The Learning Network on Sustainability

A mechanism for the development and diffusion of system design for sustainability in design schools

Lara Penin[1], Carlo Vezzoli[2]

Abstract

The LeNS project is an action of curriculum development involving seven partner institutions in Asia and Europe that will jointly design, produce and implement new modular and adaptable courses and teaching subsidies in Design for Sustainability with a focus on product service system innovation, contributing to the transition towards sustainability.

The paper will describe LeNS as a mechanism to develop and diffuse system design for sustainability in design schools in a transcultural perspective, where design educators in industrialized and emerging countries share knowledge and come out with a design education agenda able to respond both to local and global sustainability challenges. LeNS output will be an open artefact, allowing a decentralised and collaborative production and fruition of knowledge.

[1] Politecnico di Milano INDACO Dept. lara.penin@polimi.it
[2] Politecnico di Milano INDACO Dept. carlo.vezzoli@polimi.it
Lara Penin wrote 2, 3, and 6. Carlo Vezzoli wrote 1, 4, 5

1. Introduction

Approaching sustainable development from a global perspective, there is a very clear need of shifting of consumption and production patterns of industrialized, emerging and low-income countries. This shift or transition will have to respond to the challenges of radical reduction of resources consumption and emissions, not to mention socio-ethical aspects such as poverty reduction and increase of wellbeing. There is an emerging understanding that a great deal of this change can be directly linked to decisions taken in the design phase of products, services and systems (system design understood as both the design of the mix of products and services jointly capable of fulfilling a given demand, and the design of the interactions among the stakeholders involved in the offer).

Along the last 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. Design schools have therefore to be able to provide design students with a broad knowledge base, as well as effective tools so a new generation of designers can have an active role as catalysers and enablers of the transformation of our consumption and production patterns.

Under this perspective, there is a pressing need of mechanisms that act at the education level, enabling design educators in industrialized, emerging and low-income countries to share knowledge in this field and come out with a design education agenda able to respond both to local and global sustainable development issues. This paper will present the concept of a multi-polar network on education for design for sustainability involving design schools in Europe and emerging countries in Asia, as an effective strategy in this direction. This concept has been formalized in the project *LeNS: The Learning Network on Sustainability, Asian-European multi-polar network for curricula development on Design for Sustainability focused on system innovation*, funded by the European Commission programme Asia-Link[3].

The LeNS project proposes curriculum development in seven partner institutions in Asia and Europe that will jointly design, produce and implement new modular and adaptable packages of curricular courses and modules. This will include teaching/training materials, teaching tools (including distance-learning), guidelines for courses/modules design and implementation and illustrative examples.

In practice, the design of this curriculum package starts from the analysis of the current state of art (i.e. how *Design for Sustainability* is currently approached in the partners institutions and in the respective regions) and takes in consideration the local needs and constraints of each partner context as well as the global agenda of sustainability. From this initial verification, the partners will jointly design the didactic pilot courses/modules to be implemented in each partner institution through an exchange modality that combines two kinds of flows:

- content flow, with students from European partner institution designing for an Asia partner campus; and students from Asian partner institutions designing for European partner campus,

---

[3]LeNS is an action of curriculum development funded by the Asia Link programme, under European Commission's EuropAid Programme. It is a 3 years project started on 15th December 2007 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, Faculty of Architecture, Department of Industrial Design (Thailand).

– experts flow, with European partner institutions hosting Asian partner staff; and Asia partner institutions hosting European partner staff.

This unique combination of content and experts flows will allow of the flourishing of innovative forms of collaborative didactics that explores both in-situ and distance-learning, configuring a *transcultural* didactic process, an effective approach for design education, 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, creating 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 designers worldwide to reach design practice through an embedded sustainability approach.

The LeNS project has the ambition of being a catalyser for actions and exchange on education in design for sustainability worldwide, through the production of an open-source curriculum package (**OLEP: open learning e-package**), a strong dissemination and communication strategy (through prizes, conference, exhibition publications and thorough on-line exposure) and finally a replicable web-platform to be easily reproduced in a worldwide scale.

2. LeNS process and approach

LeNS is an action of curriculum development in the field of Design Sustainability and PSS innovation design. Its starting point is that a new generation of designers is formed with the right conceptual and operative tools to be able to cope and contribute to this transition towards a sustainable society. For that, design educators across regions should be able to create and incorporate new learning resources into existent or new curricula. In the LeNS project, the focus is on Europe and Asia, but its ambition is to reach worldwide design educators and schools through the production of an output that follows an open source model, allowing users from around the world to use and transform it.

The benefit thus of LeNS project are in the first instance for the partners institutions but it can and hopefully will be expanded beyond them.

The LeNS process foresees the development of new curricula reflecting both a shared macro agenda on sustainability but also localised, contextual sustainability agendas that respond to local needs and demands in the economic, social and cultural levels. It takes in consideration also the experiences and expertise at each partner that may emerge under different forms. The partners will 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. The partners will then collect and develop new subsidies for new courses and come out with a first (beta) version of the Open learning e-package (OLEP). OLEP beta version will be used (tested) along 8 pilot courses at the partner institutions following an exchange modality: 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. 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. At the end of the pilot courses implementation, a "final" version of the OLEP will be primed and opened to external diffusion.

This process can be summarized as follows (see fig. 1):

1. State of the art

State of the art of current practices and experiences on DfS and PSS in partners (*available*): each partner will gather and exchange their own knowledge, previous didactic and research experiences in the field and share specific priorities and approaches.

This work is done according to the verification of *DfS needs of each partner* according to its own *sustainability agenda* and establishment of localized PSS agendas and approaches (*need*).

The results will be the basis upon which the teaching modules will be designed and teaching subsidies will be developed in terms of disciplinary content and structure and exchange modalities.

2. Design of the didactic pilot modules and teaching subsidies

Development of all the necessary inputs for the implementation of the didactic pilot courses and teaching subsidies.

Didactic pilot courses will be designed and the necessary and teaching subsidies will be gathered or developed *ex-novo* according to expressed needs and demands, including methods and tools.

The process takes further the assessment of need areas of DfS/PSS at partners (*need*) and matches *available* with *need*.

The result is the first (beta) version of the OLEP (open learning e-package) ready for testing. The beta version will be continuously updated along the implementation phase (3).

3. Implementation of pilot courses

 The implementation of the didactic pilot module will be carried out within a total period of 18 months. This time span will allow in progress assessment of the teaching materials (OLEP) and consequent improvement for the remaining academic semesters.

Teaching modules will be as much as possible integrated in normal curricula activities; this will both reinforce the institutional commitments and provide reduction of costs by establishing synergies.

The exchange of teachers will be carried out so to implement in each of the partner institutions the didactic pilot courses to be done in collaboration between the local teacher (*host*) and a *guest teacher* in a transcultural learning/teaching process. It is foreseen that a third teacher (the *observer*) will follow the pilot course implementation at the hosting schools (see fig. 2) reporting back the results to the OLEP development.

The pilot courses will be focused on PSS design for food, mobility and healthcare/well-being and will use as design ambit the university campus of each partner.

4. Preparation of OLEP "final version"

According to the results of the implementation process of pilot courses, a "final" 2010 version of teaching subsidies will be formalized. It is a final version regarding the LeNS project (that lasts three years: from December 2007 to December 2010). 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.

At this point, the teaching package (OLEP) assumes an open-source model: an online platform for sharing learning objects on DfS, open to external users who will be able to use and transform the original material, and contribute to its further development. In addition, the platform is thought to be reproducible i.e. using the original code, users can reproduce its architecture in a localized version, for example in different languages or focused on specific regions.

During the whole process, an evaluation process will be carried out in parallel, through both external evaluators and internal evaluators (the *observers* of the pilot courses). Dissemination activities are foreseen along the process and in the last phase to increase the diffusion of the in-progress and final results.

3. Need for local PSS agendas in design education

The LeNS project starts from the following assumption on PSS potentialities:

"A system innovation (PSS approach) may act as a business opportunity to facilitate the process of social-economical development in an emerging context - by jumping over or by-passing the stage characterised by individual consumption/ownership of mass produced goods - towards a more "satisfaction-based" and low resource intensity advanced service-economy, characterized by the development of local-based and network-structured enterprises and initiatives, for a sustainable re-globalisation process aiming at a democratisation of access to resources, goods and services".

It starts thus from the assumption that PSS approach is not only valid as a potential sustainable strategy for industrialised countries but it is also a potential leapfrog strategy for low-income and emerging countries. PSS and system innovation bibliography has been almost exclusively produced in and for mature industrialised countries, notably Europe and to some extent the United States. An effort to adapt and verify PSS approach in developing countries in general and in the particular economies of each country is imperative.

This is an effort that started in 2000 by the United Nations Environment Programme (UNEP) involving a group of international researchers to start disseminating and exploring the concept of system innovation in a worldwide scale in particular in the so-called low-income and emerging countries[4]. At that moment, some potentialities of PSS for low-income and emerging countries are highlighted:

"First of all, if PSS are eco-efficient at system level it means that they may represent opportunities, at least at a macro level, for a context with fewer economic possibilities to respond more easily to unsatisfied social demands.

Secondly, PSS offers are more focused on the context of use, because they do not only sell products, but they open relationships with the end user. For this reason, an increased offer in these contexts, should trigger a greater involvement of (more competent) local, rather than global, stakeholders; fostering and facilitating a reinforcement of the local economy.

Furthermore, since PSS are more labour/relationship intensive, they can also lead to an increase in local employment and a consequent dissemination of skills.

In addition, since the development of PSS is based on the building of system relationships and partnerships, [it is] coherent with a democratic re-globalisation process.

Finally, they are coherent with the development of network enterprises on a local base for a bottom-up re-globalisation. This last consideration is quite important since its connection to the potential for convergences between environmental and socio-ethic sustainability."[5]

Another base line is the recognition that PSS already exists in emerging Asia. In India, we observe the share use of artefacts as the norm, as well as productive and social organisation based on "spontaneous services" very much related to micro-entrepreneurship[6]. In China, car-pooling became a very popular practice across the country, responding to traffic congestion of the big cities (even if not recognised by the public authorities as a legal service). In Thailand, sustainable practices are more recognised in traditional lifestyles that are greatly based on resource saving principles. But as we know, the rapid process of industrialisations have imposed changes of traditional production and lifestyles and so forth demands new models and conceptual keys that allow putting in perspective the complexity of these countries. These new models and concepts will not reflect tradition alone, but on the other hand cannot simply mirror the industrialised countries' processes.

---

[4] Vezzoli (2007 pp 134), Vezzoli and Manzini (2008), see also UNEP (2002).
[5] Vezzoli (2007)
[6] As revealed for example by the project Creative Communities for Sustainable Lifestyles, www.sustainable-everyday.net/ccsl/

The initial challenge for LeNS was therefore starting a process of a more localised in-depth appreciation of PSS and system innovation in emerging Asian countries, considering the great diversity of each country economic, social and cultural model. LeNS has proposed establishing a dialogue amongst its partners so to determine a multipolar and extended knowledge base from where to start the development of curriculum that would respond to these localized PSS views.

The first step of the project was then to understand the main sustainability drivers and agenda at each partner country and region and confront these with their current didactic and research practices, identifying gaps and demands that will inform the development of curriculum and teaching subsidies so to cover the identified need-areas.

In practice, LeNS proposed a mechanism starting from the collection of data at each partner (presented as reports) covering the following points:

– General vision on DfS and the particularities of Df/PSS in partners' context (country and region). How the contextual situation of the partner city/country/region affects the construction of a local sustainability agenda and description and critical view on how the school is dealing with the issue.

– Description of previous experiences on DfS (Eco-design, Life-Cycle Design, Social Innovation, Strategic design, Product-Service System (PSS) Design, etc) regarding teaching and research on education, whether entire courses, modules, short term workshops for under or post graduation students, materials and tools used with students, support tools for teachers, projects and networks, etc.

– Best practices of educational (and research) experiences on DfS, cases and inspiring examples from other institutions.

– A draft map of main design schools in the countries and regions involved where design for sustainability is taught, under different areas or sub-areas such as Product Life Cycle Design/ecodesign, Sustainable (Product-Service) System design, Design of Services, Strategic Design, Design and Social Innovation, Sustainable Consumption and Production, etc.

This information collected at each partner was then collated resulting in some synthesis and tentative maps:

– An overview of the sustainability agenda in the involved countries and regions

– Visions of Design for Sustainability between Asia and Europe, articulating commonalities and variations

– Preliminary hypothesis of country-based PSS relevance areas (localised PSS)

– Map of existing didactic and research experiences on Design for Sustainability and PSS innovation

– Overview of existent methods and tools

These results will provide then insights for pilot course subsidies development (contents and teaching materials), ensuring that existent expertise and experiences and expertise at each partner (that may emerge under different forms) is taken in consideration as well as the new material are developed so to respond to expressed needs of each partner. It should also ensure that the development of new curricula reflects both a shared macro agenda on sustainability but also localized, contextual sustainability agendas that respond to local needs and demands in the economic, social and cultural levels.

4. Transcultural pilot courses

A cross-learning mechanism for design educators

The 8 pilot courses foreseen in the LeNS process will occur through an exchange of teachers of the partner institutions (experts flow). European teachers will teach in Asian design schools and Asian design teachers will teach in European design schools.

The pilot courses will be as much as possible integrated in normal curricula activities or within new courses or workshops, structured so to maximize the interaction between the *guest* teacher and the *host* staff and students.

The exchange scheme foresees that one *hosting teacher* will receive a *guest teacher* coming from the counterpart institution within the thematic cluster and in a second moment will be received as a guest in the counterpart institution (the roles of guest and host are inverted and the same procedure is repeated) see fig.2. The thematic clusters determine the exchanges, as follows:

- **Food-chain A: pilot courses 1 and 2.** One partner hosts a guest teacher into his/her course. Students at the host partner will design new sustainable **food** solutions for the university campus of the guest teacher.

- **Food-chain B: pilot courses 3 and 4.** One partner hosts a guest teacher into his/her course. Students at the host partner will design new sustainable **food** solutions for the university campus of the guest teacher.

- **Mobility 2: pilot courses 5 and 6.** One partner hosts a guest teacher into his/her course. Students at the host partner will design new sustainable **mobility** solutions for the university campus of the guest teacher.

- **Health-care/wellbeing: pilot courses 7 and 8.** One partner hosts a guest teacher into his/her course. Students at the host partner will design new sustainable **health-care/wellbeing** solutions for the university campus of the guest teacher.

Each exchange is followed by a third party, the *observer*, a teacher coming from a third partner. The role of the Observer is monitoring and annotating the development of the activities along the period of implementation of the pilot course at the host institution. The observer will be in-site during the visit of the host teacher at the guest institution and follow the developments of the long-distance collaboration. The aim of the observer is that of assessing the process of implementation of the didactic pilot module and reporting its results to the work package leader.

The observer can intervene and contribute along the process of implementation of the courses whether during the 'on situ' phase or the virtual (long distance) phase. This will happen in accordance with the 3 involved partners (guest teacher, host teacher, and observer). At the end of each half cycle of exchange, the observer will prepare an evaluation report, that will feed back the teaching pack, that can be updated transformed for the following pilot course implementation.

The implementation of the 8 pilot courses will be carried out within a time span of one and an half year, so to allow in progress assessment and consequent improvement for the remaining academic semesters. The OLEP therefore will be constantly evolving along the implementation of the pilot courses.

The exchange activity aims as a whole to promote a process of mutual learning, intended as a **cross-learning mechanism** among the partners: each teacher learns form each other, not only in terms of contents, but also in terms of teaching views and approaches. This process of sharing is extended throughout the whole project. The pilot courses will be the highest point of the cross-learning process, where the guest teacher and the observer will follow how the host teacher conducts his/her course. The other partners (not present) will learn via video-recorded lecture.

A transcultural design exercise

LeNS' exchange mechanism foresee also a content flow, referring to the exchange that will take place in terms of design subjects: students from European partner institutions designing for an Asia partner campus; and students from Asian partner institutions designing for European partner campus triggering a collaborative international design process.

The strategy of using the university campus of other contexts (countries) as the design ambit for experimental learning courses can be justified in two levels.

First, adopting the university campus as the design ambit:

At the theoretical level, if we assume the whole experienced based on the approach of system innovation and transition for sustainability, the campus is a peculiar restricted community, an ambit for which it is effective to design (and implement) sustainable innovative solutions in technological, socio-cultural, organizational, economical and environmental terms. We can say thus it could be thought as a "community-lab" for sustainable innovation. At the same time, campuses could represent an optimum "community-window", because of their potential to showcase and disseminate the sustainable innovations and ideas later to be spread to wider communities (and to society at large).

At a practical level, the approach is effective because is easier for participants to collect information about the campus since they are working in the campus, and at the same time students living (and/or spending great part of the day) in campus should be well motivated and aware. Even in cases where the campus is restricted to a building, there is a community of student and teachers eating, moving to and from, taking care of wealth, etc.

Second, adopting a (campus of a) different context (country) as a design ambit:

An initial clarification is necessary. It is certainly not our idea that a designer who is alien from a particular socio-cultural context could alone design sustainable products, services or a system for that context, unless when part of an international ad-hoc team.

The intention instead, is to promote an experimental learning design exercise for students. The focus is on the learning process for students, where the value is not only the strict feasibility of the students' concepts, but rather the process of confrontation with other socio-cultural context in a design process (even though experimental). In this sense, proposing students to design for another country's campus enables:

– students/teachers (designing for other campuses) to discover a different context from their own through a strategic analysis of the information provided and through direct critics and evaluations of local teachers.

– teachers/students (when evaluating/criticizing the concept designed for their own campus) to discover another's culture interpretation of their own (and even be surprised by unusual ideas)

Said in other words, we enable a "transcultural" learning process by introducing the students (and teachers) to an approach able to "decentralize" one's own cognitive references and values, and direct oneself towards other cultures returning to one's own culture enriched by the confrontation experience. This process should also give the students the perspective of an international design practice and an enriched cultural experience. Since it is an experimental process, it does not embody or express a consolidated truth, but are a testing ground for some hypothesis, and will reveal for sure some limits to be understood.[7]

---

[7] It is also worth mentioning that this approach has already been tested in previous experiences: since 2002, POLIMI has been partnering with IIT Delhi and the Tsinghua (together with other universities in Brazil, China, Turkey and South Korea) in an informal educational network on the theme of Design of Sustainable Product-Service Systems for their respective university campus, named LENS (formerly known as DECOS). These experiences are the basis of the EC funded LeNS project.

5. An open source learning model

As it has been initially described in section 2, the main final output of the LeNS project is the Open learning e-package (OLEP) on System design for sustainability. We can enter now a little bit more in detail of the OLEP's nature and mechanisms.

The OLEP can be described as an e-package composed of a set of 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 easy to be used and free being based on the open-source and copy left logic: users (mainly teachers) can download, modify and reuse the available set of learning resources. The OLEP will be targeted also at students, designers, entrepreneurs and interested persons/institutions. The OLEP will be located within the LeNS web platform.

Generation and acquisition of contents

The open learning e-package contents will be produced during the LeNS project, but can incorporate other existent or future material considered as interesting and relevant. Most part of the materials will be developed within prior to the pilot course implementation and will evolve in synergy with the courses implementation (see figure 1). It will be edited into its final shape after the pilots' implementation.

The teaching materials will be developed based upon the identified needs. They will be also partly based upon the teaching materials of the partner institutions developed prior to the LeNS project, as well as new teaching materials to be developed *ex-novo*. Each topic will be covered by a range of different supporting media. These activities will be concentrated before the beginning of the first pilot course, but will continue along the whole implementation process, that is spread in an 18 months time span.

Next to the teaching materials developed and collected in the preparatory phase, the core of the OLEP will be constituted by the materials used in (selected to/developed for) the 8 pilot courses. In practice, each partner teacher holding a course will develop (as normally for any course): a programme for the course; a series of computer presentations to support the lecture; a series of video-recorded lectures. And each teacher holding a course will make available for his/her students: a series of texts (course bibliography); a set of tools for the design exercise, whether new or existing tools.

After the implementation of each of the 8 pilot courses, an evaluation will be carried out (based on the observer report) to assess the impact of each of the teaching materials used. This assessment will inform the teachers of the next pilot courses as well as the progressive development of the OLEP final version (indicating for example if a given tool needs to be adjusted, materials that work better in a given context, etc).

Any existent educational support material considered as interesting and relevant will be also incorporated (e.g. tools, texts, power point, etc. used by teachers outside the Lens consortium). Finally, a final conference is foreseen to the presentation and discussion of these results. The conference proceedings as well as a selection of the outcomes of the award, exhibition and other dissemination activities will be incorporated to OLEP final version.

OLEP general requirements

The open learning e-package (OLEP) aims at facilitating the introduction and implementation of Design for Sustainability (focused on product service system innovation) in the educational curricula of design schools and universities worldwide (starting form the LeNS consortium).

In practice, the open learning e-package contents will be:

– Indications, guide-lines and examples of courses (programmes, supporting materials, expected results, etc) targeting teachers who wish to activate new courses or renew

existing ones on system design for sustainability (incorporating it on the school/university curricula)

- Materials and tools to support teachers in holding courses and didactic modules, on system design for sustainability.
- Materials and tools to support students who follow courses on system design for sustainability.
- Materials and tools to support designers in incorporating DfS thinking into their practices.

The OLEP is meant as a modular package of learning modular resources (or learning objects). Any interested design teacher is allowed to: **download, modify/remix and reuse**. The aim is to allow any design teacher to adapt and use the learning resources he/she finds useful, according to his/her specific didactic needs, institutional requirements or local context particularities. Also students and designers are welcomed to access the OLEP to support their learning activities (linked or not to a given course).

The OELP contents will take different formats:

- Texts in different formats, such as print-on-demand from the publisher (with ISBN code), printable in common printers (whole or partially), readable on screen, editable files (for open-sources documents, modifiable by the user)
- Slides presentations
- Composed presentations that integrate video-recorded classes (teachers classes and students presentations) with slides presentations
- Audio or audio/video files (e.g. recorded lessons)
- Software and other tools
- Archives and databases of best practices, examples, etc.

The e-package will be hosted at the LeNS web-platform, to be directly downloaded by users (typically registered teachers and students). On-line visioning should also be possible (with the possibility of streaming audio-video). To allow greatest diffusion and penetration to teachers (and students), all e-package contents should:

- Be free-access (preferably)
- Have a modular structure
- Be developed with an open-source and copy-left logic (preferably), with intellectual property rights (authorship), but without restrictions to diffusion (i.e. Creative Commons license).

The system architecture will facilitate the access of teachers (and students), allowing optimal fruition. A pragmatic and user-friendly approach will be followed and a guide will be prepared and made available identifying different users profiles to properly guide them throughout the OLEP use (teachers, students and designers). Nevertheless, learning resources could be accessed as **single** objects or grouped objects as related to a particular course/teacher. More precisely, a pre-selector and three modalities of access have been so far identified:

- a language filter will be available as pre-selector
- access to all learning resources of a particular course/teacher (e.g. a teacher who wants to start a course from the beginning could have be interested in an overview of the organisation of all the contents within a course; and a student who wants to receive support for the course he/she is following could have them gathered);
- access by content regardless the teacher/course (e.g. allowing a teacher who wants to improve a course to get direct access to all that has been produced/collected related

to a specific issue; and allowing a student who wants to deepen a content to get direct access to it independently from the teacher indications);

– advanced access by other tags/metadata typical of learning resources; the list of tags to be associated to learning objects are listed at the end identifying a proposal for compulsory; suggested and optional.

Teachers who are part of the LeNS consortium will be able to update the e-package during and after the project duration. They will constitute the OLEP scientific board. Teachers and users external to the LeNS consortium (the wider network) will be able to use the package through an open-source logic as described earlier, but the update will be controlled by the LeNS scientific board, safeguarding the scientific reliability of the new materials. External teachers and users of OLEP can apply to become members of the scientific board after the project termination (rules to be defined).

6. Conclusions

LeNS aims at becoming a mechanism for the development and diffusion of system design for sustainability in design 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, especially in Asian emerging economies. 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.

Contributing to this process of transition towards sustainability requires facing the complexity of the current dynamics of a changing society, where global and local drivers are in permanent dialogue but not always find balance.

In this framework, LeNS ambition is first of all that of being in itself a transcultural learning process. Design educators will be confronted with different learning approaches and different approaches regarding DfS in relation to both global and local interpretations and priorities of sustainability. Design students will be confronted with design subjects that are different from their usual design situations. In both cases, a cognitive challenge is created, in a vision of a *cosmopolitan localism* (Sachs, 1998, Manzini, Vugliano, 2000, Manzini, Jègou, 2003), a condition where actors find a positive balance between localization (being rooted to a place, a community, cultural values and socio-economic conditions) and the "global flows" (Appadurai, 1996) that characterises the contemporary society.

In the long term, LeNS ambitions to offer an **open** output, a platform for storing and sharing knowledge (learning objects 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.

This final result: the open learning e-package (OLEP), is intended as a true open source artefact, allowing users to freely **use, modify, remix and reuse** the OLEP material according to their needs in the framework of decentralised and collaborative production and fruition of knowledge.

References

Appadurai, A. (1996), Modernity at Large, Cultural Dimensions of Globalisation. University of Minnesota Press, Minneapolis.

Colorni, Alberto (ed). 2006. *KIWI Knowledge Interaction Web Information*. Milan: Centro Metid Politecnico di Milano

Crul M.R.M. and Diehl Mr.J.C. 2006. *Design for Sustainability a practical approach for Developing Economies.* Delft/Paris: Delft University of Technology/UNEP

Pillan, M., Sancassani S. 2003. *Costruire servizi digitali.* Milan: Editore Apogeo

Jun, C. 2006. "Sustainable Design development in China" *in* Penin L. and Vezzoli, C. (eds). 2006. *Designing Sustainable Product-Service Systems for All. Sustainable clothing care concepts for university campuses in emerging contexts.* Supported by UNESCO under The Decade for Sustainable Education. Milan: Libreria Clup

Leong, B.D. 2008. "Is a radical systemic shift toward sustainability possible in China?" *in* Tukker et all (2008) *System Innovation for Sustainability. Perspectives on radical changes to sustainable consumption and production.* Greenleaf Publishing, Sheffield.

Penin L. and Vezzoli, C. (eds). 2006. *Designing Sustainable Product-Service Systems for All. Sustainable clothing care concepts for university campuses in emerging contexts.* Supported by UNESCO under The Decade for Sustainable Education. Milan: Libreria Clup

Manzini, E. & Jégou, F. (eds). 2003. Sustainable Everyday. Scenarios of Urban Life. Milan: Edizioni Ambiente

Manzini, E:, Vugliano, S. 2000. Il locale del globale. La localizzazione evoluta come scenario progettuale, Pluriverso N1

Meroni, A (ed). 2007. *Creative Communities People inventing sustainable ways of living.* Poli.design Edizioni, Milano. download at: http://www.sustainable-everyday.net/main/?page_id=19)

Ravotto Pierfranco (ed). 2007. SLOOP Sharing Learning Objects in an Open Perspective. SLOOP project European Commission Leonardo da Vinci. Milan: ITSOS Marie Curie

Sachs, W. 1998, a cura di, *Dizionario dello sviluppo*, Gruppo Abele, Torino

Srinivasan, A. and Varadajan, S. 2006. "Services: the Indian perspective" *in* Penin L. and Vezzoli, C. (eds). 2006. *Designing Sustainable Product-Service Systems for All. Sustainable clothing care concepts for university campuses in emerging contexts.* Supported by UNESCO under The Decade for Sustainable Education. Milan: Libreria Clup

Tukker et all (2008) *System Innovation for Sustainability. Perspectives on radical changes to sustainable consumption and production.* Sheffield: Greenleaf Publishing

UNEP United Nations Environment Programme. 2002. *Product-Service Systems and Sustainability. Opportunities for sustainable solutions.* Paris: UNEP

Vezzoli, C. (2007) *System Design for Sustainability. Theory, methods and tools for a sustainable "satisfaction-system" design.* Milano: Maggioli Editore

Vezzoli, C. and Manzini, E. (2008) "Review: design for sustainable consumption and production systems" *in* Tukker et all (2008) *System Innovation for Sustainability. Perspectives on radical changes to sustainable consumption and production.* Sheffield: Greenleaf Publishing
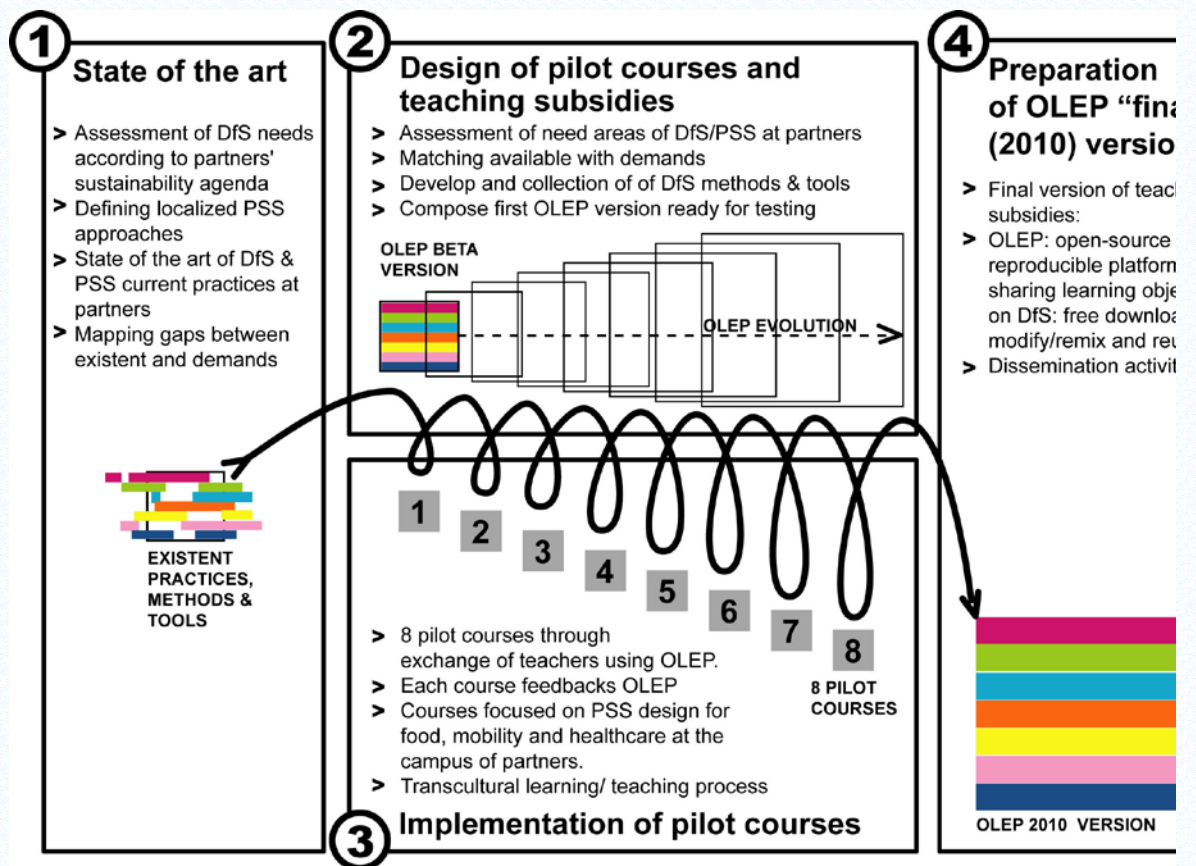
Fig. 1: The LeNS process for the construction of the Open Learning E-Package (OLEP), through pilot courses implementation.
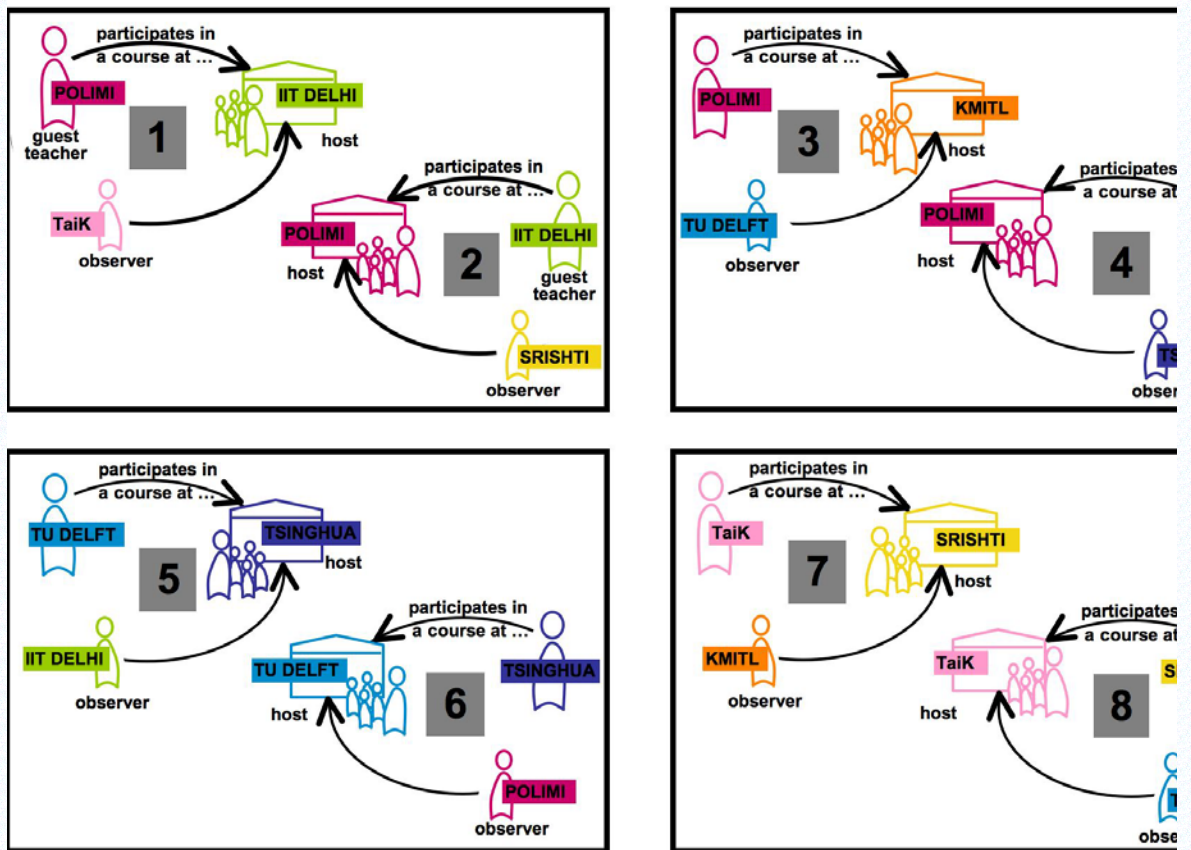
Fig. 2: The scheme of the eight pilot courses, based on an exchange modality of teachers of LeNS' partners institutions