

Large Scale Deployment of Tablet Computers in High Schools in Brazil

Giovanni Farias

Athabasca University

Canada

giovanni.farias@gfarias.com

Mohamed Ally

Athabasca University

Canada

mohameda@athabascau.ca

Claudia Alexandra de Souza Pinto

Federal University of Santa Catarina

Brazil

claudiapinto@egc.ufsc.br

Fernando José Spanhol

Federal University of Santa Catarina

Brazil

spanhol@egc.ufsc.br

ABSTRACT

Recently different sectors of society of many countries have been demanding significant improvements in their education systems, and teaching and learning practices (Keller, 2008; Latchem & Hanna, 2001). The need for keeping up or developing competitiveness has been the main reason for these improvements. These countries has been faced with challenges in terms of lack of skilled workers, capacity of resilience from the labor market to deal with dramatic economic changes, and the pursuit for more productivity based on the use of technology. Brazil is a good example of one of these countries. It has been struggling to improve its public basic education in order to develop the workforce. One of the initiatives to improve the education system is by changing the education paradigm in high schools with the use of tablet computers in a large scale deployment. This paper describes the social scenario that led to this initiative and how it has been made in a large country, as well as the research that is being carried out to investigate the impact of such initiative in the learning outcomes in public high schools in Brazil.

Author Keywords

Brazil, distance education, mobile education, high-school education, tablet computers, teacher training.

INTRODUCTION

Brazil is the world's fifth largest country, occupying approximately 8.5 million square kilometers, with a population of 190 million people. Its economy is the world's sixth largest by Gross Domestic Product (GDP), which means around \$ 2.5 trillion USD (\$12,788 USD per person) (Trading Economics, 2012). Its economy is built on a diversified industry, which ranges from base industries (metallurgy, cement, etc.) (BNDES, 2011) to high-tech industries (automobile, satellite, aircraft, information and communication technology, nuclear submarines, etc.) (Castellano, 1996, chapter 2).

Brazil's growing economy has made it to realize the existence of serious educational problems, especially in basic education levels. Since 2004, the labor market has been facing a growing number of available job openings, but many positions are not filled by Brazilian workers because of a lack of skilled education (Amorim, 2012). Although current Brazil's unemployment rate is at its second lowest in recent history (less than 5%) (Terra, 2012), this could be further reduced through improved basic education, as high numbers of skilled positions remain unfilled because of a lack of qualified professionals, and the inability of potential workers to obtain required training. Thus, 57% of Brazilian companies face difficulties finding skilled workers. This follows only behind Japan (80%) and India (67%) (Rebouças, 2012). According to Lazzareschi, the low quality of basic education in Brazil makes it extremely difficult for potential workers to obtain necessary skills or secure better positions (2010, p. 198).

The symptoms of the Brazil's labor market problems are not difficult to be find: 28% of the population between 16 and 64 years are able to read but do not understand what was read in Portuguese (i.e. functional illiteracy) (Bruini, 2011). Furthermore, 20% of students who complete junior high school and who live in large cities do not master reading and writing standards. This education problem is also detected by international assessments, such as the Programme for International Student Assessment (PISA) (OCDE, 2009), which demonstrates that Brazil occupies the 53rd position in a group of 65 countries whose students were assessed. The analysis of data on dropout in high school, raised by the UNDP (United Nations Development Programme), indicates that 24.3% of students between 15 and 17 years of age leave school (UOL, 2013).

It is important to note that these results involve two different education systems: public and private sectors. The private sector ends up offering much better basic education for those who can afford it. The result is an educational segregation: 85% of the population depends on public basic education for their children, while the remaining 15% access a better quality education, some of them with world class education quality (Taffarel & Albuquerque, 2011).

However, in order to give sustainability to its development, Brazil has to count on the society as a whole, not just on a small elitist segment. The shortage of skilled labor and the social problems aforementioned are related to the quality of the basic education provided to most of the Brazilian population, and Brazilian leaders are aware of these issues. Recognizing these educational scenarios, different federal administrations have been working to improve public basic education in Brazil. Among the initiatives that have been taken, some can be highlighted: (1) mandatory school attendance for school-age students (Todos Pela Educação, 2011); (2) limiting between 25 and 35 the number of students per classroom (Lemos, 2012); (3) establishment of a minimum wage for teachers (MEC, 2008); (4) creation of a web portal dedicated to teacher online training and open educational resources delivery (MEC, 2011); (5) creation of an assessment policy to evaluate each public weaknesses (MEC, 2007); (6) several pilot projects are being carried out to validate new teaching methodologies for public basic education, including the use of technology as an education tool.

THE INTRODUCTION OF TABLET COMPUTERS IN PUBLIC SCHOOLS

The most recent large scale initiative taken by the Brazilian government was the introduction of tablet computers in schools. In 2011, the ministry for education announced an investment of \$90 million USD to buy 600,000 tablet computers to distribute amongst high school teachers (G1, 2012). It also includes the purchase of computers, projectors and interactive whiteboards (IWBs) for the classrooms, as well as teacher training, school Internet connectivity improvements and open educational resource creation.

The plan is to provide tablet computers to teachers to improve the capacity of teachers to deliver more effective classes, and to enable students to obtain needed knowledge and skills. Thus, the country will be able to count on skilled workers to support its growing economy. The content that will be used in the project is available in the Portal do Professor, or Teacher's Portal. This portal hosts the open educational resources (OER) which may be used by any teacher. Content provided by Khan Academy and localized to Brazilian Portuguese also will be available for any high school teacher in Brazil (Paraguassu, 2013). The training on the use of tablet computers, IWB and OER is planned to be provided by public federal universities, spread out across the country.

The government is in a hurry to deploy the tablet computers to see results as soon as possible. National education leaders state that if the devices are properly used, they can provoke a revolution in the quality of K-12 education. Thus, it will be possible to jump from the current low quality public education to a higher quality level in few years. However, this eagerness has resulted in the establishment of very short time frames for all deployment processes.

DEPLOYMENT ISSUES

Despite these initiatives, the introduction of tablet computers in high schools has been bombarded with criticism from different segments of society, especially from scholars. There is no lack of reasons for this. Below we can reflect about some of them:

1. There was little time for adapting new teaching methods, the training and the content to meet regional demands. This situation creates barriers to teachers' acceptance of the new paradigm at first, mainly amongst those who are unionized.
2. Teachers are skeptical of government initiatives because of a history of technology deployment in schools with poor practical results in terms of learning outcomes. This skepticism is reinforced by criticisms from some Brazilian scholars against this kind of initiative. Cardoso (2012), for instance, states that "introducing tablet computers in the classroom means more of the same". She points out that there is a lot of government enthusiasm at the beginning of the process, but after some time, research shows little or no significant results from the use of the technology. She names this phenomenon "politician technophilia".
3. The lack of broader curriculum planning to support the use of the new technology in the learning process, the absence of defined standards for the content available for the teaching process, and the uncertainty of when the students will also have tablet computers available for them are some other factors that feed the criticism (Teles, 2012).
4. There is little statistical data about the level of digital inclusion amongst high school teachers. However, the general perception is that that the level of digital inclusion among the teachers is relatively low. This uncertainty about the teacher digital inclusion, united to the fast track training provided for the teachers to learn how to use tablet computers in classroom in the first year of deployment, causes skepticism about their ability to deal with the new teaching paradigm.
5. Tablet computers have been used for educational purposes by private schools for a long time (Nascimento, 2013). However, the work scale for this public education initiative is much larger, managed by federal government in partnership with eighteen state governments (out of 27). Thus, there is a managerial issue to be considered when dealing in large scale, especially regarding the quality control of the deployment process.
6. Most of the teachers have not accumulated experiences on the use of Open Educational Resources (OERs) in their teaching strategy. This is because the current initiative marks the first time that computing devices are being deployed on such a scale in Brazil. So far, only very active and digitally included teachers have had the opportunity to experiment with such kinds of resource for teaching.

RESEARCH PROBLEM

In spite of all these issues, the initiative of deploying 600,000 tablet computers among high-school teachers in a large scale operation must be studied in its main aspects: logistics, training, OER, digital inclusion, infrastructure, teaching methods, learning outcomes, among others. It is important to answer some questions, such as: (1) What is the impact of the use of tablet computers in the learning outcomes in a scenario like one described here? (2) What are the main aspects of the deployment process to be observed considering the scale of the operation? (3) What are the perceptions of the involved teachers about the new teaching paradigm and its deployment?

The answers to these aforementioned questions, and others that may arise during the research, are very important to identify the weaknesses and strengths of using tablet computers in public high schools in Brazil. The knowledge obtained from this initiative can help to improve the deployment process for the future, when the policy of using such paradigm must be extended.

RESEARCH METHODOLOGY

The research project must be divided into four main parts, as follows:

Planning - Collecting data about the Brazilian tablet computer based education operation in order to plan the best way the research may take place to answer the research questions. It also involves the establishment of local partnerships to support the research.

Pilot Project - This research involves some unpredictable variables, such as the type of content available for use on the tablets, the teacher experience with the technology, what is the best approach to collect data accordingly to the scenario conditions. This phase aims to adapt the research project to occasional unpredicted research scenario.

Data Collection - The research data collection itself takes place during all school year in Brazil, which runs from February to December, and must be performed in a way to avoid bias in the results.

Data Analysis - A huge volume of data will be collected during one year (form responses, recorded interviews, learning outcome information, recorded observations). Thus, this phase will take a few months to process the data collected and organize the achieved results.

After the pilot-project has been carried out, the research questions can be adjusted to fit the reality of the research scenario. Three Brazilian public high schools from different regions will be invited to participate in the research. The teachers of each school will be invited to participate of the data collection, which consists of answering an online survey with some questions regarding different aspects of the deployment process and teaching strategies, with and without tablet computers. A second data collection round will take place based on the results from the first data collection. Some teachers will be interviewed, depending on their responses, in order to identify some specific problem regarding to the feasibility of the new teaching paradigm.

At the end, the collected data will be analyzed to highlight all the main aspects that must be observed in a deployment process like this. The final report will be generated based on this analysis.

CONCLUSION

There is no similar study on the impact of the use of tablets in large scale educational systems like the Brazilian one proposed in this proposal. Thus, studying the educational impact of using tablets in this context can bring significant contributions to the use of tablet computers in education like it is done in Brazil. The obtained results can be used as a reference for large scale deployment in other countries or regions.

The research will use both quantitative and qualitative methods and will provide concrete arguments to arrive at definitive conclusions concerning the research questions. Thus, if the collected data lead to such arguments, in order to give sustainability to the conclusions necessary to research questions, the research will have been a success.

Researching the way that the Brazilian educational system deals with the challenges regarding deployment, such as training, initial acceptance and use, adoption difficulties and rejection, is very important to obtain know-how for other initiatives. The Brazilian case offers a very interesting research scenario for western countries, since this country is fairly aligned with the western culture, tradition and behavior. However, the Brazilian experience can be replicated in many different countries around the world, even those that are culturally different. After all, few countries in the world have an organized and somehow centralized education system, with such large number of students (8 million), to get the opportunity to research on large scale deployment of the use of tablet computers in classroom.

This paper aims to be the first of a sequence to discourse about the different phases and challenges, in different aspects of the use of tablet computers in large scale deployment in schools.

REFERENCES

- Amorim, R. (2012). A revolução por trás do apagão da mão-de-obra. Istoé Magazine. Retrieved from: http://www.istoe.com.br/colunas-e-blogs/coluna/239414_A+REVOLUCAO+POR+TRAS+DO+APAGAO+DE+MAO+DE+OBRA+
- BNDES - Banco Nacional de Desenvolvimento Econômico e Social. (2011). Indústria de Base - Relatório Anual. Retrieved from: http://www.bndes.gov.br/SiteBNDES/bndes/bndes_pt/Hotsites/Relatorio_Anual_2011/Capitulos/desempenho_operacional/insumos_basicos/
- Bruini, E. (2011, November 2). Educação no Brasil. Brasil Escola. Retrieved from <http://www.brasilecola.com/educacao/educacao-no-brasil.htm>
- Cardoso, C. (2012, July 10). Tablet na sala de aula: mais do mesmo. Carta Capital Magazine. Retrieved from <http://www.cartacapital.com.br/carta-na-escola/tablet-computers-na-sabela-de-aula-mais-do-mesmo/>
- Castellano, S. (1996). Proposição de um modelo para planejamento e desenvolvimento de projetos em empresas de alta tecnologia. (Master's dissertation). Retrieved from <http://www.eps.ufsc.br/disserta96/castellano/cap2/cap2.htm>
- Convergência Digital (2011, January 28). Banda larga nas escolas: Operadoras dizem ter ultrapassado meta do governo. Retrieved from <http://convergenciadigital.uol.com.br/cgi/cgilua.exe/sys/start.htm?infoid=25022&sid=4>
- G1. (2012, February 3). MEC vai comprar 600 mil tablet computers para escolas públicas de ensino médio. Retrieved from <http://g1.globo.com/educacao/noticia/2012/02/mec-vai-comprar-600-mil-tablet-computers-para-escolas-publicas-de-ensino-medio.html>
- Keller, G. (2008). Higher education and the new society. Maryland: John Hopkins University Press.
- Latchem, C. & Hanna, D (2001). Leadership for 21st century learning: Global perspectives from educational innovators. New York: Routledge.
- Lazzareschi, N. (2010). O apagão de mão de obra no Brasil. Ponto e Vírgula, 7, 192-199.
- Lemos, Iara (2012, October 16). Comissão do Senado aprova número limite de alunos na sala de aula. G1. Retrieved from: <http://g1.globo.com/educacao/noticia/2012/10/comissao-do-senado-aprova-numero-limite-de-alunos-na-sala-de-aula.html>
- MEC - Ministério da Educação. (2007). Índice de Desenvolvimento da Educação Básica. Retrieved from <http://portal.mec.gov.br/index.php?Itemid=336>
- MEC - Ministério da Educação. (2008). Piso salarial profissional nacional. Retrieved from http://portal.mec.gov.br/index.php?Itemid=382&id=12253&option=com_content
- MEC - Ministério da Educação. (2011). Portal do Professor. Retrieved from <http://portaldoprofessor.mec.gov.br/index.html>
- MDCE - Ministério do Desenvolvimento e Comércio Exterior. (2012). Tendências e debates: o que a balança comercial revela. Retrieved from <http://www.brasilmaior.mdic.gov.br/na-midia/index/institucional/id/1957>
- Nascimento, A. (2013, January 29). Tablet adotado nas aulas de escolas particulares. Diário de Pernambuco. Retrieved from http://www.diariodepernambuco.com.br/app/noticia/vida-urbana/2013/01/29/interna_vidaurbana,420615/tablet-adotado-nas-aulas-de-escolas-particulares.shtml
- OCDE - Organization for Economic and Co-operation Development. (2009). [Figure comparing countries' and economies' performance, 2009]. Programme for International Student Assessment Rankings 2009. Retrieved from <http://www.oecd.org/pisa/46643496.pdf>
- Paraguassu, L. (2013, January 16). MEC vai distribuir a docentes aulas da Khan Academy. Estadão Magazine. Retrieved from <http://www.estadao.com.br/noticias/vida,mec-vai-distribuir-a-docentes-aulas-da-khan-academy,985158,0.htm>
- Rebouças, F. (2012, November 27). Déficit de mão de obra no Brasil. Infoescola Magazine. Retrieved from <http://www.infoescola.com/economia/deficit-de-mao-de-obra-no-brasil/>
- Taffarel, C., & Albuquerque, J. (2011, January 1). Educação pública x educação privada: a disputa da década no início do século XXI. Rascunho Digital. Retrieved from <http://www.rascunhodigital.faced.ufba.br/ver.php?idtexto=842>
- Teles, G. (2012, February 2). Governo federal distribuirá 600 mil tablet computers para escolas públicas. Jornal da Globo. Retrieved from <http://g1.globo.com/jornal-da-globo/noticia/2012/02/governo-federal-distribuir-600-mil-tablet-computers-para-escolas-publicas.html>
- Terra (2012, Dezembro 21). Taxa de desemprego no Brasil é a segunda menor da história. Retrieved from http://economia.terra.com.br/noticias/noticia.aspx?idNoticia=201212211104_RTR_SPE8BK00T
- Todos Pela Educação. (2011). [Retrieved data related to registered 4-17 year old students in schools. Números da Educação no Brasil. Retrieved from <http://www.todospelaeducacao.org.br/educacao-no-brasil/numeros-do-brasil/brasil/?ano=2011>

Trading Economics. (2012). [Graph illustration of Brazil GDP between 2000 and 2012]. Brazil GDP. Retrieved from <http://www.tradingeconomics.com/brazil/gdp>.

UOL. (2013, March 14). Brasil tem 3a maior taxa de evasão escolar entre 100 países, diz Pnud. Retrieved from <http://educacao.uol.com.br/noticias/2013/03/14/brasil-tem-3-maior-taxa-de-evasao-escolar-entre-100-paises-diz-pnud.htm>.