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LeNS_AFRICA
An African Learning Network on Sustainability for the development and diffusion of teaching materials and tools on Design for Sustainability in an open-source and copyleft ethos

Carlo Vezzoli[a], Fabrizio Ceschin[a] & Mugendi M'Rithaa[b1]

[a]Politecnico di Milano, INDACO Department, Unit of Research Design and System Innovation for Sustainability (DIS), Via Durando 38/A, 20158 Milan, Italy
e-mails: carlo.vezzoli@polimi.it; fabrizio.ceschin@polimi.it

[b]Cape Peninsula University of Technology, Department of Industrial Design, South Africa
e-mail: MugendiM@cput.ac.za

Keywords: Africa; Learning network; Design for Sustainability (DfS); Didactic materials and tools; Open Learning E-Package.

Abstract

It is a shared opinion that sustainable development requires a system discontinuity, meaning that radical changes in the way we produce and consume are needed. Within this framework there is an emerging understanding that an important contribution to this change can be directly linked to decisions taken in the design phase. For this reason design schools have therefore to be able to provide design students with a broad knowledge and effective Design for Sustainability tools, in order to enable a new generation of designers in playing an active role in re-orienting our consumption and production patterns.

Under this perspective, there is a pressing need of mechanisms that act at the education level, enabling design educators (and researchers) to share knowledge in this field. Along this direction this paper presents the intermediate results of the Learning Network on Sustainability (LeNS) project, an Asian-European multi-polar network for curricula development on Design for Sustainability focused on (Product-Service) System innovation, financed by the European Commission under the Asia-Links programme[2]. LeNS is a mechanism to develop and diffuse system design for sustainability in design schools with a transcultural perspective. The main output of the project will be the Open Learning E-Package (OLEP), an open web platform that allows a decentralised and collaborative production and fruition of knowledge produced as learning subsidies. It can be described as a modular e-package of teaching materials (texts, slide shows, audio, video, etc) and tools for designers, that design educators (but also students and professionals as designers, entrepreneurs and interested persons/institutions) worldwide will be able to download (free of charge), modify, remix and reuse (copy left).

Apart from the contents, the same LeNS web platform is realised in an open-source and copy left ethos, allowing its download and reconfiguration in relation to specific needs, area of interest and interested partners. Within this perspective one of this hypothesis is about the setting up of an African Learning Network on Sustainability, which, taking in consideration the local needs, interests and opportunities, could represent a significant enabling platform capable to sensitise, support and empower a new generation of African design educators, designers and entrepreneurs to reach design practice throughout an open collaborative learning approach.

1. Sustainable development, Design HEIs challenge and the LeNS project

In approaching sustainable development from a global perspective, there is a very clear need for significant changes in the consumption and production patterns of industrialized, emerging and low-

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[1] The paper is the result of the collaboration between the three authors. Nevertheless Vezzoli wrote sections 2, 4.2 and 7; Ceschin wrote sections 1, 3 and 4.1; M'Rithaa wrote sections 5 and 6.

[2] The Asia Link Programme aims at promoting networking between higher education institutions in Europe and developing countries in Asia. LeNS is a 3 years project started on 15th December 2007. It is coordinated by Politecnico di Milano University INDACO Department (Italy) and has as partners Delft University of Technology, Industrial Design Engineering (The Netherlands); University of Art and Design Helsinki, School of Design (Finland); Indian Institute of Technology New Delhi (India); Srishti School of Art, Design and Technology (India); Tsinghua University, Industrial Design Department, Academy of Arts & Design (China) and King Mongkut's Institute of Technology Ladkrabang, Department of Industrial Design (Thailand).

income contexts. This change and its transition will have to respond to the challenges of radical reduction of resources consumption and emissions, together with a socio-ethical improvement in the quality of life, such as poverty eradication and a marked increase in a diffused well-being. Consistent with this framework there is an emerging acknowledgement that a key role can be directly linked to decisions taken during the design phase of products, services and systems.

Over the last few decades, the role of design has increased in relevance and recognition, and the approach of Design for Sustainability has been evolving in research and has started to be recognised in many parts of the world. It is clear that designers must have a theoretical background as well as know-how that enable them towards a practice committed with these pressing challenges. Consequently, design Higher Education Institutions (HEIs) and design researchers/educators, need to be able to equip design students with a broad knowledge base, as well as utilizing effective methods and tools so that a new generation of designers can play an active role within the transformation of our consumption and production patterns.

Under this perspective, there is a pressing need for “mechanisms” operating at the educational level, enabling design educators in industrialized, emerging and low-income contexts to speeding up the knowledge sharing in this field and come out with a design education agenda able to respond both to local and global sustainable development issues. Within this scope it is operating the ongoing Learning Network on Sustainability (LeNS) project, an Asian-European multi-polar network for curricula development on Design for Sustainability (DfS) focused on (Product-Service) System innovation, financed by the European Commission under the Asia-Links programme.

LeNS is a project aiming at developing and diffusing system design for sustainability in design schools in a transcultural perspective. The main output of the project will be the so called **Open Learning E-Package (OLEP)**, an open web platform that allows a decentralised and collaborative production and fruition of knowledge. It can be described as a modular e-package of teaching materials (slide shows, texts, audio, video, etc.) and tools for designers, that design researchers/educators (as well as students, designers, entrepreneurs and interested persons/institutions) worldwide will be able to download (free of charge), modify, remix and reuse (copyleft) according to their own socio-economic priorities and unique geo-political realities. Apart from the contents, the same LeNS web platform is realised in an open-source and copyleft logic, allowing its download and reconfiguration in relation to specific needs, area of interest and themes, hence supporting the proliferation of emerging networks focusing on local/content issues.

Firstly, the paper will introduce the Asian-European LeNS project, present the OLEP and the web platform features, and illustrates its potential benefits on knowledge development, sharing and dissemination. Then secondly, whilst cognisant of the state-of-the-art of current practices and experiences on DfS in African Universities, the paper will propose a hypothesis of configuration of the LeNS Africa network.

2. LeNS process and approach

In practice, the development of the contents of this E-Package starts from the analysis of the current state of art (i.e. how Design for Sustainability and the concept of Product-Service System are currently approached in the partners institutions and in the respective regions) and takes in consideration the local needs and constraints of each partner’s context as well as the global agenda of sustainability. From this initial verification, the partners jointly design a set of didactic pilot courses to be implemented in each partner institution through a transcultural exchange modality that combines two kinds of flows:

- *content flow,* with students from European partner institution designing for an Asian partner campus; and students from Asian partner institutions designing for European partner campus,
- *experts flow,* with European partner institutions hosting Asian partner staff; and Asian partner institutions hosting European partner staff.

This unique combination of content and experts flows allows the flourishing of innovative forms of collaborative didactics that explores both *in-situ* and distance-learning, configuring a transcultural didactic process where design schools become labs for experimental research and education. In this perspective a sort of osmotic process between open-front research and experimental didactic is created, establishing a continuous flow that contributes to develop and verify new hypothesis on

design approaches, methods and tools for sustainability. And, through this process, sensitise and empower a new generation of design educators. The LeNS project acts as a catalyst for actions and exchange on education (and research) in design for sustainability worldwide, through the production of the previously mentioned open-source E-Package and a replicable web-platform to be easily reproduced in a worldwide scale.

LeNS process can be summarized as follows (for a detailed description see [1]):

1. *State of the art.* Partners analyse what is their state of art in terms of didactic and research in DfS and PSS and express what are the main demands not yet covered.
2. *Design of the didactic pilot modules and teaching subsidies.* Partners collect and develop new subsidies for new courses and come out with a first (beta) version of the Open learning e-package (OLEP), which will evolve till the end of the pilot courses period.
3. *Implementation of pilot courses.* The OLEP evolves being used (tested) along 8 pilot courses at the partner institutions following an exchange modality. The logic of this process is that of refining and expanding the beta OLEP along its implementation in the 8 pilot courses, feeding back the original pack. Each partner (teacher) preparing a new pilot course will use the learning resources developed for the OLEP beta version and for the pilot courses already occurred; any teacher is engaged in using, integrating and remixing the didactic materials produced by the other partners. Furthermore the knowledge exchange will occur even during the pilot course implementation since each partner will host a guest teacher from another partner and each partner will play the role of guest teacher at another partner, according to an exchange agenda.
4. *Preparation of OLEP "final" version.* According to the results of the implementation process of these pilot courses, a "final" 2010 version of teaching subsidies will be available. It is a final version regarding the LeNS project. But, since it will be an open package, it foresees its continuous updating and development to be done by users after the termination of LeNS project.

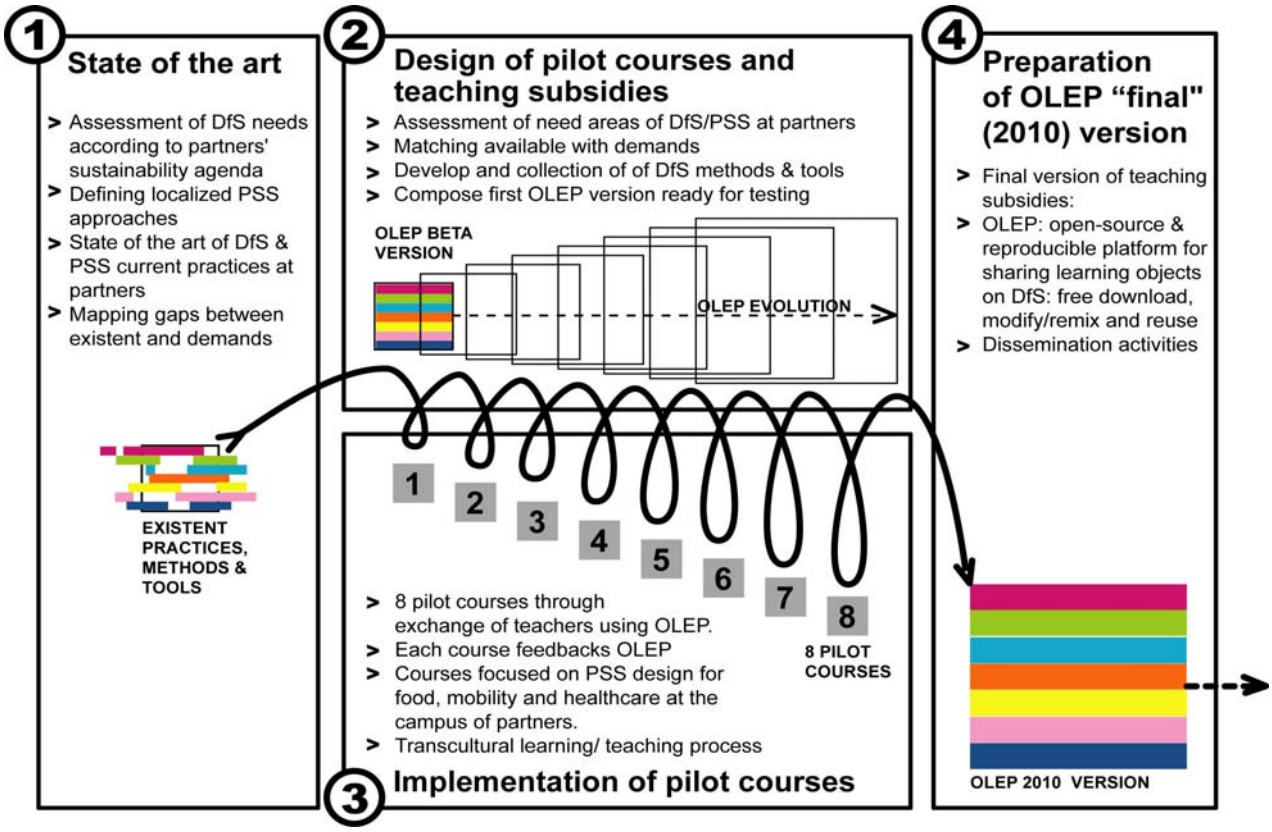

Figure 1: The LeNS learning process for the construction of the Open Learning E-Package (OLEP).

LeNS project is currently undertaking the third phase. The OLEP beta version has been finalized,

tested and improved in the first three pilot courses: “PSS design & business” at the Technical University of Delft in February 2009; “System Design for Sustainability” at Politecnico di Milano in May 2009; “Product-Service System Design for Sustainability” at IIT Delhi in July 2009. All the learning resources produced for these courses are available on the OLEP platform: www.lens.polimi.it.

3. LeNS main results: the Open Learning E-Package (OLEP) and a replicable web-platform

As said before the main result of the LeNS project is the OLEP, that can be described as an e-package composed of a set of modular learning resources targeted at design educators, to facilitate the activation and implementation of courses on design for sustainability (DfS) with a focus on sustainable (Product Service) Systems innovation. The learning resources of the OLEP will be easily to be used and free, being based on the open-source and copy left logic: teachers (as first intermediate learners) can download, modify and reuse the available set of learning resources. The OLEP is obviously targeted even at students and other professionals for their continuous education such as designers, entrepreneurs and interested persons/institutions. The OLEP will be located within the LeNS web platform (www.lens.polimi.it).

The main OLEP functionalities are (for a detailed description see [2]):

1. *downloading/viewing learning resources by teacher/course/year* (e.g. a student wants to view learning resources related to the course she/he is attending; a teacher wants to set-up/up-date a course on DfS and wants to search for appropriate learning resources to download, and modify, remix and reuse in her/his course);
2. *downloading/viewing learning resources by content/type* (e.g. a student wants to view a learning resource related to a specific topic even related to other courses she/he is not attending; e.g. a teacher wants to add a content to her/his own course on DfS, and wants to download specific learning resources, and then modify, remix and reuse them in her/his course);
3. *uploading a cours*e (e.g. a teacher wishes to upload her/his own course).

The OLEP and the supporting web-platform are intended as a true open source artefact. In fact not only the contents, but the same LeNS web platform is realised in an open-source and copyleft logic, allowing its download and reconfiguration in relation to specific needs, area of interest and interested partners. Within this perspective several hypotheses related to the launch of regional networks (e.g. in Italy, United Kingdom, Japan, Brazil and Africa) have been proposed. Each of this affiliated networks will be linked with the main one, but at the same time will be independent and focused on specific needs and themes (for example the Brazilian network will focus on PSS design for low-income communities, while the English network will be oriented on the engineering aspects of PSS). In relation to the scientific reliability of the uploaded materials, each “affiliated” network will be responsible of controlling the scientific quality of what will be produced.

4. Opportunities and threats of a free-access, open-source, copy left and modular learning model

4.1 Opportunities

The approach behind the LeNS project is that teaching subsidies produced for courses, when free of charge, copy-left and easy available, could be an effective base for a knowledge development and sharing within a specific community of researchers and teachers [2]. The following text explains why.

…to facilitate knowledge dissemination

A possible path to facilitate knowledge dissemination through teaching materials is that of making them free, and available on-line. In this way it is enabled the less expensive option and the easiest access, since users can use teaching materials on-line at no-charge, or download and print them (in toto or only the needed parts). Moreover geographic location is no longer a barrier for having access to research results and teaching materials. The matter of access to knowledge becomes even more crucial in a research field like Design for Sustainability, characterised by being quite recent and therefore not extensively disseminated.

…to facilitate continuous and rapid knowledge upgrade
Knowledge is in a constant advancement: new ideas, concept and theories are introduced; existing information is reviewed and refined, while outdated information is removed. The traditional academic process by which this takes places includes the publication in books and refereed journals. This is an important process to guarantee the scientific relevance of what is published, nevertheless it could result inefficient where knowledge evolves at a rapid pace. In other words for rapidly changing knowledge the traditional process of transmitting research results could be supported by other innovative ways of knowledge sharing. Researchers and teachers (and students), should have complementary ways to access to the most updated knowledge and discoveries in their respective fields [3]. For these reasons, an on-line platform through which share knowledge can potentially increase dissemination of new ideas and research results, thus facilitating a readily access, review and update of information.

…to facilitate collaboration between researchers/teachers
As it has been just underlined, in research fields quite recent and in rapid development, like Design for Sustainability, it is of key importance that researchers/teachers work with each other across institutions and geographic boundaries in order to increase a focused share of knowledge and experience. This allows research results to be readily discussed, refined and translated into teaching materials. In this way colleagues of a same scientific community can collaborate directly with each other, modifying and integrating contributions produced and edited by others, and therefore keeping the knowledge up to date. Reuse of knowledge is encouraged and new ideas can readily evolve [4]. In this sense an online platform through which stimulating collaboration between researchers/teachers can potentially foster the advancement of knowledge.

…to facilitate knowledge adaptation in relation to different students (learners) and contexts
Different students (learners) are differently able to absorb information. In fact they may have different learning approaches, and therefore a fixed and static teaching material may result appropriate for some students and not for others. If a learning resource (whether a text a slideshow or other) results difficult to understand for a given group of students, their teacher may intervene on the material, modifying it or delivering it in an alternative way. In order to facilitate this process, knowledge could be transmitted in a modular and open-source modality. In this way teachers could potentially be able to easily modify/integrate the different modules, to respond to the different learners' needs.

…to facilitate knowledge adaptation in relation to different contexts
Knowledge and the way in which it is delivered to learners must to take in consideration the great diversity of each economic, social and cultural context. In particular, in relation to Design for Sustainability, it has to be ensured that the development and delivery of teaching materials reflect both a shared macro agenda on sustainability, but also localised, contextual sustainability agendas that respond to local needs and demands. For these reasons a knowledge transmitted in a modular and open-source modality (but also organized in courses in order to answer to the different teachers' necessitates and starting conditions, i.e. new course activation or course upgrade), could fit the previous mentioned needs, enabling easy adaptation by teachers in relation to specific local needs and context characteristics. Moreover, if this process is shared through a web-platform, it could also facilitate teachers operating in similar contexts to share experiences and teaching materials.

4.2 Threats
The main problem related to the production and sharing of knowledge in an open logic is the control of the scientific reliability of the produced contents. A second problem is related to the knowledge dispersion when open platforms accept any kind of content targeted to any kind of user.

…to appoint the scientific responsibility of teaching materials
In order to tackle the first of these weaknesses a possible answer could be to establish a scientific board, to guarantee the scientific quality of the uploaded contents. In addition, or as an alternative, the possibility of uploading materials could be restricted to quality institutions/teachers.

The approach behind LeNS is to safeguard and guarantee the scientific reliability of the uploaded contents. In this sense a scientific board has been set up with the aim of controlling the scientific quality of the produced materials. Furthermore, each teacher works together with a host teacher form and other partner institution and an observer (form a third institution) is “reviewing” the quality of teaching and teaching materials. Finally and external evaluator team has been appointed by the lens project selecting key expert worldwide. In order to facilitate this process only the partners’ teachers have the possibility to upload learning contents on the web-platform. In addition, partners’ teachers have the opportunity to allow (after a review and on their responsibility) other teachers to contribute in the OLEP contents development.

…to address the scientific community
Knowledge platforms that are open to different and not linked topics run the risk to become dispersive and, as result, not to address in a effective way the scientific community. In order to tackle this potential problem an open web-platform should focus on specific topics, as in the case of the LeNS developing learning resources for design for sustainability focused on (Product-Service) System Innovation.

5. State of the art of design and sustainability in African universities
A number of tertiary level or higher education institutions (HEIs) have begun to actively interrogate Design for Sustainability (DfS) within their respective milieu (for a detailed overview on the African perspective on DfS see [5]). The vast majority of these HEIs embed such discussion in topics covered in such undergraduate subjects as design theory, design for development, design for society, design thinking, and contemporary issues in design. An even smaller number of HEIs on the continent offer supervisory support for DfS-related postgraduate studies – the Sustainability Institute in Stellenbosch, South Africa is one such HEI with a dedicated focus on issues of sustainability, albeit not with a specific design orientation. The Cape Peninsula University of Technology in Cape Town has identified this gap and offers design-specific postgraduate qualifications.
Design subjects in many countries are typically under-resourced and under-appreciated in part due to the enormity and urgency of other pressing socio-economic challenges. Subsequently, DfS-specific research at HEIs on the continent is only beginning to emerge. Notwithstanding the low levels of formal engagement DfS, there is a growing awareness of the urgent need to address this important area. For example, Maseno University and the University of Nairobi (both in Kenya) have linked future DFS interventions within the pervasive labour-intensive *jua kali* informal sector – wherein DfS engages artisans and students in a participatory process. The artisans learn how to be innovative and entrepreneurial whilst the learners/students gain useful experience in the real world.
Through the Network of Africa Designers (NAD) initiated by Adrienne Viljoen of the SABS Design Institute, the peer-to-peer platform offered to members has facilitated a diffusion of DfS-thinking, building up on the interest generated from the Creative Communities for Sustainable Lifestyles–Africa project. The challenge posed by Ezio Manzini on the potential of African communities to leap-frog into a more sustainable future informs a renewed vigour. Consequently, Makerere University (in Uganda) is presently interrogating DfS within the context of micro-enterprise development in the textile industry, specifically with respect to sustainable natural fibres such as bark cloth (*ficus*).
Other NAD members include the Kwame Nkurumah Univerity of Science and Technology (in Ghana) whose current focus is on packaging for cash crops such as cocoa, whilst and the Federal University of Technology, Akure (in Nigeria) and the Kigali Institute of Science & Technology (in Rwanda) tackle the challenge of sustainable import-substituting technologies and products. The University of Botswana is unique in that it offers DfS-specific undergraduate courses (*Design for Sustainable Development*; *Environmental Factors in Design*; and *Eco-Product Design*) to both Industrial Design and Design Education learners and anticipates a positive impact by DfS on its quest for a more sustainable and diversified economy. Zimbabwe Institute of Vigital Arts operates in a constantly changing and volatile environment and yet remains committed to generating sustainable context-responsive design solutions.

6. The launch of LeNS Africa

As intimated earlier, the most effective and sustainable networks often require personal and committed contact. The exciting synergies being realized through the NAD membership bodes well for future DfS diffusion. Further, the transcultural, open source and copyleft ethos adopted by LeNS will ensure a more equitable and inclusive dynamic amongst participating actors. The evolving didactic and pedagogical tools (such as the OLEP one) provide an excellent place to begin interrogation of design for sustainability without the usual encumbrance of prohibitive start-up costs – a factor that typically restricts the participation of HEIs in developing (and majority world) contexts.

On the other hand, Africa engenders many elements of sustainable ways of living though arguably such practices exist by default (and not necessarily by design). The sense of community that inspires sustainable ways of being is alive and well in Africa and is manifest through the spirit of *ubuntu* (or humanness). In this regard, Africa reminds the rest of humankind of the interconnected of all people and of the need to reaffirm one another in our quest for a sustainable future.

The growing core group of African universities mentioned herein have recently committed to consolidating their links through LeNS Africa. There is a patent need for design agenda that supports and reinforces democracy and social equity and cohesion amongst the various communities on the African continent [6]. The expressed desire to participate in this vibrant platform in a sense illustrates the keen desire of the continent to engage in a robust designerly dialogue with the rest of the world. This dialogue will ultimately impact upon the collective aspiration of a better future for all.

7. Conclusions

LeNS aims at becoming a mechanism for the development and diffusion of system design for sustainability in design Universities and Schools. It appears to us that this is proposed in the right moment, when sustainability is being incorporated in the worldwide agenda, and in all levels and there is a clear perceived growing demand of design for sustainability. It appears also that it is the right opportunity, of interfering at the education level, since education is very much the base of every change. Within this framework LeNS ambitions to offer an open output, a free-access, open-source, and modular-content web-platform for storing and sharing knowledge (learning resources in design for sustainability, courses, guide-lines and examples, teaching materials, methods, tools, presented through different supports texts, slide presentations, video, audio, etc) among design educators, students and practitioners.

It is intended also as a reproducible platform, allowing interested users to reproduce its architecture in localized versions, in different languages or focused on specific regions or themes. In this perspective LeNS Africa, which will be coordinated by Mugendi M'Rithaa (Cape Penisula University of Technology) represents the first context-based network developed form the LeNS project.

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