However, the attention to the countries where educational development goes hand in hand with ICT implementation may help to better assess the potential of digital services for the future educational transformations. The ready experience of these countries will show whether the use of ICT in education is a real panacea or just one of the auxiliary means for developing an integral and inclusive system of a modern school.

Education development in Sub-Saharan Africa (SSA) is still one of the highest priorities in the world education system development. The SSA region in which there are more than 50 countries has 33 that are classified by the United Nations as the least developed world countries [32]. In the past these impoverished countries, albeit each in their own way, have gone through similar periods of colonial and postcolonial history, and face similar educational problems nowadays. The second half of the twentieth century witnessed some large social projects for the development of national education systems in many SSA countries, but despite this fact they still have not overcome such problems as extremely low literacy rates and a poor access to education.

In the past two decades hopes for positive educational developments in SSA countries have been mainly focused on the implementation of such UNESCO and UN programmes as "Education for all" and "Millennium Development Goals". As they provisioned for the end of the first 15 years of the new millennium all children of the world would have equal access to free and high-quality primary education, the gender inequality would be eradicated and the quality of education improved [27]. However, according to some expert’s accounts, the success of these programmes has been unsustainable. In SSA countries 33 million out-of-school children were in 2015 compared to 57 million worldwide, the chances of school enrollment for girls from disadvantaged families were rated as the lowest and the number of children dropping out of school reached 20% of all applicants [27, p. 12].

At the same time the increase of mass accessibility of primary education in the SSA countries has led to a growing number of students that considerably undermined the quality of education provided because of the need to employ unqualified teachers [15, p. 6]. This trend must remain relevant in the coming decades - by 2050 the population of SSA countries will double according to the UN forecast [6], and this will only increase the burden on the primary school level.

The secondary and the higher levels of education in almost all countries in the region are less developed and demand greater financial expenses against the background of
huge students’ outflow abroad [28, p. 9]. These levels have long undergone a reduction of qualified teachers and suffered from the lack of opportunities for students to continue their studies because of poverty and other socio-economic factors [20].

All these factors considered explain why ICT has become a new hope for a radical breakthrough in the field of education. Great hopes are pinned on it, and that is why the issue of the impact of the ICT use in various education areas is extremely relevant for all countries, and for the SSA countries in particular. However, the distinctive feature of the poorest SSA countries is that digital services are integrating in relatively underdeveloped national educational systems.

Materials and methods

The core concern of the article is to analyze digital transformation of school education in SSA countries, thereby to attempt to determine the capacity of ICT use and to assess whether it can be the decisive factor in the creation of successful modern educational systems.

The article surveys and analyzes applied studies, reporting documents of public organizations and government agencies (UNESCO, UN, Worldbank analytics and national governmental reports), electronic educational platforms (open access online learning resources), periodicals (local and worldwide online news outlets). Methods of scientific analysis, comparative analysis, generalization, synthesis, induction, deduction and interpretation of results are used.

Results

As seemed 20 years ago, the countries of African continent would never achieve the worldwide temps of Internet and digital technologies spread. The prospects of digital technologies use in the economic and social segments of these countries were met with great expectations, even though they could not be immediately realized due to the low spreading of necessary technologies. At the beginning of the new millennium, the number of Internet users from the countries of SSA was only 1% of the global value [1, p. 160]. When 7 years later it increased only by 2.5%, experts warned about a "digital gap" in access to digital services: the growing technological lagging of the world least developed countries, the imbalance among SSA countries, the gaps between generations elites and poor, a center and a periphery of a given country [29, p. 58, 52]. The change came with the active spread of cheap mobile technologies. There were 650 million mobile phone users on the African continent in 2013 - more than in the United States or Europe [36, p. 22]. By 2016, according to some estimates, two-fifths of the population of SSA countries had mobile phones, and this rate was quite high even in countries with limited access to electricity [17]. These numbers have increased even more in 2017. South Africa followed by Ghana, Nigeria, Senegal and Tanzania are leading in the growth of Internet users, the young and more educated citizens being the most active [21].

Such positive dynamics in the spread of access to digital technologies has generated a new wave of interest in harnessing the potential of ICT for various areas of social life in SSA, including economy, education and agriculture. On their part the experts of UNESCO published in 2015 the forecast for digital educational development on the African continent:
“Digital services for education in Africa” [9]. It was based on the results of four-year research. The research team included representatives from development and international agencies, NGOs, private ICT companies, publishing sector, training institutions. The UNESCO team has supposed that the use of digital technologies could solve a number of problems typical for all countries of the region. First of all, it can compensate for the lack or poor quality of teaching and learning materials (especially textbooks) and unfavorable school environment, besides improving the quality of teacher training.

Since the release of the UNESCO forecast, some practical measures have been released. Yet the hopes for a possible breakthrough in the field of education have encountered certain difficulties. It is now possible to present the first results of ICT application in some SSA countries in order to comprehend what problems it has met in the field of education. Below the results of a comparison issues presented in UNESCO forecast with subsequent studies focused on the effect of ICT implementation in school practice in SSA are presented.

Insufficient equipment was often singled out as one of the most significant problems of education in the region. Schools were often poorly equipped with the necessary furniture, classrooms were overcrowded, and there were not enough textbooks and teaching aids. According to the UNESCO report data, in 2008 in Kenya, Malawi, Uganda, Tanzania, and Mozambique 50% of students said that they had not had books in their classroom. And from 20 to 40% of teachers admitted that they had not had any teaching aids on their subject [9, p. 25]. Possible change in this situation region was connected with digital services usage: electronic devices equipment was believed to simplify access to the information for students, teachers and administrators and to facilitate the process of organizing educational activities. Mobile phones were proposed as a cornerstone: primarily due to their availability and prevalence over other types of electronic devices in the region [9, p. 50].

Some later studies were focused on mobile technologies penetration in education and impacts of mobile phones' massive use by children and adolescents in SSA. A large-scale study was held in various regions of Ghana, Malawi and South Africa [31]. From 2012 to 2016 this longitude surveyed about 1,500 children and young people. Only a few students noted that they use a mobile phone to improve school performance (16.3% in Ghana, 11.6% in Malawi and 49.7% in South Africa), that is to find the necessary information, to clarify assignments, to calculate. The students’ percentage who believed that mobile phones have a negative impact on learning at school and at home was higher (24.1% in Ghana, 42.4% in Malawi, 62% in South Africa) [31, p. 25-26]. The following negative impacts were stressed: academic performance affected by disrupted classes, because of both pupil and teachers' calls; disruptions in adolescent sleep patterns associated with cheap night calls; time lost through sessions on social network sites; harassment and bullying; and widespread access to pornography [31, p. 28]. Besides, not all families can buy a personal mobile phone for their children which is crucial when it becomes part and parcel of education. Many children were ready to sacrifice food, books and, in some cases, their bodies to save up the funds needed to buy the phone [31, p. 28]. Researchers proposed that this can be avoided by equipping schools with educational tablets. In subsequent years, such projects were realized in a number of countries, but it required such costs that not all states could bear on their own. And it is obvious that the identified negative impacts are relevant up to date and still are a characteristic feature of the modern educational practice around the world [e.g. 22].

Discussion about up-to-date equipment for schools misses another important issue: is it possible to do without printed teaching and learning materials at all? This issue is very acute in the school practice of sub-Saharan countries because equipment of schools is still often
extremely poor. In modern scientific and educational circles there is no single solution to this problem. Experts predict that the rejection of printed teaching and learning materials in favor of digital ones can affect cognitive, emotional-volitional and psychosomatic state of schoolchildren [10, p. 220]. It is obvious that such a change could lead to changes in educational relations when the central role of teacher as a source of knowledge shifts towards his auxiliary role as a mediator in working with information. But considering the insufficient level of teacher training in the underdeveloped SSA countries, it is often argued that the digital expansion of the information space should positively affect the quality of education.

It is the quality of education and teacher training that was singled out among the next most important problems of school education in the region by UNESCO experts. The quality of education remained at an extremely low level despite the great efforts taken in the first decade of the 21st century. Millions of children in SSA graduated from school in 2010 without reaching the level of basic literacy [33]. It is not surprising that digital technologies became a new hope in solving this problem. However, in the process of practical use of ICT, schools faced new challenges [22; 31].

In 2019, the results of a study of the correlation of access to mobile communications and the spread of wired Internet with the quality of primary education in 49 SSA countries were published [2]. Statistical analysis for 2000-2012 showed that high rates of mobile phone penetration had a positive effect on one of the markers of poor education quality (the ratio of students to teachers). That is, it was connected with a decrease in the number of students per teacher and should help to improve the quality of education. But for the Internet penetration this is true only for the countries demonstrating initial higher indicators of poor education quality and it is not so for the countries with indicators below the average [2, p. 13].

Does this mean that the spread of digital technologies contributes to the indicators improvement of education quality? What for researchers, they have noted that further analysis could focus on other factors affecting the indicators of the education quality. In this respect, it should be stressed that while in the analyzed study a quantitative analysis was carried out for a certain period, the qualitative indicators were not taken into account. The researchers proceeded from the premise that the quality of education should increase as soon as the reduction of children's number in class-rooms allows teachers to pay more attention to each student [2, p. 10]. However, such premises disregard the professional qualifications of teachers and the indicators of academic performance [2, p. 4]. And the alternative data for the same period pointed to an alarming situation: the teacher training system in the region couldn't cope with the increase of primary school pupils and urgently required a larger number of qualified specialists [15, p. 6]. In SSA countries 60 to 80% of contract teachers had minimal or no professional training that negatively affected the quality of training. While in one countries the situation was better, in others it was worse – for example in Malawi only 27% of sixth grade graduates could reach the minimum standard in reading. That's why the problem of school staff teaching, especially in case of on the job training, was regarded to be extremely urgent [15, p. 6; 9, p. 22].

That is why online training and teacher support programmes seems to be a solution for Sub-Saharan Africa. Among the most notable international programme stands out the joint project of UNESCO and the People's Republic of China "Enhancing Teacher Education for Bridging the Education Quality Gap in Africa" [12] and such platforms as iEARN (International Education and Resource Network) [16] and TESSA (Teacher Education in Sub-Saharan Africa) [35; 9, p. 76, 83-84]. All these large-scale projects
have been built as "umbrella" projects – they are designed for different countries of the region, and face significant difficulties.

For example, TESSA project which has existed since 2005 under the auspices of the Open University (UK) is a network of 15 national and international organizations operating in Ghana, Kenya, Nigeria, Rwanda, South Africa, Sudan, Tanzania, Togo, Uganda and Zambia. The project provides teachers with free access to 75 e-learning modules in five core areas – literacy, mathematics, science, life skills, social sciences and arts, and all these in four languages: Arabic, English, French and Swahili. The creators of the programme emphasize that the modules are interactive, variable and can be adapted in accordance with the context and educational needs [26, p. 263].

In fact, special efforts have been undertaken to put this project into effect. For example, in Kenya with the support of volunteers from the staff of one of the teacher training institutes special courses were integrated into the educational curriculum of the Higher Education Institution, aimed to train future teachers in using this online platform. The coordinators of the project note that they faced a certain resistance from the institute staff and the project popularization was mainly due to those students who were emotionally captured by the project [26, p. 267]. Some efforts were also required for introducing the project on the place in schools: adapting the proposed programmes, the teachers faced technical difficulties in accessing the teaching and learning materials in accordance with their own pedagogical practice and local context and then in promoting it among other teachers [26, p. 268]. Evaluating achievements, the project managers focused on its positive aspects: the use of the platform contributed to the formation of teachers’ active pedagogical position and stimulated the creation of interactive groups within pedagogical collectives [26, p. 270]. Nevertheless, it is clear that the use of ICT in the schools requires special efforts to further training both for institutions teachers and for local school administration, as well as demands for the special attention to be paid to adjusting the content of educational programmes to the local context. This is extremely important for the region facing the development of an acute civilization crisis provoked by globalization and traditional values revision [30].

From the above it can be assumed that government programmes in the field of ICT implementation in education would have greater efficiency in contrast to “umbrella” supranational projects, since they would be able to ensure fuller cultural continuity in teacher training for successful adaptation to local conditions. Such programmes at the state level have already been undertaken and deserve special attention.

A general analysis of the educational situation in SSA countries indicates a number of similar trends in the application of digital technologies. However, the region is rather heterogeneous and some experts note the huge differences among countries or even among regions within one country. The countries lagging behind in the development of education are first of all Niger, Eritrea and Burundi, among others [9, p. 14], while the most developed one in all spheres of education remains South Africa. For the further comparison, two countries were selected: Uganda and Kenya, which have some similar historical developments and each of which has recently begun large digital education projects. At the same time Uganda is a rather poor country with scarce resources, while Kenya is one of the leading countries in Tropical Africa. This contrast will provide an opportunity to look at ICT use from different perspectives. In order to comprehend a situation in this area, the description of the digital reforms will be prefaced with some information on the education system of each country and the deepness of digital technologies penetration.
Education in Uganda and ICT: Local Projects and External Funding

The difficult milestones of Uganda’s postcolonial history have affected the development of all social spheres of society, and especially of education. The countdown of the current stage in the development of the country’s educational system started in 1987, when the massive construction of educational institutions had begun. The introduction of compulsory free primary education (for four children in a family) was announced in 1997, and in 2006 compulsory secondary education was introduced. Education in primary school begins at the age of 6 and lasts for 7 years, in secondary – 6 years. For the first four years training is carried out in local languages, of which there are about 30 in the country, and then in English as the official state language of the country. As in all countries in the region, the main features of the Ugandan education system are overcrowded primary school class-rooms, teacher shortage, poor learning outcomes and high dropout rates on the primary and secondary school levels. According to the 2016 UNICEF report while 84% of children in the age from 6 to 12 attended primary school, only 19.7% of adolescents attended secondary school [37].

Uganda faces both the problems of an unfavorable school environment (weak or inadequate infrastructure, lack of teaching and learning materials, etc.) and poor quality of teacher training. To solve these problems, the government agencies attract external funds from donors – public non-governmental organizations, private investors, commercial companies, as well as funds received directly from other countries. All these problems have been a characteristic feature of the region. But in Uganda that this trend can be traced especially clearly. Private and community schools with partial government subsidies are widespread in addition to public schools. A number of educational projects have been implemented with financial support from UNICEF, UNESCO and particular countries, for example, programmes to improve the level of primary education sponsored by the UK, and teacher training sponsored by Belgium [25].

One of the largest programmes in the past decade has been the project called “Supporting Children’s Literacy and Health in Uganda”, started by the United States Agency for International Development (USAID) and developed by the nongovernmental organization RTI International [34]. The programme implemented since 2012 has been supposed to facilitate the reform of the standardization of native languages teaching in the lower grades. As part of this programme, new teaching and learning materials have been developed, as well as special teaching and learning methods for teachers. However, the programme received an ambiguous assessment from the teachers’ staff, who perceived it as an external intervention tool of "donors" that did not fit the current realities of modern Ugandan school practice. Moreover, the programme created without taking into account local socio-cultural aspects was met quite differently at the local level provoking a wave of discontent and accusations by the Ugandan regions against each other and the organizers of the programme [39]. Despite all these the Ugandan authorities decided to choose the same way in financial assistance of ICT implementation for all-national school education.

The rates of digital technologies penetration in the country are not the most significant among other African countries. the World Bank estimates that 24% of the population had access to the Internet in 2019, which is the average for the SSA region, but rather low compared to the global indicators [19]. Although the development of the mobile Internet is gaining momentum [38] and the process of integrating digital technologies into everyday life and school practice is proceeding on its basis, it is very limited by the technical equipment of schools and poor quality of teachers’ training [24].
Very well aware of the fact, the country’s authorities decided to implement one of the largest digital projects in Uganda in recent years with the support of the People's Republic of China and under the auspices of UNESCO. In cooperation with the China Funds in Trust (CFIT), the ICT Competency Standards Framework for Teachers in Uganda (ICT-CFTU) programme was implemented as part of a large joint project between UNESCO and China for teachers’ training and retraining in 2012-2017. The project aimed to improve the situation with the shortage of teachers and the low level of their training in SSA. The Ugandan part of the programme was implemented on the basis of three main institutions for the teacher training. Its core concerns were to accelerate the development of the country's digital infrastructure and to increase teachers’ competence and skills in the use of digital technologies in educational practice. The result of the project: 685 teachers trained, one training online platform and 9 manuals produced, 272 equipment units purchased [18].

The documents reporting on ICT-CFTU results do not contain any qualitative assessment of the programme results or information on the further application of the acquired competencies by teachers in educational practice. There is no data on the long-term results of the programme as well. Coupled with the scale of the programme itself, all this suggests that the project is at best fragmented. One can only hope that for the country where the number of schoolchildren is drastically increasing every year such a project and similar ones would bring some practical benefits. This case confirms the experts’ opinion that in order to radically improve the quality of education in African countries they need to build long-term coherent national programmes, albeit with the attraction of foreign funding [29, p. 186].

Digital Literacy Programme: A Large-Scale Education Project in Kenya

Unlike Uganda, the education system in the Republic of Kenya is sometimes referred to as one of the best in Equatorial Africa. However it must be stated, that past more than half of a century after the state independence, the education system in Kenya is still at the stage of formation and searching its own path. For the large part it was initially designed to train practically oriented specialists but it became obvious that the system was ineffective and could not cope with rapidly changing social and economic realities. As a result, in post independent Kenya the education system has become one of the main subjects of the political opponents’ rhetoric and the field of large and ambitious projects.

Introduced in 1985, the contemporary Kenyan school system is structured on an eight-year elementary – four-year secondary – four-year high school system. In 2003, primary education was once again declared free, which should have made it more accessible to different sectors of society. By 2012, 90% of children of the corresponding age were enrolled in primary education schools. But only about 20-30% of primary school graduates entered secondary school. At the same time, a study of student literacy and the quality of education showed low results: an increase in the number of students leading to class-room overcrowding caused a decrease in the quality of education [28, p. 91].

To solve this problem, some projects have been implemented with the active participation of non-governmental organizations and large global corporations. For example, within the framework of a joint programme with Microsoft in 2009, about 60 schools were to be equipped with computers and the Internet [28, p. 90]. The Aga Khan Islamic Foundation’s project supported as well the introduction of e-learning programmes at Kenyan schools over the past decade that reached more than 100,000 students and 1,200 teachers in 100 schools in Kenya and Uganda [5]. Against this background and with an obvious crisis of the public school system, studies began to appear that criticized large-scale government projects and provided data according to which non-state educational support programmes made it
easier to solve flexibly this problem and to ensure the inevitable spending on additional teachers and equipment [4].

Disregard these opinions in 2013 authorities issued strong statements promising to solve problems in education and raise the system to a new level and announced a large-scale project called Digital Literacy Programme (DLP) [7]. Launched by the Kenya Ministry of Education the programme, is one of the largest projects in Africa to date. This initiative, launched by the Kenya Ministry of Education, is one of the largest digital programmes in Africa to date. Relying on its own – one of the most developed on the African continent – technical infrastructure, the Kenyan government launched a massive upgrade of school equipment. In total, it was planned to purchase 1.2 million tablet computers, laptops for teachers at the rate of two per school, projectors, e-books, school routers, and also provide schools with network electricity or solar panels [14].

The programme, which started in 2016, included three stages. In the first, called "Learning to use", public elementary schools received different types of digital devices and had to start to familiarize students and stuff with it. It was reported about perchizing of about a million devices and over 100,000 devices assembled at the Kenyan universities assembly plants, as well as training more than tens of thousands of teachers to work on these devices. In mid-2019, Phase 2 – “Using to Learn” – was planned to start and aimed to introduce students to the concept of information technology ideas in teaching, to foster creativity and to drive innovation. At this stage, digital learning centers with the appropriate infrastructure were planned to be created in schools. The third stage, "Using to Produce", was supposed to teach how to use information technology in work and stimulate higher education by creating expanded laboratories for the design of digital products [7].

The perceived as successful counting and reading Swahili programmes called the Tusome Early Grade Reading Activity and Primary Mathematics and Reading initiative created by already mentioned NGO RTI International became a basic framework for DLP digital educational products. In addition, the Kenya Institute of Curriculum Development entered into a technological partnership with the private sector to create digital education software for primary school students to be installed on devices supplied to schools [7; 14, p. 55-56].

Early estimates were mixed. There were arguments about the feasibility of using educational programmes developed with attracting external financing in national software products, calls not to forget about the material support of teachers during the period of such large-scale reforms and concerns about uncontrolled children access to the entire spectrum of world Internet content [13]. It is also emphasized that in addition to the dependence of the programme on the technical state of school facilities and networks, the central issue is the development of effective educational content for older grades [14, p. 59].

As noted above, in recent years’ mobile phones and smartphones have become the most promising platforms for the development of accessible educational technologies. It is in this regard that platforms are gaining popularity, providing access to educational resources on a personal phone, available to an increasing number of students and teachers. A striking example of such a system is the stand-alone project EnzaEducation. This company positions itself as a provider of digital educational services via SMS and web messages, as well as software bots in social messengers. The platform is currently operating in Ghana, Cote d'Ivoire and Kenya. In Kenya, with the support of a local mobile operator, special software has been developed to provide access to original teaching and learning materials for primary and secondary schools. The company reports more than 10 million users, of which half is the Kenyan audience [11].
Moreover, the practice of distance learning in 2020 showed that many students are cut off from knowledge and information, since they do not have access to the school’s digital resources [23]. This problem is becoming more and more urgent in the republic of Kenya at all levels because its government was one of the first in the world to set on course for the development of digital economy and security: electronic passports and other measures are in the process of introduction which limits the possibilities of citizens who do not have access to necessary technical means. The authorities, of course, understand the difficulties they face, but do not abandon the far-reaching goals proclaimed previously. After a period of lull when the rumors of phasing out of a large-scale digital literacy programme had been widespread the government announced that its second phase would be launched soon [8]. Then it announced also the preparation of a major and long-overdue reform of the school system as a whole, including the development of new priorities in training and the creation of holistic curricula for the whole country [3].

Comparing the results of the introduction of digital technologies in the education systems of Uganda and Kenya, the following can be said.

Projects with the attraction of external funding, both in the development of national education and in planning a national strategy for the ICT use in education are distinctive features of Ugandan authorities strategy. This approach makes it possible to achieve local results, but so far there is no evidence that this leads to a significant breakthrough in the field of qualitative and quantitative indicators of the level of development of the educational system. And there is no hope that this will be possible to achieve only due to the very natural properties of digital technologies without the development of special culturally and context oriented digital educational products. At the same time, the practice of using educational projects with the involvement of third-party states and non-governmental transnational public organizations shows that they often do not take into account local sociocultural and educational specifics, which in turn leads to resistance from the school community, creating new difficulties and contradictions within educational teams and society as a whole. In this case, we can express full support for the experts’ assertion that the missing of state regulation in the field of telecommunications and the economy as a whole may lead to the further loss in the independent policies of the SSA countries [1, p. 162] as reflected both in education systems and in the use of ICT for learning.

The Kenyan authorities have relied on major national ICT implementation projects for all social sectors, including the education system. Based on this some success was achieved in the technical and software equipment of schools. However, and even in the absence of studies on the long-term effect of the Kenyan state programme for the introduction of ICT into the educational practice of schools with problems of class congestion and low teacher training, it can be said that such innovations will not be a ready solution to all problems, but will require consistent and thoughtful coordination of many state institutions, without removing the need to maintain a full and independent educational policy.

As in Uganda, in Kenya the main prospect for further development is the development of curriculum content that could be implemented in digital educational products.

Discussion

Various aspects of the ICT use in educational practice is undoubtedly one of the vital research directions. The paper considered this problem analyzing the impact of macro-
regional and national programmes for ICT use in education in a number of SSA countries. Previous studies of this issue in the SSA region were based mainly on assessing the implementation of separate programmes and did not focus on the study of general regional trends and their implications for understanding the role of ICT potential in educational practice in general [e.g. 4; 22; 26]. The analysis presented in this paper made it possible to look at the issue retrospectively and compare the planned plans with the results of their implementation. A comparative analysis of the national systems of Kenya and Uganda allowed to highlight two main trends in promoting digital innovation in education: stand-alone programmes and large nationwide projects.

The pivotal trends of digital transformation in education in SSA region are in many respects consonant with the main ones in other world countries. Among them: the quality of education in the digital age, the use of ICT in the material and curriculum support of the educational process, the consequences of ICT application for better teachers’ training.

The SSA countries experience has shown that the optimistic projections for the quantitative growth of education systems should take into account such important indicators as quality and effectiveness of education as well as professional training of teachers while expanding access to some forms of Internet technologies. The complete replacement of printed teaching and learning materials with digital educational products and the development of independent supranational educational resources has often disregarded the important behavioral and sociocultural factors. The development of universal online platforms for supporting the teachers’ educational activities has opened up access for more specialists from different countries. But their use has still required special efforts to properly inform and psychologically adapt teachers and to adjust the content of educational programmes to the national contexts.

**Conclusion**

Large-scale state projects in the field of educational digital transformation in SSA countries demonstrating significant improvements of technical and software equipment, do not remove the need to maintain and develop full-fledged curricula and to take into account the age and socio-cultural characteristics of schoolchildren. Therefore, ICT could justify itself only combined with a vigorous development of other aspects of educational systems.

The implementation of educational projects at national levels both in the field of education development and in the implementation of digital technologies provides certain benefits even without maintaining a unified school system. However, the efforts on such implementation has rarely taken into account the local socio-cultural and educational specifics generating resistance to innovation on the part of teachers and parents that could further aggravate contradictions within unstable educational systems.

The introduction of information technologies should not be regarded as the only condition for cardinal changes in the field of education and the main path for the effective development of modern educational systems. Deep and multilateral reworking of all constituent parts of national educational systems is still in great demand. The recognition that ICT use does not in itself become a central factor in the quality improvement of learning and has potential negative consequences is of great importance for all modern educational systems in the world.
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Информация об авторе
Уланова Наталья Сергеевна
(Россия, Москва)
Кандидат психологических наук, старший научный сотрудник Центра цивилизационных и региональных исследований
Институт Африки Российской академии наук
natalya.ulanova@gmail.com
ORCID ID: 0000-0001-9624-4541
Researcher ID: AAB-1405-2021

Information about the author
Natalya S. Ulanova
(Russia, Moscow)
PhD (Psychology), Senior research fellow
Centre for Civilisational and Regional Studies
Institute for African Studies of the Russian Academy of Sciences
E-mail: natalya.ulanova@gmail.com
ORCID ID: 0000-0001-9624-4541
Researcher ID: AAB-1405-2021