BRICS Sustainable Digital Education Policies under the UN SDG

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Abstract : The purpose of this study is to examine the understanding of contexts for a sustainable Education in BRICs. The lines of analysis of this research were oriented according to the following research questions: RQ1) What types of policies were defined by the BRICs to potentiate a sustainable Education? RQ2) Which learning contexts can potentiate a sustainable Education? A policy and a literature analysis were conducted to investigate this topic. The results are the learning contexts that can contribute for a more sustainable education in BRICS, and the presentation of a proposal for learning analytics for those contexts. The policy and literature analysis allow us to define the guidelines to build recommendation for policy regarding the BRICs region. It will also help to create understanding considering the educational implications in society.

Introduction

The possibilities of increasingly interactive resources in the globalized world have changed the concept of communication and sharing of education linked to innovative technologies. Since the technology linked to communication contributes to access to education and this has been expanded through digital communication networks. The innumerous paths taken by innovation linked to technology point to different realities and orientations in the process, new methods in the educational context.

Educational methodologies and practices have changed over the years. Today, the educator has interaction technologies, such as digital boards, web conferences and other tools to enhance the process of teaching and learning, in addition to expanding his performance and thus helping people with disabilities. Many of the "new" ways of learning and teaching were motivated by the advancement of technologies, but specifically, the emergence of Digital Communication Technologies (TCD). These digital tools have contributed as strategies that offer resources to deal with the growing production and dissemination of knowledge. In the late 1990s, last century, the web enabled new forms of computer-based learning (Moore; Kearsley, 2008).

This consolidation took place from a system called the world wide web (www), enabling virtual classrooms, aiming to take a great advantage of the internet and the web for education. This change in teaching, driven by the integration of technologies, brought elements innovative for learning, as it was characterized by the provision of texts, audio and video on the same communication platform, enabling the transposition of geographical, temporal and mainly communication barriers.

In 2020, in a knowledge society, globalized and technologically interconnected. We are experiencing a scenario of educational changes due to the COVID-19 pandemic. We are articulated to combat this virus with social isolation and so we think more and more about digital education.

Digital Education as a Driver of Sustainability

Educators are using technology to engage students in the learning process, and numerous studies have shown evidence of increased interest to learn when digital devices are incorporated into the learning environment.

The strategies to include technologies in the educational context can be defined as (Sousa and Costa, 2014; Sousa et al, 2017; Sousa at al., 2018): A - Open strategy, which establishes access to information and production of knowledge for all, with a focus on flexible content; C-Constructive strategy, which integrates openness to new spaces of knowledge, with its progressiveconstruction; and I-Interactive strategy, which presupposes the development of the interactive processes that occur in the virtual environment.

This strategies become more important in BRICs, helping to develop a more inclusive, innovative,and with more quality Education, contributing to eradicate poverty, in line with the UN Sustainable Development Goals (1- No poverty, 4 – Quality education and 10 – Reduced inequalities).

In line with the studies already done regarding the integration of technologies in the learning process to make it more flexible and inclusive, it is possible to identify a) The implementation ofe-books and tablets in education with the aim of reducing costs with textbooks (Sousa and Costa,2014); Faris (2013), focused on the integration and application of technologies (iPad) in the learning process; Plopper, and Conaway (2013), sought to know how students used digital tools in the learning process; Johnson (2012) focused on the technological change and professional control of teachers; Silva (2014) studied the application and use of digital technologies by teachersin higher education in Portugal and Brazil; Vieira, and Santarosa (2013) carried out a review of the international literature on the trends in the insertion of digital devices in education, and in thelast years several studies have been made about Open Education Resources as MOOCS Baturay (2015) and the influence on the students achievement and performance.

Methodology

The methodology approach of this research was qualitative with the content analysis of the Education Policies implemented in BRICs in the past one year. This was followed by an identification of the learning contexts needed to develop the skills to implement the policies related to digital learning in order to achieve the UN SDG identified à priori.

1st phase of the research - Analysis of BRICS Policies for o Sustainable Education

In some countries that are part of the BRICS[1], which is a multilateral group created and directed by countries outside the axis of Western and developed countries, composed of: Brazil, Russia, India, China and South Africa. Education already had a stamp of priority, betting on technologies according to an agenda with Sustainable Development Goals (SDGs) interconnected with the holding of a United Nations Assembly and with the objective of building a post-2015 development agenda, which resulted in the declaration "Transforming Our World: the 2030 agenda for sustainable development ".

In order to catalyze transformative cooperative action on an international scale, the 2030 Agenda designated 17 integrated and universally applicable objectives aimed at sustainable development, accompanied by 169 goals and indicators (Koehler, 2016; Sarwar, 2015). Among the objectives proposed in this agenda, in item 4 it provides: To ensure inclusive and equitable quality education, and to promote lifelong learning opportunities for all.

This objective, listed above, can be achieved by investing in public policies in three areas:

Basic education - universal primary and secondary education (in Brazil, China, India and South Africa) should reduce inequalities in the provision of quality education to all and increase school performance. Countries should also emphasize good quality early childhood care and education programs.

Higher education - expansion in the offer of higher education and construction of centers of worldexcellence in teaching and research.

Skills development - In this item, we can see the concern of adding new products and services topromote innovation and create incentives for the formation of interconnected workers, so we canconclude that information and communication technologies are linked to this training to guaranteethese skills (UIS, 2014).

In Brazil, the first action that implemented education providing for digital actions and methodologies was the National Education Plan, which establishes the objectives for the decade 2014-2024.

The plan establishes ten overarching objectives: eradicating illiteracy; universal school attendance; reducing inequalities; improving the quality of education; job training; promotion of socio-environmental sustainability; cultural, scientific and technological advancement; increased share of education spending in GDP; improving the status of teachers; dissemination of the principles of equality, respect for diversity and democratic management of education.

In China, the National Medium- and Long-Term Plan for Educational Reform and Development was implemented covering the decade 2010-2020. It describes, for the first time, a general strategy that follows five executive principles: giving priority to education; make student-centered education; experiment with innovative reforms; provide all citizens with equal access to education and improve its quality.

These principles are translated into a series of strategic goals: expanding access to education at all levels (associated with quantitative goals to be achieved by 2020); improving the quality of education, and reducing inequalities between schools and between urban and rural areas; development of lifelong education.

This plan from China provides for systemic reforms at all educational levels: reforms in assessments; greater autonomy for schools and universities; support for non-governmental education (through funding and the removal of legal restrictions); capacity building at the regional level; and promoting international exchanges and cooperation relations.

Finally, guarantee measures are explained that should strengthen the educational system as a whole; they concern teachers (recruitment, training, social status, ethics and efficiency), funding, distribution, management), the use of information technology and relevant equipment, and the rule of law.

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[1] This term BRIC (still without South Africa) entitled by Goldman Sachs, who proposed that these countries would be increasingly important in the global economic scenario and in a few decades would be among the six largest economies in the world. The main objective of this group of countries is to influence global geopolitics and the market, based on the alleged importance of large developing countries with a crucial role in the economy. The BRICS represent 41.2% of the world population and 29.6% of the land's territory.

In India education is found in Chapter 21 in India's 12th Five-Year Plan (2012-2017). This plan establishes six goals that concern all educational levels, with a focus on implementing the Right to Education Law. The six goals are: universal access to quality, free and compulsory education for children aged 6 to 14; improvement in frequency and retention; increase in the number of enrollments in senior secondary education (gross enrollment rate of 90% in secondary education,and 65% in senior secondary education); improving the literacy of young people and adults (80%); universal provision of at least one year and pre-school education; and improving the results of learning assessments, focusing on basic reading and calculating skills in the 2nd grade,and critical thinking, expression and problem solving in the 5th grade.

In Russia, the Education Development Program for 2013-2020 focuses on the quality of education. Its main objectives include the modernization of pre-school and general education, with improvements in infrastructure, governance and financing of education, in order to guaranteeequal access; the creation of a modern educational quality assessment system; the development of higher education; and initial and continuing training to meet the needs of young people and adults. Seven subprograms translate these objectives into specific measures for each educationallevel.

In South Africa, education policy is guided by the National Development Plan 2030 (adopted in 2011), which aims to eliminate poverty and reduce inequality. Chapter 9 of that document sets goals for the educational system through 2030 and includes: universal early childhood care and education; school education with high standards of literacy and mastery of mathematical operations; expansion of training and higher education; and an innovation system that links universities, scientific councils and other research and development institutions.

In 2011, the Department of Basic Education approved the 2014 Action Plan itself, a five-year plan that paves the way for a long-term plan, Schooling 2025, which sets goals for students, teachers, school principals and parents.

The Department of Training and Higher Education recently adopted a white paper on post-school training and education, which also fits into the plans until 2030. The overall objective is to better serve South Africa's social and economic needsby expanding the access to education, improve its quality and increase the diversity of offer, whileensuring better coordination of institutions and cooperation with workplaces.

Policies for international cooperation in education and skills development were discussed by thesecountries by the BRICS at the meeting in Paris that determine strategic education tools for sustainable development and inclusive economic growth. The education ministers of these countries articulated a common Action Plan to promote exchanges between their academics.

Results of Policy and Literature Analysis

During the second half of the twentieth century, knowledge of environmental issues and improvements was increasing (Letcher and Vallero, 2011). As a result of developments in digitaltechnologies and globalization, human culture has evolved in a diverse way, in addition to environmental improvements. Today's world's socioeconomic system and economic circumstances have contributed to growing regional disparity and polarization in society. It has been extremely important to consider the convergence of political, social, and economic dimensions for human and natural processes (Liu et al., 2007).

One of the most important subdimension is Education, and according to the current global environment and in BRICS, the digital learning has assumed a maximum relevance, as all the countries needed to define and implement policies to implement social distance. To overcome the impossibility of presential classes the educational institutions began to have classes online. In this case, the digital tools and learning contexts become even more important, and the analysis of literature helped to systematize the learning contexts presented in table 1:

2nd phase of the research – Identification of the learning contexts to develop digital skills fora Sustainable Education

Table 1 –Digital Learning Contexts

Digital learning contexts	Authors
Collaborative Communities; Cooperative learning; Collaborative learning; Network participation.	Barber, W.; King, S.; Buchanan, S. (2015); Chen, Liwen; Chen, Tung-Liang; Chen, Nian-Shing (2015) Trotskovsky, E.; Sabag, N. (2015) Muñoz González, Juan Manuel; Rubio García, Sebastián; Cruz Pichardo, Ivanovna M (2015) Sohrabi, Babak; Iraj, Hamideh (2016) Liwen Chen; Tung-Liang Chen; Nian-Shing Chen *(2015)* Patricia; Curwood, Jen Scott; Carvalho, Lucila; Simpson, Alyson (2015) Salmon, Gilly; Gregory, Janet; Lokuge Dona, Kulari; Ross, Bella (2015) Masterman, Elizabeth (2016) Stewart, Bonnie (2015) Liyanagunawardena, Tharindu Rekha; Lundqvist, Karsten Øster; Williams, Shirley Ann (2015)
LMS; Youtube; Facebook; Instagram; Wikipedia; Linkedin; Google; Websites eLearning; Mobile learning; Learning object repository; Blended learning; Blackboard; Moodle Learning Manager; Twitter; Videoconferencing; MOOC – massive open online courses.	Tena, Rosalía Romero; Almenara, Julio Cabero; Osuna, Julio Barroso (2016) Sungkur, Roopesh Kevin; Panchoo, Akshay; Bhoyroo, Nitisha Kirtee (2016) Xu, Hong (2016) Martin-Garcia, Antonio V.; Hernández Serrano, Mª José; Sánchez Gómez, Mª Cruz (2014) Salmon, Gilly; Gregory, Janet; Lokuge Dona, Kulari; Ross, Bella (2015) Guerra, Wendy Josefina Guzmán; de los Ángeles Martín Hernández, María; Pírez, Luisa Elvira Rojas (2014) Stewart, Bonnie (2015) McNaughton, Susan M; Westberry, Nicola C; Billot, Jennie M; Gaeta, Helen (2014)
Flipped classroom using digital media; Experiential online development; Open educational practice; Online learning environments; Technology integrated teaching methods; Digital storytelling; Educational games; Augmented reality; Web-based video; Digital video; Webinars	Moorefield-Lang, Heather; Hall, Tracy (2015) Alhajri, S (2016) Joshua Rudow & M. Anwar Sounny-Slitine (2015) Unger, Daniel R.; Kulhavy, David L.; Busch-Petersen, Kai; Hung, I.-Kuai (2016) Wendy Nielsen and Garry Hoban (2015) Kosonen, K., Ilomäki, L. & Lakkala, M. (2015) Friend, Jennifer; Militello, Matthew (2015) Sungkur, Roopesh Kevin; Panchoo, Akshay; Bhoyroo, Nitisha Kirtee (2016)

These digital contexts and tools presented in table 1 can facilitate and promote the learning process.

Discussion and Conclusions

The research on learning contexts in BRICS for a more sustainable education intended to respond to the research question: RQ1) What types of policies were defined by the BRICs to potentiate a sustainable Education? RQ2) Which learning contexts can potentiate a sustainable Education?

The main policies are investment in digital technologies and active methodologies in the areas of Basic Education, Higher Education and skills development. About basic education, it is the emphasis on programs and projects that reduce inequalities in the provision of quality education for all and increase school performance. In higher education, expanding the offer of vacancies and building centres of world excellence in teaching and research. Regarding the development of skills, it is the promotion of innovation through tools and methodologies that create incentives for the training of interconnected workers.

The main contexts found were: Collaborative Communities; Cooperative learning; Digital combinational system; Collaborative learning; Flipped classroom using digital media; Moving from fixing to online space; Experiential online development; Open educational practice; Network participation. And the digital learning methodologies used in those contexts are new methods of teaching using technology with the purpose to improve the quality of education and involve students in the educational process: Project based-learning; Problem based-learning; Digital stories; Online learning environments; Digital Moments; Technology integrated teaching methods; Digital storytelling; Educational games; Authentic learning.

Limitations and future studies

First of all, the plans from different country are related to different periods of time, although all the dates of the studied plans refer to periods after, or include, the establishment of sustainable development objectives by UN.

As we can see at table 3 there is a common period 2014 to 2017 whereby all countries have defined education plans.

Table 3 – Education Plans

	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Brazil					a)	a)	a)	a)	a)	a)	a)	a)	a)	a)	a)						
Russia				d)	d)	d)	d)	d)	d)	d)	d)										
India			c)	c)	c)	c)	c)	c)													
China	b)	b)	b)	b)	b)	b)	b)	b)	b)	b)	b)										
Soth Africa		e)	e)	e)	e)	e)	e)	e)	e)	e)	e)	e)	e)	e)	e)	e)	e)	e)	e)	e)	e)

a) National Education Plan

b) National Medium-and-Long -Term Plan for education Reform and Development

c) Five-year Plan 2012-2017

d) Education Development Program

e) National Development Plan 2030

Also, it's different the compulsory school at different countries. In China it's compulsory be at school for nine years, in India is compulsory be at school at fourteen years old. Brazil has compulsory education until seventeen years old. In South Africa, education is compulsory between nine and fifteen years old. In Russia education it's compulsory for eleven years. Usuallythe children go to school first time at six years old. In all countries the children between ten and fourteen are at school.

Finally, there is a gap for the goals between those countries. At same time we have who aims to eliminate poverty and reduce inequality and who aims to increase the number of students in higher education. All of them are going on to achieve the 4th SDGs (ensure inclusive and equitable qualityeducation, and to promote lifelong learning opportunities for all).

For these reasons we can have some limitations at this study, but there's also, the window of opportunity to analyze the indicators of 4th SDGs, which are relevant to the BRIC's and the digitallearning evolution.

In another study is possible compare the results for the indicator Proportion of persons aged between 16 and 74 years old performing computer related activities, by Type of activities performed at computer, for BRIC's in a period after the SDGs have been established (2015). Just as we can work on the results of this indicator, we can assess the relevance of each of the policies developed in each plan / country, as we have at table 4.

Table 4 – Policies in the Education Plans

	Brazil	Russia	India	China	South Africa
Eradicating iliteracy	x				
Universal school atendence	x		x		
Reducing inequalities	x			x	
Improving the quality of education	x	x	x	x	x
Job training	x				x
Increasing share of education spending	x				
Cultural, scientific and e Tecnological advancement	x				x
Lifelong education		x	x	x	
Improve the number of enrollments in senior secondary			x		
Universal provision of pre school atendence		x			x
Development of higher education		x			x

OCDE, Education at a Glance 2017

Recommendations for Policy

This research intends to contribute for a more sustainable education in BRICS suggesting important recommendations for policy:

Promote the use of digital learning contexts, focused on mobile devices, and which enablearning everywhere, it is easy to use, and has rich content, high efficiency, flexibility, security, reliability, interactivity, portability, and other features that can be used to compete with other teaching methods.

Define measures to implement adaptable learning strategies, tools, and resources to promote the use of digital learning.

Incentive the creation of a culture where the role of the teacher changes from a primary source ofinformation into secondary source of information and a facilitator guiding the students' learning processes.

Promote technology innovation into classrooms, creating infrastructures to be possible the implementation of digital Learning strategies; designing technology-integrated learning will continue playing a crucial role.

A consistent and structural change in the learning strategies will allow the students to acquire competencies as problem solving, collaboration and communication, and will provide means forall students in a global way.

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