Plan Ceibal 2020: Futures Scenarios for Technology and Education

The case of Uruguayan Public Education System

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Futures of a Complex World - June 13th, 2017 - Turku, Finland
Uruguay

3.4 million people
GDP per capita US$ 16,350
we speak Spanish...
love tango, football, mate & barbecue!
À l’école", Jean-Marc Côté et al, France, 1899
PUSH-BUTTON EDUCATION

Tomorrow's schools will be more crowded; teachers will be correspondingly fewer. Plans for a push-button school have already been proposed by Dr. Simon Ramo, science faculty member at California Institute of Technology. Teaching would be by means of sound movies and mechanical tabulating machines. Pupils would record attendance and answer questions by pushing buttons. Special machines would be “geared” for each individual student so he could advance as rapidly as his abilities warranted. Progress records, also kept by machine, would be periodically reviewed by skilled teachers, and personal help would be available when necessary.
Agenda

1. Brief Introduction of Plan Ceibal
2. Futures Scenarios
3. Results & Future Reflections
Plan Ceibal is a 10 years old Government Agency to minimize digital divide and to leverage pedagogies with technologies and digital strategies to help improve educational outcomes nationwide in the public education system in Uruguay.
Beneficiaries

- 100% coverage from 1st to 9th grade in Public System
- 100% of classrooms internet access, 95% of students have broadband internet access
- <5% of Public Educational Budget

797,000 users with laptops, tablets and Internet
52,000 laptops, tablets and Internet in libraries in schools
Educational Portfolio

- Schoology LMS
- Educational Resources curation
- English Teaching
- Maths Adaptive Platform
- Digital library
- National On-line Evaluation
- Robotics & Sensors Kits, digital labs & fablabs
- Computational, Design Thinking
New Pedagogies for Deep Learning

[Fullan, 2013]

A global network of schools, “living lab” to test, implement and improve disruptive pedagogical practices in seven different countries (being one of them Finland) with focus on methodology, pedagogy and accountability.
Rethinking XXIst Century Competencies

Critical Thinking and Problem Solving

Global Citizenship

Creativity

Collaboration

Character

Communication
Futures Scenarios

Try to shape the future of education instead of reproducing linear and reductionists views of future of it…
Research Problem

General

How do we imagine Education in 20-30 years now?

Specific

How do we introduce Futures perspectives and studies in Plan Ceibal policy and implementation?

More Specific

How do we Apply Futures Studies to New Technologies adoption and challenges for effective integration in the educational process?
Definition

New Technologies - broad sense

Set of educational technologies such as access technology, virtual platforms, contents, methodologies and digital strategies.

[Horizon, 2015]
Research questions

1. What **New Technologies** should Plan Ceibal **consider** within the next 4-5 years?

2. What are Key **Implementation Challenges** related to those New Technologies?

Don’t overestimate short-term effects of technology while underestimate long term effects!
Scenarios Construction

<table>
<thead>
<tr>
<th>Dimensions</th>
<th>Phases</th>
<th>Results</th>
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<tbody>
<tr>
<td>Technological Supply</td>
<td>Delphic Method</td>
<td>- New Technologies</td>
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<td>- Implementation Challenges</td>
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<td>- SWOT</td>
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<td>Technological Demand</td>
<td>Network Demand Analysis</td>
<td>- Growth Model</td>
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<td>- Trends</td>
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<td>- Projections</td>
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<td>Technology Supply &amp; Demand</td>
<td>Scenarios Construction</td>
<td>- Scenarios</td>
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<td>- Narrative</td>
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<td>- Recommendations</td>
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Participative, semi-quantitative
Evidence based, quantitative
Exploratory, semi-quantitative
Delphic Method

First Round
- 39 New Technologies
- 19 Implementation Challenges

Second Round
- 20 New Technologies
- 5 Implementation Challenges

Results
- 20 New Technologies Ranking
- 5 Implementation Challenges Ranking
- SWOT and Strategies Typology

Two Panels: External & Internal
Results

1. **Delphi** allowed foresight on new technologies
   a. Order the panorama of (20) New Technologies and (5) Implementation Challenges for the next 5 years and impact over next 10
   b. Identify critical factors for achieving wished scenario

2. **Internet Use Analysis** at schools evidence an exponential growth of +70% average annually period 2011-2015

3. **Scenarios Construction** suggested 4 possible scenarios of #EdTech in Uruguay in next 4-5 years

4. **“2020-1: New Paradigm”** being wished scenario:
   a. Systems’ alignment
   b. Teacher's new role and empowerment
   c. Personalized Learning
   d. Innovative culture
   e. New classroom’s design (i.e: fablab)
Results

How to address challenges to achieve wished scenario

1. The main challenge is to achieve structural change in Educational System which implies political, administrative, cultural, educational, technological and ethical dimensions

2. Main levers for change are found in human and cultural potential of Plan Ceibal as well as human potential of teachers

3. Personalized learning and other methodological and technological devices and approaches (i.e: learning analytics) could be leveraged if points 1 and 2 advance
Futures Reflections

1. At Organizational level: **systematize prospective process** for Technology and Education Scenario planning and other needs.

2. At Educational System level: *think about introduction of futures studies into K-12 education*. Mindsets and mental models?

3. How to gain insights to better understand and manage technological and educational change time scales?

4. **Key Implementation Challenges** are not technological, but rather social and cultural factors.

5. **How can the educational system** be aware of its process and embrace and also anticipate educational changes?
References


“The future is already here — it's just not evenly distributed”
William Gibson

Thank you!
Deep Learning supported by Technology

Three key elements

Effective Pedagogy

Leadership for change

Technologies as accelerators of learning

Challenges

#1 Transform schools into educational environments to increase competencies and generate knowledge

#2 Innovate in digital strategies to develop connected to the real life contextualized and relevant knowledge
To implement a prospective analysis based on Delphi Methodology to obtain consensus about critical New Educational Technologies and implementation challenges related to this technologies with an horizon of 4 years
## Results

### New Technologies

<table>
<thead>
<tr>
<th>Rank</th>
<th>External Panel</th>
<th>Internal Panel</th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>Cloud Computing</td>
<td>Adaptive Learning</td>
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<tr>
<td>2</td>
<td>On line Learning</td>
<td>Mobile Learning</td>
</tr>
<tr>
<td>3</td>
<td>Social Networks</td>
<td>On line Learning</td>
</tr>
<tr>
<td>4</td>
<td>Mobile Broadband</td>
<td>Social Networks</td>
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<tr>
<td>5</td>
<td>Mobile Learning</td>
<td>Virtual Remote Labs</td>
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<tr>
<td>6</td>
<td>Info Visualization</td>
<td>Gamification</td>
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<tr>
<td>7</td>
<td>Adaptive Learning</td>
<td>Mobile Broadband</td>
</tr>
<tr>
<td>8</td>
<td>Gamification</td>
<td>Learning Analytics</td>
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<tr>
<td>9</td>
<td>Bring your own device</td>
<td>Bring your own device</td>
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<tr>
<td>10</td>
<td>Learning Analytics</td>
<td>Cloud Computing</td>
</tr>
<tr>
<td>11</td>
<td>On line identity</td>
<td>Inverted Classroom</td>
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<tr>
<td>12</td>
<td>Crowd sourcing</td>
<td>Badges &amp; Micro-credits</td>
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<tr>
<td>13</td>
<td>Flipped Classroom</td>
<td>MOOCs</td>
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<td>14</td>
<td>Visual Data Analysis</td>
<td>Open Licensing</td>
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<td>15</td>
<td>New generation batteries</td>
<td>Augmented Reality</td>
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<tr>
<td>16</td>
<td>Augmented Reality</td>
<td>Speech-text Translation</td>
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<td>Open Hardware</td>
<td>Holography</td>
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<td>18</td>
<td>Internet of Things</td>
<td>Internet of Things</td>
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<td>19</td>
<td>Natural User Interfaces</td>
<td>Crowd-sourcing</td>
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<tr>
<td>20</td>
<td>Semantic Applications</td>
<td>Self-quantified</td>
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## Results

### Implementation Challenges

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<th>Rank</th>
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<tbody>
<tr>
<td>1</td>
<td>Profit from system-wide big data</td>
<td>Integrate New Techs in educational change process</td>
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<tr>
<td>2</td>
<td>Integrate New Techs in educational change process</td>
<td>Empower teachers on their educational practices</td>
</tr>
<tr>
<td>3</td>
<td>Empower teachers on their educational practices</td>
<td>Integrate personalized learning</td>
</tr>
<tr>
<td>4</td>
<td>Rethink teachers’ and professors’ role</td>
<td>Develop complex thinking and communications</td>
</tr>
<tr>
<td>5</td>
<td>Integrate personalized learning</td>
<td>Rethink teachers’ and professors’ role</td>
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## Panels - External

<table>
<thead>
<tr>
<th>Name</th>
<th>Affiliation</th>
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<tr>
<td>Alejandro Maiche</td>
<td>FPSIC-UDELAR, Uruguay</td>
</tr>
<tr>
<td>John Moravec</td>
<td>Minnesota U., USA</td>
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<tr>
<td>Ana Rivoir</td>
<td>FSC-UDELAR, Uruguay</td>
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<tr>
<td>Laura Motta</td>
<td>ANEP, Uruguay</td>
</tr>
<tr>
<td>Antonio M. Battro</td>
<td>indep., Argentina</td>
</tr>
<tr>
<td>Leticia Britos</td>
<td>Stanford U., USA</td>
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<tr>
<td>Carlos Petrella</td>
<td>FING-UDELAR, Uruguay</td>
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<tr>
<td>Luis Garibaldi</td>
<td>CFE-ANEP, Uruguay</td>
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<tr>
<td>Celsa Puente</td>
<td>CES-ANEP, Uruguay</td>
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<tr>
<td>Luis Osin</td>
<td>CET, Israel</td>
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<tr>
<td>Claudio Rama</td>
<td>indep., Uruguay</td>
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<tr>
<td>Marcelo Bagnulo</td>
<td>UCRM, IETF, Spain</td>
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<tr>
<td>Cristóbal Cobo</td>
<td>Oxford U., UK</td>
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<tr>
<td>Pablo Brenner</td>
<td>Colloquia, Uruguay</td>
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<tr>
<td>Daniel Kofman</td>
<td>Télécom ParisTech, France</td>
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<tr>
<td>Pablo Sprechmann</td>
<td>NYU, USA</td>
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<td>Eugenio Severin</td>
<td>indep., Chile</td>
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<tr>
<td>Rafael Mandressi</td>
<td>CNRS, France</td>
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<tr>
<td>Fernando da Rosa</td>
<td>Ibirapitá, Uruguay</td>
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<tr>
<td>Raquel Aguilar</td>
<td>CTEP, Uruguay</td>
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<tr>
<td>Fernando Santamara</td>
<td>U. de la Sabana, Colombia</td>
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<tr>
<td>Gonzalo Mateos</td>
<td>Rochester U., USA</td>
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<tr>
<td>Guillermo Spiller</td>
<td>Facebook, USA</td>
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- We used the K-12 Horizon Project [Horizon, 2014] to generate the initial items

- Questionnaires were administered online through google forms
Procedure

1. Invite expert panels
2. Design first round quiz
3. Publish first round
4. Collect and Process first round data
5. Design second quiz based on previous step
6. Publish second round with first round feedback
7. Collect data from second round and Process
8. Analyze and obtain final results and discussion
9. Present Results
Data Analysis

- **First round:** The external panel harvested 21 expert's answers and the internal one 18.

- **Second round:** 14 external panelists answered the second quiz (i.e. 67% attrition rate) and 18 experts answered second round in the internal panel (100% attrition rate).

Criterion was 10 responses minimum in each panel
Data Analysis - New Technologies

First round

39 New Technologies were ranked after computing average scores and consensus metric (IQD).

Second round

20 top new technologies

- Impact
- Horizon
- Usability
Data Analysis - Implementation Challenges

First round

5 out of 19 items were obtained regarding importance given by panelists

Second round

- Implementation Difficulty
- Forecast for 2020 year resolution

Feasibility: to what extent each Implementation Challenge can be solved in 2020.
Content Analysis

Text answers with explanations of panelist we generated:

- SWOT Analysis (Strengths, Weaknesses, Opportunities, Threats) to solve Implementation Challenges
- Typology of Strategies to boost the resolution of principal Implementation Challenges