Higher Education for Sustainable Development

Rodrigo Lozano (PhD)

email: r.lozano@uu.nl & editorinchief@jclp.org-sustainability.com

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Universidad de Castilla La Mancha
Albacete, Spain
Top 20 inventions in the last 50 years

1. Colour TV
2. DVD & Blu ray
3. Lasers
4. Microwaves
5. Bar codes and scanners
6. Automated Teller Machine (ATM)
7. Space exploration
8. Magnetic resonance imaging
9. DNA testing and sequencing
10. Birth-control pill

http://www.newscientist.com/special/big-impact
http://www.cnbc.com/id/44504579/page/17
http://www.answers.com/Q/How_has_technology_changed_in_the_last_50_years
Top 20 inventions in the last 50 years (2)

- Light and portable computers
- The microprocessor
- The mobile phone
- GPS /Satnav
- Internet
- Email
- Online Shopping/ecommerce
- Green chemistry
- Photovoltaic Solar Energy
- Biofuels

http://www.newscientist.com/special/big-impact
http://www.cnbc.com/id/44504579/page/17
http://www.answers.com/Q/How_has_technology_changed_in_the_last_50_years
Benefits of development

- Large increase in **economic activities** ($2.4 trillion in 1900 to $6.3 trillion in 1950 to $46 trillion in 2001)
- Large growth in **industrial production** outputs, over fifty times during the past century, four-fifths since 1950s
- Rise in **individual income** ($2,582 in 1950 to $7,454 in 2001 to $17,760 in 2011)
- Increase in **international goods trade** ($311 million in 1950 to $5.5 trillion in 2000)
INDUSTRIALISATION EFFECTS
Economic aspects

- Economic disparity and political instability
- Marginalization
- Consumption
- Bribery & Corruption
- Disproportionate income e.g. rich/poor ratios (within countries, and between developed and developing countries)
- External debt
Ratio of income of the richest 20% vs. poorest 20% of world population

<table>
<thead>
<tr>
<th>Year</th>
<th>Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>1960</td>
<td>30:1</td>
</tr>
<tr>
<td>1970</td>
<td>32:1</td>
</tr>
<tr>
<td>1980</td>
<td>45:1</td>
</tr>
<tr>
<td>1989</td>
<td>59:1</td>
</tr>
<tr>
<td>1991</td>
<td>61:1</td>
</tr>
</tbody>
</table>

Adapted from Kirby (2003) and Reid (1995)
Environmental aspects

- Growing water scarcity
  - Unsafe drinking water
  - Desalination
  - Deforestation
  - Artificial waterways
  - Other

- Global warming
  - Climbing temperatures
  - Melting glaciers, rising seas
  - All over the earth we're feeling the heat
  - Why isn't Washington?
Social aspects

- Poverty and extreme poverty
- Under-nourishment and food insecurity
- Diseases and epidemics (e.g., HIV-AIDS, malaria)
- Population growth
- Aging population
- Illiteracy
- Human rights abuses
- Gender inequities
- Armed conflict and warfare
Cross-cutting aspects

- Responsibility
- Governance
- Inter-relatedness
- Environmental aspects
- Short-, long-, and inter-relatedness
“Humanity has the ability to make development sustainable – to ensure that it meets the needs of the present without compromising the ability of future generations to meet their own needs.”

(WCED, 1987, p. 8)
EDUCATION ROLE IN LEADING TOWARDS SUSTAINABLE SOCIETIES
“Education is critical for promoting sustainable development and improving the capacity of people to address environment and development issues” (UN, 1992)

We are at the end of the United Nations’ Decade of Education for Sustainable Development (DESD) (UNESCO, 2005)
The education we have

• The number of students around the globe enrolled in higher education is **forecast** to more than double to **262 million by 2025** ([http://www.universityworldnews.com/article.php?story=20120216105739999](http://www.universityworldnews.com/article.php?story=20120216105739999))

• In more developed countries, the percentage of adults with the equivalent of a college degree rose to **more than 30% in 2010** ([http://247wallst.com/special-report/2012/09/21/the-most-educated-countries-in-the-world/](http://247wallst.com/special-report/2012/09/21/the-most-educated-countries-in-the-world/))
In spite of the advances...

- **2% of the world population** attend higher education, but more than **80 per cent** of the decision-makers in industry, community and politics are **graduates of universities** (Scott et al., 2013)

- **25% of teachers** were **absent** from school, and only about half were teaching, during unannounced visits to a nationally representative sample of government primary schools in **India** (Kremer et al. 2004)
Universities

• For centuries, they have been major agents of social change, yet themselves remaining conservative and resist change.

• They educate future societal leaders, decision-makers, and intellectuals.

• They rely on reductionism and specialism and testing by repetition, with a primary focus on the conquest of nature and the industrialization of the planet.

(Burke, 2000; Elton, 2003; Lozano, 2006)
Reductionistic education

• Much of modern education and praxis has relied on Newtonian and Cartesian mental models, which are based on rationality, causality, mechanistic interpretation, silo thinking, and reductionism (Ketola, 2009; Lovelock, 2007; Nonaka & Takeuchi, 2001)
Reductionistic education

• This has resulted in **unprecedented advances** in development and industrialisation (Dunphy, Griffiths, & Benn, 2003; Jensen, 1993)

• But, it has led to the **conquest of nature** through competition (Cortese, 2003), **industrialisation** (Carley & Christie, 2000; Orr, 1992; Reid, 1995; WCED, 1987), **overspecialisation** and disciplinary isolation (Cortese, 2003; Costanza, 1991)
Reductionistic education

- This has also fostered highly individualistic, greedy and self-interested behaviours (Stead & Stead, 1994)
- Such reliance on rationality, whilst neglecting and ignoring emotions (Henry, 2001), have resulted in a civilisation crisis that confronts us with an unsustainable present and a threatened future (Carley & Christie, 2000; Haberl, Fischer-Kowalski, et al., 2011; Reid, 1995)
SD in universities

• During the last decade an increasing number of universities have been engaged in incorporating and institutionalizing SD into their systems.

• Yet, SD is still an innovative idea in most universities, and has not yet permeated into all disciplines, scholars, and university managers, or throughout the curricula.

(Argyris, 1977; Senge, 1999; Calder and Clugston, 2003; Cortese, 2003; Lozano, 2006)
Universities that have made major SD achievements

- **Cardiff University** (UK)
- **University of Leeds** (UK)
- Chalmers University of Technology (Sweden)
- Technical University of Catalonia (Spain)
- TU Delft (the Netherlands)
- ETH Zurich (Switzerland)
ESD Declarations

• Since 1972 many academic declarations, charters and partnerships have developed that were designed to foster environmental education, and education for sustainable development.

• Since 1987 there has been a large increase in such initiatives and their implementation.

• Caveat: Signing one does not ensure that the SD is implemented.
## Brief History of the efforts taken in HE for SD

<table>
<thead>
<tr>
<th>Year</th>
<th>Event/Declaration</th>
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<tbody>
<tr>
<td>1972</td>
<td>Stockholm Declaration on the Human Environment</td>
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<tr>
<td>1990</td>
<td>Talloires Declaration, France.</td>
</tr>
<tr>
<td>1992</td>
<td>Rio Conference: Agenda 21, Chapter 36</td>
</tr>
<tr>
<td>1992</td>
<td>Association of University Leaders for a Sustainable Future founded.</td>
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<tr>
<td>1999</td>
<td>First Environmental Management for Sustainable Universities conference first held in Sweden</td>
</tr>
<tr>
<td>2000</td>
<td>Global Higher Education for Sustainability Partnership (GHESP)</td>
</tr>
<tr>
<td>2001</td>
<td>Lüneburg Declaration</td>
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<tr>
<td>2002</td>
<td>World Summit on Sustainable Development in Johannesburg, South Africa (Outcome: the Ubuntu Declaration)</td>
</tr>
<tr>
<td>2004</td>
<td>Declaration of Barcelona</td>
</tr>
<tr>
<td>2005</td>
<td>Start of the Decade of Education for Sustainable Development (DESD)</td>
</tr>
</tbody>
</table>
Declarations’ Common Themes (1)

- **Focus** on environmental degradation, threats to society, and unsustainable consumption
- Ethical or moral **obligation** of universities to work towards sustainable societies, including the inter-generational perspective
- Inclusion of SD throughout the **curricula** in all disciplines

(Calder & Clugston, 2003; Lozano-Ros, 2003; Wright, 2004)
Declarations’
Common Themes (2)

- Encouragement of SD **research**
- Move towards more sustainability orientated university **operations**
- **Collaboration** with other universities
- **Stakeholder** engagement and outreach
- **Trans-disciplinarity**

(Calder & Clugston, 2003; Lozano-Ros, 2003; Wright, 2004)
HESD system elements

- 'Educating the educators'
- Education
- Research
- On-campus life experiences
- University system
- Institutional framework
- Assessment and reporting
- Collaboration with other universities
- Community operations

(Lozano et al., 2013)
HEIs’ stakeholders

- Academic directors
- Directors of department,
- Directors of divisions,
- Professors (in undergraduate and postgraduate courses)
- Researchers
- Staff
- Students
- Alumni
- Community
- Employers
- etc.
University System

• SD needs to be incorporated in a trans-disciplinary into:
  – Curricula
  – Research
  – Operations
  – Outreach and engagement with stakeholders
  – Collaboration with other universities
  – Assessment and reporting
  – Institutional framework
  – On-campus life experiences
  – Educate the educators programmes

(Lozano et al. 2013)
EDUCATION AND SD
One of the key areas of interest for HESD has been...

- ... the incorporation of the concept into curricula at all levels
- Including methods to achieve this in practice (Boks & Diehl, 2006; Wemmenhove & de Groot, 2001)
- And particularly in terms of students gaining an understanding of how their decisions and actions affect the environment and society (Lozano, 2010b; Lozano & Peattie, 2009)
Approaches to incorporating SD into curricula

1. Coverage of *some environmental* issues in an existing course or courses (Davis, Edmister, Sullivan, & West, 2003; Thomas, 2004)

2. **A specific SD course** (Abdul-Wahab, et al., 2003; Boks & Diehl, 2006; Cortese, 2003a; Kamp, 2006; von Blottnitz, 2006)

3. SD *intertwined* as a concept in regular disciplinary courses, tailored to the nature of each specific course (Abdul-Wahab, et al., 2003; Kamp, 2006; Peet, Mulder, & Bijma, 2004; Thomas, 2004)

4. SD as a possibility for *specialization* within the framework of each faculty (Kamp, 2006)

5. SD as a *undergraduate or post-graduate degree* (Lozano & Lozano, 2014)
Factors limiting SD incorporation in curricula (1)

- Lack of **SD awareness** (Lozano, 2006)
- Little or no motivation or realism (Boks & Diehl, 2006)
- Changes in curricula translated into **budget claims** (Peet et al., 2004)
- Insecurity and **threat to academic credibility** from teachers and professors (Peet et al., 2004)
- Confusion about SD (Velazquez et al., 2005)
- **Broadness** of SD (Chau, 2007)
- Lack of **financial resources** (Velazquez et al., 2005)
Factors limiting SD incorporation in curricula (2)

- Over-crowded curricula (Abdul-Wahab et al., 2003 Chau, 2007)
- **Lack of SD** knowledge from **administrators** (Davis et al., 2003) or **support** (Velazquez et al., 2005)
- Some lecturers being **unaware or failing to see** the relevance of SD to their teachings (Lozano, 2006)
- **Teachers** who might prevent or support the diffusion (Barab & Luehmann, 2003)
Factors limiting SD incorporation in curricula (3)

• SD seen considered to be radical (Lozano, 2006)

• Considered to have little or no relevance in the course or discipline (Lozano & Peattie, 2007)

• Uncertainty of the efforts required to engage and incorporate SD
Challenges in Getting SD into the Curriculum

- **Academic traditions** based on specialisation and specific disciplines
- Educators unaware or do not see SD’s **relevance** to their courses
- Tendency towards **adding** a lecture into the schedule
- SD can **challenge** or change the way we think about or teach something
- People tend not to want to **change** what or how they teach

(Lozano, 2006, 2009)
SD ASSESSMENT AND REPORTING
Sustainability Reporting (1)

• A voluntary activity with two general purposes:
  – (1) to **assess** the current state of an organisation’s economic, environmental and social dimensions, and
  – (2) to **communicate** a company’s efforts and Sustainability progress to their stakeholders (Dalal-Clayton and Bass, 2002; Hamann, 2003)
Sustainability Reporting (2)

- It can be used for:
  - assessing sustainability performance over time,
  - benchmarking against other companies or organisations, and
  - demonstrating how the organisation influences and is influenced stakeholders (Daub, 2007; GRI, 2011; R. Lozano, 2006a; Schaltegger & Wagner, 2006)
## SR tools comparison

<table>
<thead>
<tr>
<th>Tool</th>
<th>Brief description</th>
<th>Focus areas</th>
<th>Advantages</th>
<th>Disadvantages</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>ISO 14000 series (especially 14031) and EMAS</strong></td>
<td>Assess the environmental impact of operations and improve their performance</td>
<td>Environment</td>
<td>Provides a systematic understanding of environmental dimension. Report internally about results, performance and plans.</td>
<td>Does not address economic and social dimensions. Sometimes is entirely informational, e.g. ISO 14031. Costly and labour intensive</td>
</tr>
<tr>
<td><strong>SA 8000</strong></td>
<td>Auditable certification standard based on international workplace norms of ILO conventions, the Universal Declaration of Human Rights and the UN Convention on the Rights of the Child</td>
<td>Social (mainly focused on the human and labour rights)</td>
<td>Addresses human and labour rights explicitly throughout the company. It raises public awareness about the company’s efforts.</td>
<td>Not focused on environment and economic dimension of sustainability. It does not consider synergies among the dimensions.</td>
</tr>
<tr>
<td><strong>AA 1000 Framework</strong></td>
<td>Help to establish a systematic stakeholder engagement process to ensure greater transparency, and effective responsiveness to stakeholders</td>
<td>Social and Ethical</td>
<td>Stakeholder management through the entire process. Emphasis on innovation over compliance, and possibility to chart their own course as opposed to being guided.</td>
<td>Complex in implementation. It is resource intensive. It does not explicitly consider the economic and environmental dimensions, or their synergies.</td>
</tr>
<tr>
<td><strong>GRI Guidelines</strong></td>
<td>Guidelines for reporting on economic, environmental and social performance. Their use is voluntary. They contain general and sector-specific Performance Indicators</td>
<td>Economic, environmental, and social</td>
<td>One of the most complete guidelines available. Multi-stakeholder participation. Recognised worldwide.</td>
<td>Large number of indicators, which complicates longitudinal comparisons and benchmarking. It can become costly to collect the information for the indicators. It does not consider synergies among the dimensions.</td>
</tr>
</tbody>
</table>

(Lozano & Huisingh, 2011)
HESD assessment and reporting tools

– the Graphical Assessment of Sustainability in Universities (GASU) based on the GRI guidelines (Lozano 2006, 2011; Lozano, et al. 2013)
– the National Wildlife Federation’s State of the Campus Environment (Shriberg, 2002)
– the Sustainability Assessment Questionnaire (Shriberg, 2002)
– Higher Education 21’s Sustainability Indicators (Shriberg, 2002)
– the Auditing Instrument for Sustainable Higher Education (AISHE) (Roorda, 2001)
– STARS (AASHE, 2010)
HEIs’ SD reports

Number of HEIs reports published per year

- Year: 1999 to 2013
- Number of reports: 0 to 45
- Forecasted data point
SR discussion

• It can help:
  • to communicate the university’s efforts more systematically and effectively to its stakeholders
  • to assess coverage and performance, and benchmark against other institutions
• It important to have sufficient time and access for data collection when preparing a report
• It is a necessary step for universities and their leaders to detect current SD efforts and plan future ones
CURRICULA ASSESSMENT
Sustainability Tool for Assessing UNiversities’ Curricula Holistically (STAUNCH®)

• Developed with two objectives:
  1. to assess systematically how universities curricula contributes to SD
  2. to facilitate consistent and comparable auditing efforts

• Based on two combined equilibria:
  – cross-cutting themes’ dimension
  – SD contribution, looking for the balance among the four SD dimensions
# STAUNCH© criteria

<table>
<thead>
<tr>
<th>Economic</th>
<th>Environmental</th>
<th>Social</th>
</tr>
</thead>
<tbody>
<tr>
<td>• GNP, Productivity</td>
<td>• Policy/Administration</td>
<td>• Demography, Population</td>
</tr>
<tr>
<td>• Resource use, exhaustion</td>
<td>• Products and services (inc. transport)</td>
<td>• Employment, Unemployment</td>
</tr>
<tr>
<td>(materials, energy, water)</td>
<td>• Pollution/Accumulation of toxic waste/Effluents</td>
<td>• Poverty</td>
</tr>
<tr>
<td>• Finances and SD</td>
<td>• Biodiversity</td>
<td>• Bribery, corruption</td>
</tr>
<tr>
<td>• Production, consumption patterns</td>
<td>• Resource efficiency and eco-efficiency</td>
<td>• Equity, Justice</td>
</tr>
<tr>
<td>• Developmental economics</td>
<td>• Global warming, Emissions, Acid rain, Climate change, Ozone depletion</td>
<td>• Health</td>
</tr>
<tr>
<td></td>
<td>• Resources (depletion, conservation) (materials, energy, water)</td>
<td>• Social cohesion</td>
</tr>
<tr>
<td></td>
<td>• Desertification, deforestation, land use</td>
<td>• Education</td>
</tr>
<tr>
<td></td>
<td>• Ozone depletion</td>
<td>• Diversity</td>
</tr>
<tr>
<td></td>
<td>• Alternatives</td>
<td>• Cultural diversity (own and others)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Labour, Human rights</td>
</tr>
</tbody>
</table>

**Cross-cutting themes**

- People as part of nature/Limits to growth
- Systems thinking/application
- Responsibility
- Governance
- Holistic thinking
- Long term thinking
- Communication/Reporting
- SD statement
- Disciplinarity
- Ethics/Philosophy
Calculations of contributions to SD

• Strength and relative percentages in the four criteria groups:
  – Economic strength
  – Environmental strength
  – Social strength
  – Cross-cutting themes strength

• Contribution for each Course, Degree, School, and University
Universities that have used STAUNCH®

• **Cardiff University** (Lozano, 2010; Lozano & Peattie, 2011)

• **Leeds University** (Lozano and Young, 2013)

• **Georgia Institute of Technology** (Watson & Lozano, 2014)

• **Tecnológico de Monterrey** (Lozano & Lozano, 2014)

• Worcester University

• All Welsh universities (through Higher Education Funding Council for Wales (HEFCW) funding)
Curricula assessment discussion

• **Facilitate discussions** with the schools’ and university leaders about the curricula contribution to SD

• **Highlight** each course, degree, and school’s **contribution** to sustainability, including its **relevance** and its **proportionality**

• **Redesign and develop** courses and programmes to be more **sustainability** oriented

• **Make the links** between modules and SD more **explicit** and **clear** in the course aims
Figure 4. Curricula contribution vs. strength of SD courses in selected Cardiff University schools

Source: Lozano & Peattie (2009)
HOW DO WE MOVE FORWARD?
SD and modern education

- The concept of **SD contrasts** with the existing concepts and teaching methods in universities, which are mainly focused on resource depletion.

- World-wide, all university **leaders should recognize** that it is not possible to continue in such pathway.
SD and education

• We need to **dispel ignorance** about the impacts that development and industrialisation have had, and are having, on the environment and societies if we are to move towards more sustainable societies.

• We need to ‘**unlearn**’ the old models and provide new ones as part of the solution that actively and consciously engages in the prudent use and protection of natural resources, whilst safeguarding and improving societies’ quality of life and well-being for this and future generations.
Destroying ‘silos’

By rejecting current mental models and synthesising new ones, creativity can rupture knowledge barriers, **demolish silo mentalities**, and abrogate reductionism by fostering sustainability **metanoia** throughout the complex mosaic of individuals, groups, organisations, societies, and their **interactions**.
SD needs to be **incorporated** in a **trans-disciplinary** into:

- 'Educating the educators'
- Educational
- Research
- Campus operations
- Community outreach
- Assessment and reporting
- Collaboration with other universities
- Institutional framework
- On-campus life experiences

(Lozano et al., 2013)
SD change challenges

- The ‘**hard-wiring**’, changes in operations and on-campus experiences
- The ‘**soft-wiring**’, **mental models**, attitudes and behaviours
- The **way we teach**, questioning our paradigms
- From **reductionist** approaches to more **holistic** systems ones
- From **mono-disciplinary** to **trans-disciplinary** education
- To a **long-term** perspective
- Be **long** lasting
Challenging the *status quo*

- Progress towards more sustainable societies implies that we **move** from **reactive** responses to immediate problems, towards a more **proactive** focus on avoiding possible future problems and prepare for potential events.
- Turn real-life problems into a **learning laboratory** where **new** theories, methodologies, and tools are developed that **challenge the status quo** in order to solve today’s problems with tomorrow’s ideas.
Bridging ‘science and the arts’

- Fostering and supporting **creativity** can help to break silo mental models, by bridging the **schism** between **rationality and emotions**, as well as that between **science and the arts**
Implementing SD in your university

• Make SD the ‘Golden Thread’ throughout the university system
• Perform thorough and regular assessments
• Become more more proactive in engaging with SD
• Recognise those engaged with SD
• Foster multiplier effects
A **paradigm revolution** is needed to break through existing knowledge barriers and current unsustainable mental models, and foster metanoia for sustainability

**New ways of learning** are needed, which actively and consciously engage in the use and protection of **natural resources**, and the safeguarding and improvement of **societal well-being**, for this **generation and future ones** (see Burke, 2000; Cortese, 2003; Rosner, 1995)
This revolution has to be based on **holism**, i.e. examining a thing from outside and asks questions while it **works** (Lovelock, 2007), **transdisciplinarity** (Brown, Harris, & Russel, 2010), **system thinking** (Bagheri & Hjorth, 2007), and long-term thinking (WCED, 1987).
To develop a complete mind: Study the science of art; Study the art of science. Learn how to see. Realize that everything connects to everything else.

- Leonardo da Vinci
Theory is when you know everything but nothing works.

Practice is when everything works but no one knows why.

Me, theory and practice are always combined: Nothing works and I don't know why.
We Want:
Students who

• Are **educated** to be the best in their chosen discipline
• Can communicate and engage with **other disciplines**
• Understand the **implications** of their professional and personal decisions to the **economic**, **environmental**, and **social** of this generation and future ones
• Use **discerning and inquisitive learning** in **theory and practice**
Rodrigo Lozano (PhD)
email: r.lozano@uu.nl & editorinchief@jclp.org-sustainability.com

THANK YOU!
GRACIAS!