webLabs	**Global view of Weblabs from a CoP's point of view**	João Filipe Matos Madalena Santos

Summary

In this part we will give a global view of WebLabs project from a CoP point of view presenting some aspects graphically and others by tables with a brief presentation of each one. We will start by the working context, then we will present graphically the trajectory of the 3 years work of the various groups of people involved and the knowledge domains focused, after that we will summarize some results in terms of learning outcomes and, finally, we will share some of the critical factors that we identified (from a CoP perspective).

Note:
For the purpose of clarification this is the way we are addressing the idea of community of practice:
Communities of Practice are inter- or intra-organisational, often geographically dispersed, groups of people that have a long-term orientation on knowledge sharing or knowledge creating activities. The groups have their own identity and focus their knowledge processes around a certain practice that has a cultural dimension.

1. The working context

The working context of Weblabs project is presented here around with three main entry ponts: the spaces where the work took place, the people involved (members) and the tools designed and used along the practice.

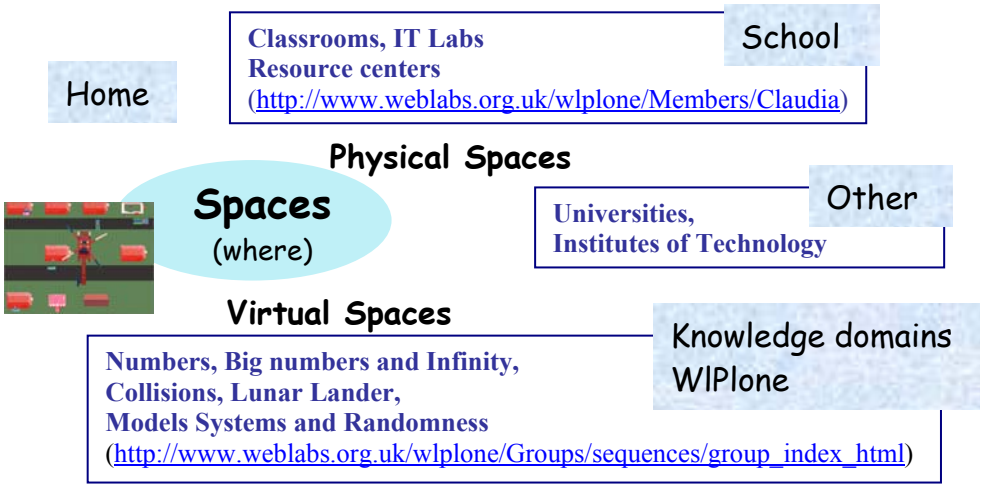
1.1. Spaces

One basic dimension we need to describe when we intend to situate any domain of action and practice created with educational purpose is the **space**(s) both in local terms (where things happen) and in organizational terms (what for). Those spaces become learning areas as they were lived by the participants as places for experiences, explorations and communication. Exploring them and using them becomes, in a sense, part of the learning that took place there.

Spaces – Where

The project evolved in activities that took place in particular physical spaces mainly in educational institutions – Schools and Universities or Institutes of Technology – but some children were able to participate from their homes in some aspects of the Project (exploring the Toon Talk tools or communicating through the Plone platform). Although all were educational institutions the differences among them took a role in what was the actual experience in each site. The more obvious were the physical, organizational and technological conditions, but the cultural dimensions attached to each one seem to play a more central role. We can refer, for instance: (i) the various pedagogical approaches – school or University, whole class ran by its teacher or a small group of children with a researcher all of them interested in a particular domain; (ii) the various approaches to school curriculum generally (more or less access to children to take decisions on what they can do and when) as well as towards particular school subjects (e.g. mathematics); (iii) the school climate and the institutional relation of the teacher (or researcher) with the school.

But the Knowledge Domains gained also a spatial dimension when they were chosen as the main organizing themes for the activities to propose to children. Those Domains became visible for children not only as the themes of the activities proposed but also by its structural dimension as they become places (in the WlPlone) where the children played, explored ideas, found tools to work with, and where they knew they could meet most of the people with whom they want to interact. By such reasons we classify here the WlPlone and the Knowledge Domains as Virtual Spaces.



Spaces – What for

Being a project with an important technological component to support and to promote working, sharing and learning with others at distance an equally important role was played by what was provided and happened in the WlPlone. The global area created became a central element of the community learning space and its design was being transformed along the project with the feedback of all the participants as they were using it and exploring it. The different parts of this large space became real but each played a particular role what help all of them to become different 'learning areas', allowing also a variety of experiences in them, according to what participants where doing there, how they appropriate or transform the goals that drove their design, how their design facilitate the projects that were taking place. To offer a structured space to live in was important but it was also good the flexibility and transparency of such space that allowed to be adjusted to different cultures, habits and interests. It was possible, for instance, to see who was on-line (and for children this was an important issue), or to decide what groups to put in front in order to facilitate the communication with whom the user was interested in working with. Community building requires initiative and engagement on the part of members.

We are presenting here each area of this virtual learning space (in WlPlone) according to the different set of activities that they intend to support but also giving visibility to the role that each area played in terms of the support of the community.

Weblabs activities spaces available for participants

Community Circle (being together)	The **global WebLab's Project** involving all types of spaces (physical and virtual) and kinds of interactions (face to face and technologically mediated)
Private Spaces (forging relationships)	**Individual pages** (+email adresses) and **groups pages**. Make possible to construct an identity to go public and to appeal to interaction.
Domain Inquiry (sharing learning trajectories)	The **Knowledge domains** areas. Where participants share ideas, comment each others productions, contribute to small joint enterprises within each domain or crossing domains.
Leadership lounge (taking charge)	The **Transparent modules** and **Teacher Guidelines** area. A space where teachers and researchers share support for planning students activities.
Practice lab (place for hands on)	The practical workspace for each **Knowledge domain**. Activity is running around **projects** or **games**, with various resources such as ToonTalk tools and Tangibles.
Connections (opening up to the world)	The **WebReports area** (in **Plone**) where projects and knowledge become public and so they are co-constructed and shared (in collaboration or due to be a communication subject)
Resource centre (keeping records)	The **WebLabs Plataform** (in **Plone**) globally, where tools, people, and publications (eg. Encyclopaedia) are available as Resources for members to use

Inspired in http://www.cpsquare.org/edu/News/archives/Final_%20Handbook04.pdf (consulted in 20 May 2005)

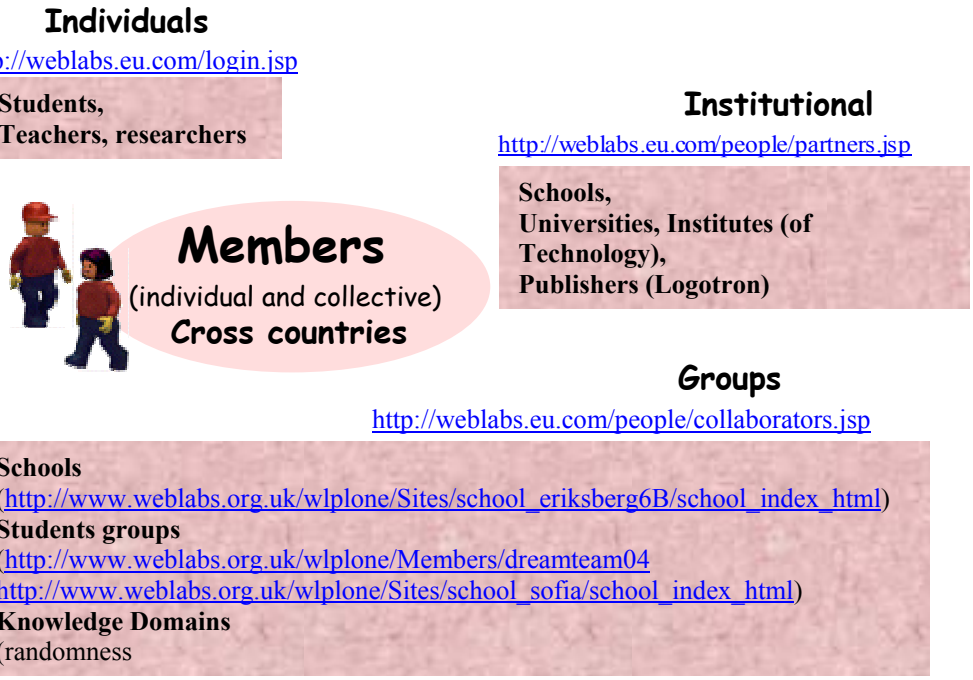
Links to illustrate some of the activity places available

Community Circle (being together)	**The public entry point for WebLabs Project** http://www.weblabs.eu.com/
Private Spaces (forging relationships)	**Some researchers personal homepages in WlPlone** http://www.weblabs.org.uk/wlplone/Members/michele http://www.weblabs.org.uk/wlplone/Members/Ken
Domain Inquiry (sharing learning trajectories)	**Sequences** http://www.weblabs.org.uk/wlplone/Groups/sequences/group_index_html **Lunar Lander** http://www.weblabs.org.uk/wlplone/Groups/force/group_index_html **Models Systems and Randomness** http://www.weblabs.org.uk/wlplone/Groups/MSR/group_index_html
Leadership lounge (taking charge)	**Teacher Guidance** http://www.weblabs.org.uk/wlplone/Help/I18NLayer.2005-02-28.3133/en
Practice labs (places for hands on)	**Guess my Robot** http://www.weblabs.org.uk/wlplone/Members/yish/my_reports/Report.2005-02-03.4559 **Infinity global** http://www.weblabs.org.uk/wlplone/Groups/infinity/group_index_html **Resort Infinity** http://www.weblabs.org.uk/wlplone/Members/Ken/my_reports/Report.2005-04-21.5907 **Converging sequences** http://www.weblabs.org.uk/wlplone/Members/yish/my_reports/Report.2005-05-23.4202/index_html **Force and acceleration** http://www.weblabs.org.uk/wlplone/Sites/school_cyprus/school_report_index_html **Make my Graph** http://www.weblabs.org.uk/wlplone/Members/gordon/my_reports/Report.2005-02-01.0036 **Encyclopaedia of Randomness** http://www.weblabs.org.uk/wlplone/Groups/MSR/Folder.2003-12-02.1157/index_html/en/document_view **Guess my Garden** http://www.weblabs.org.uk/wlplone/Members/augusto/my_reports/Report.2005-01-04.5407 **Modelling** http://www.weblabs.org.uk/wlplone/Members/jakobth/my_reports/Report.2005-02-23.0946
Connections (opening up to the world)	**The WebReports area, the Plone platform within the global WebLabs** http://www.weblabs.org.uk/wlplone
Resource centre (keeping records)	**The ToonTalk warehouse as a small area of the global WebLabs resource centre in Plone platform** http://www.weblabs.eu.com/labs/tools/

1.2. Members

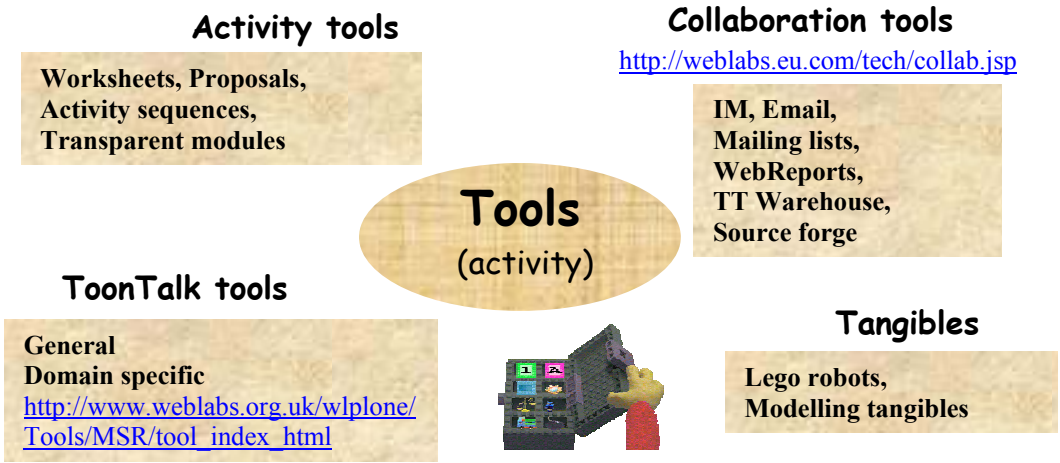
As well as there are various sites from different countries there is a variety of members in this project, what bring individual characteristics but also different modes of acting within the various action arenas. The way how people engage in the Project reflect also their interests and their own identities as well as the role that is expected from them. Each one found their own way of contributing for the overall result by themselves as individuals and as part of the small groups that had special focus and responsibilities. The learning context the global project is reflects this variety. So, to talk about the people involved is to refer to various levels: (i) individuals, as it is possible, both for adults and for children, to present themselves and act as such; (ii) institutions, not only from research and education (where teachers have a particular presence) but also the commercial side (represented by the publisher); (iii) groups that reflect some of the identities people bring with them for (or build in) the Project and they want to give visibility, according to the areas they work in the Project (knowledge domains, projects involved) but also to the small teams they start to build (e.g. groups of students that choose to assume in their webreports the name 'dreamteam')

This dimension of the Project is very important because it brings at the same time the richness but also the difficulty of dealing and constructing from and with the diversity of cultures, languages, routines, points of view approaches to learning, to research, to education,…



1.3. Tools

We should underline the diversity of tools used by children including here those that Weblabs provided to them and those that were imported from other areas of activity (such as electronic mail and instant messaging). Some of the tools were created along the development of the project and the activities of children from the analysis of the needs of the participants and the aims of the project. In particular it was relevant to note that the use of tools as support for multiple representations and for enlarging the scope of communication and collaboration between sites. We should also note that several tools that started as emerging from proposals for children became knowledge resources and acquired that dimension as they were being used by children and the way the teachers and researchers re-designed them to improve learning (e.g. collaboration, modelling).



Knowledge resources (see links below)

Guess my … (communication, collaboration) – **Robot** (infinity, convergence), **Garden** (modelling, randomness), **Graph** (lunar lander, collisions)
Games construction (modeling, collaboration);
Encyclopaedia (randomness, collaboration);
Toon Talk (representation, experimentation);
Plone and Internet use (interaction, communication, collaboration)

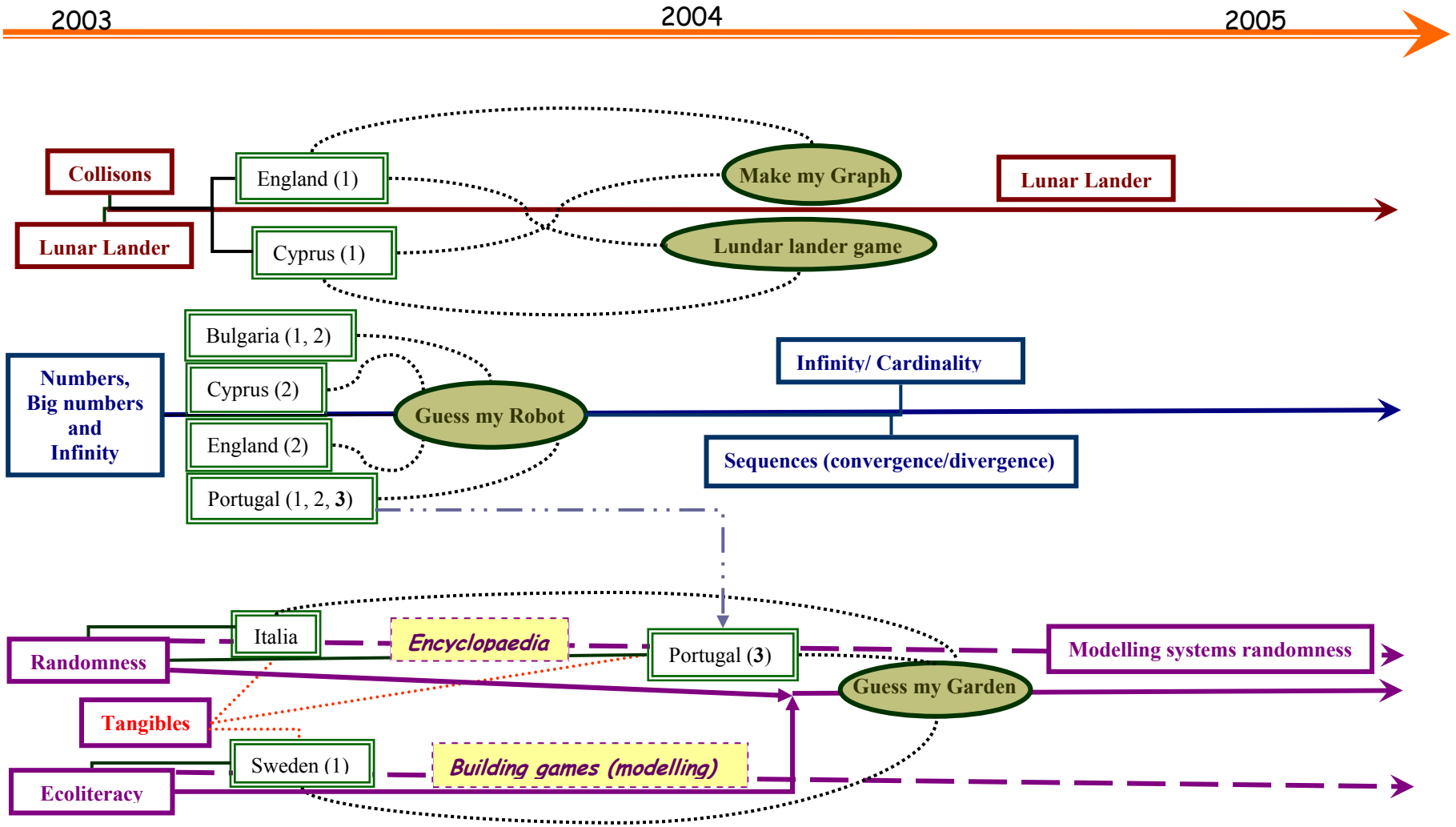
Links to illustrate some ideas about tools and resources relations with knowledge and learning

Knowledge resources
Guess my … (communication, collaboration)
- GmRobot
http://www.weblabs.org.uk/wlplone/Members/yish/my_reports/Report.2005-02-03.4559
(some examples published since 12-04)
- Make my Graph
http://www.weblabs.org.uk/wlplone/Members/gordon/my_reports/Report.2005-02-01.0036
- Guess my Garden http://www.weblabs.org.uk/wlplone/Members/augusto/my_reports/Report.2005-01-04.5407
Topic Groups (mathematic and scientific representation)
http://www.weblabs.org.uk/wlplone/Members/yish/my_reports/Report.2005-05-23.4202/index_html
Games construction (modeling, collaboration);
Encyclopedia (randomness, collaboration);
TT (representation, experimentation);
plone use (interaction, communication, collaboration)

2. The knowledge domains trajectory emerged from the collective work of all participants involved

We can look globally at the transformation of the knowledge domains (along the three years of the Project) as the result of the interaction of each other trajectories (some parallel, other overlapping and most of them crossing each other at some moments). By representing them, side by side along the Project time line, we try to make visible some of the interconnections that enabled us to learn form each other.
It was the case of the proposal "Guess my Robot" (a game's kind) implemented in 2003 within the Knowledge Domain of Numbers, Big Numbers and Infinity in order to foster communication between children through sites and to sustain the mutual engagement of children across sites. At the annual meeting of 2004 it was analyzed the way how children participated and it was decided to integrate in each of the other knowledge domains something with similar characteristics. So, other proposals, with a similar game dimension, were designed for children that were already participating together in the Collisions and Lunar Lander (Make my Graph and Lunar Lander Game). In the same direction it was decided to try bring together the children that began to work separately in two other Knowledge Domains – the Randomness and the Ecomodelling – by proposing them to participate in a common game (Guess my Garden). At the time, they already shared the exploration of some Tangible elements (Lego robots) but they came from different starting focus, the Italian children investigating the mathematical ideas around the Randomness theme and the Sweden children exploring and discussing ideas about ecological systems (animal gadgets) along their efforts of constructing games that try to model such systems. One group of Portuguese children (3) that participated before in the Knowledge domain of Numbers and that participated in the Guess my Robot activity, was interested in joining the Randomness line of experimentation by exploring the Lego robots, contributing for the *Encyclopaedia* of randomness and participating in the Guess my Garden game. The *Encyclopaedia* built by children from Italia and Portugal and the games constructed by the Sweden children, had a dimension of a product that children contributed directly and collectively to it, they were small joint enterprises they felt as their own. The Guess my X games asked more deeply for the interaction between sites but they also grown as gradually as a source of communication and by so they push and support children interest to go deeper in some scientific ideas and representations.

The directions (the focus or the design) of the various activities sequences in each Knowledge domain after children participation in those three games reflect, in some ways, what appealed more to children interests. In a certain sense we can say that they chose what aspects of those Knowledge domains they want to explore more deeply and by doing so they had a word to say on the final re-definition of those domains.


2003
2004
2005
Collisons
Lunar Lander
England (1)
Cyprus (1)
Make my Graph
Lundar lander game
Lunar Lander
Numbers, Big numbers and Infinity
Bulgaria (1, 2)
Cyprus (2)
England (2)
Portugal (1, 2, 3)
Guess my Robot
Infinity/ Cardinality
Sequences (convergence/divergence)
Randomness
Tangibles
Ecoliteracy
Italia
Sweden (1)
Encyclopaedia
Building games (modelling)
Portugal (3)
Guess my Garden
Modelling systems randomness

3. Learning outcomes in WebLabs' communities of practice

3.1. Children in WebLabs' communities – why look into children practices?

It is important to underline again that the work of children within WebLabs is part of a larger effort being made by teachers and researchers in different countries as they maintain a network of discussion and exchange of ideas in order to:
a) elaborate on the rationale, develop and test with students concrete Activity Sequences in the different domains defined in the project;
b) permanently test and suggest reformulations of many features of the software in use (ToonTalk itself and its tools; WlPlone);
c) collect and analyze data to describe how children participation in the communities relates to learning, thus contributing to producing accounts of children learning.

From a theoretical perspective based on the idea that learning is an integral part of the social practices children develop, we assume that the communities of practice within Weblabs evolved as the different teams in several countries created conditions that sustained the practices of the children and thus contributed to cultivate those communities.

As communities of practice, those groups assumed in different forms and moments a common enterprise – the development of the project – and they stimulated their mutual engagement more and more deeply. For this purpose several tools, proposals, ways of working and powerful ideas were setup and allowed the development of a shared repertoire – thus making common what is culturally different.

Thus, the research questions that were driven our analysis were:
What are the children doing together?

- Which is the joint enterprise they feel to be contributing as participants?
- Which are the small enterprises that are emerging as important for them?

What are they using (and creating) along (and for) their participation?

- What is the shared repertoire we identify, such as modes of acting and interacting (in their dialogues and actions)?
- Which audiences are in children' minds?

How do they engage in the activities?

- At what extension can we say that there are signs of mutual engagement?
- Which are the elements that sustain their engagement?
- Which are the sources for their engagement?

WebLabs imagined a supportive learning environment based on a specific design for certain practices to take place. ToonTalk tools were constructed to support experiments in science and mathematics, WlPlone was setup to allow children to represent, share and discuss their work, a set of tangibles was put in place in order to allow children to discuss complex concepts embodied in that materials.

But we have to be aware and appreciate how the communities were inherently self-defined and self-managed. The practices observed in different sites (as it is evident

when we look at the webreports from different partners in several knowledge domains) showed different ways of addressing the proposed activities and use of thecnology. This emerged from the conditions that teachers and researchers were able to setup in each site, the cultural habits of children and teachers and the pedagogical options and orientation existing in different partners. This is clear evidence that practices are not necessarily the result of the specific design but instead a reaction to the design.

The communities of practice within Weblabs were cultivated and sustained through actions of members (teachers, researchers and children) because they were powerful participants in the practice, but also because probably they were willing to share the enjoinment of being a participant of such community. This sense of belonging cannot stay apart from the notion that learning was taking place as children participated in the ongoing practices.

3.2. Learning outcomes

Learning emerged from the tension between individual experience and competence social defined in the communities. This was clearly apparent in the several Weblabs' knowledge domains as multiple evidence shows.
WebLabs' children participation in the practices involved:
- the emergence of a joint enterprise – visible in e.g. the production of an Encyclopaedia on Randomness and Probability, the construction of models to represent simple population dynamics, the testing of specific features of Toontalk and giving feedback to researchers, etc.
- an evolving mutual engagement – visible through interactions giving access to others to each one products, processes, resources and ideas on WlPlone; sharing tools and stories, commenting on others' ideas, offering help to solve problems, etc.
- the development of a share repertoire – instantiated in the language used, the ways of approaching problems and situations, the representations through the use WlPlone and of Toontalk tools, styles of modeling (e.g. the chain doing-testing-playing), etc.

The experience of experts (as oldtimers in the communities) was one of the elements that gave shape to the competence in the communities. But the competence was also socially defined and therefore became an issue mainly driven by the apprenticeship process.

Children learnt in several dimensions:

- ways of approaching and using technology: ToonTalk being seen firstly as a game-like software (as was the case in Portugal) but this vision evolving into a programming language (strongly noticed in Sweden);
- forms of dealing with problems and questions, demands and challenges: as the increasing horizontality of relations within the WebLabs' communities encouraged children to use in full the teachers and researchers as resources; as children assumed they were accountable to their peers in other countries and sites;
- ways of representing and sharing ideas: as children needed to describe their thinking and work on WlPlone to explain processes, reply to challenges (as in GmR and GmG), comment on others' comments (as in the Encyclopaedia), building from others' ideas (e.g. when reporting for their own site);

- a notion that knowing something admits several levels of expertise (that escape from the duality of knowing or not-knowing) putting in this way an emphasis on the partiality of knowledge and its distributed character (as it was the case in the construction of the Encyclopaedia for Randomness);

- the very idea that the partiality of knowledge goes also into the dimension of its diversity allowing and stimulating children to participate in different forms and levels of involvement and thus contributing to a general sense of belonging;

- the emergent sense of pleasure showed by most children in discussing ideas and going deeper in their own thought and in the quality of their products (e.g. challenges in GmG, webreports on the use of tangibles to explore mathematical ideas) showing a notion of localized depth that comes from their interaction with tools, with each other, with the powerful representations available in ToonTalk – instead of waiting to be teached by their teachers;

- the evolving notion of the important, power and fun of crossing boundaries both in terms of hierarchies and of cultural groups.

In terms of the knowledge domains in WebLabs, the results point to:

(i) Most of the children seem to have a strong sense of being relevant participants in a project with particular characteristics. In general terms, children show that they are engaged in:

- experimentation and development of a software that is not yet stable,
- a specific (but rather relevant) audience constituted by their peers – other children in other countries acting as their partners in such project;
- the use of powerful communication and representation technologies – the platform WlPlone in the internet and ToonTalk;
- the sense of self management of time and choices – most of the activities were developed in a structure quite different from what they usually do in schooling.

So the main joint enterprise that children assume as the one that all of them are doing together is the ***Project*** itself. Emerging small joint enterprises among children according to particular groups of children involved in particular activities, mainly organized around the domains of knowledge they were working with. Prototypical examples are:

- Eco-modelling in Sweden using tangibles and representations in Toontalk;
- the construction of the Encyclopaedia for Randomness and Probability by children from Italy and Portugal;
- the construction of game-like simulations in Sweden by groups of young children using animal gadgets;
- building together a number sequence, sharing ways of doing things (e.g. programming two robots to work together);
- building theories about comparing probability given different Random Gardens;
- main involvement being the construction of a specific mathematical artefact in Fibonacci sequences, with explicit goals set-up by the children themselves;

(ii) Children developed a repertoire that grows out of their experience with WebLabs and therefore they show increasing sophistication in the description, discussion and analysis of problems and situations. Prototypical examples are:

- the integration of ToonTalk terminology in their discussion of mathematical problems in constructing and guessing rules for specific number sequences using recursive modes to define them;

- the dialogues and discussion that comes as a basis for the design of several games built with Toontalk in Sweden when children talk about "changing behaviours", "experiment", etc;

- children creating elements for a specific repertoire to discuss relevant issues in Lunar Lander (e.g. the pixel as screen unit to understand displacement in different movements);

- adopting ways of describing things when facing the need to report to others in Lunar Lander (e.g. the use of the concept of acceleration);

- children denoting a strong ownership of knowledge in Cardinality experiments (and thus enabling them to enact their mathematics knowledge);

(iii) The sources of engagement of children in the activities in the various knowledge domains are closely related to the conditions set-up for them to work and the message passed by teachers and researchers regarding children's place and voice in the activities. It is apparent that in the several knowledge domains, the resources provided helped to make the emergence of practices that integrated relevant items in terms of learning:

- children being aware that they are able to construct something theoretical and general (e.g. theories developed by Italian children about Random Gardens with more or less probability for a certain event, in Randomness) based on their experiments with GmG;

- possibility of appreciating of own work and reflect on it because powerful representations were available and used and thus encouraging an approach to modelling in terms of improving quality of own models by observing its behaviour (e.g. in Eco-modelling by Swedish children);

- the possibility of asynchronous communication between children in different sites and countries via WlPlone where they included photographs of their representations and processes and therefore encouraging the analysis of others' forms of work in specific problems (e.g. Portuguese children willing to understand the way children in Bulgaria were representing number sequences on the blackboard using algebraic notation);

- the powerful media used to show virtual experiments to children and encourage them to interrogate and reflect on the phenomena observed and try to model it (e.g. videos of collisions in 1DCollision activities);

- the embodiment of complex mathematical concepts in tangibles as a source of reasoning and comprehension of its relationships and instantiation in concrete acts performed by children (e.g. Lego robots used by Italian and Portuguese children in work related to randomness and probability; e.g. space modelling tangibles used by Swedish children to model systems);

- the possibility of moving between different representations became a powerful way of playing with complex ideas in science and mathematics (e.g., Cardinality, Randomness) and showed the ability of children to purposefully choose the appropriate medium to represent and express ideas.

- children were generally able to claim for relevant mathematical explanations of the phenomena and problem faced assuming in many occasions ToonTalk and Toontalk tools and a good medium to convey those explanations.

In conclusion, five key ideas made up the learning of children in WebLabs:
- the relationship between experience and competence
- the engaged partiality and diversity of knowledge constructed by children;
- the horizontality and agency involved in the practices;
- the localized depth and meaningfulness of children thinking and action;
- the boundary crossing and cultural dislocation children co-opted in setting up their practices.

4. Some of the **Critical factors** identified

Analysing all the work done and the data we have (from a CoP point of view), we can identify some critical factors (for the learning that such spaces, proposals and tools can promote or facilitate) at three main dimensions: community, activity and organization.

Community	Activity	Organization
Coordination roles that implement a climate among participants that allow and invite to co-responsibility and motivate them to go deeper. That is, sustain interaction avoiding to micro-management.	Imagine **products** with an open dimension: - being the reification of children participation, - allowing children to experience ownership (a genuine sense of pleasure and interest in going deep in their explorations and to enrich their products)	Give **visibility to**: - whom is **coordinating** what, - the **products** (and their contributors) and the **how to contribute** for their evolution
Diversity and similarity – in order to work at the same time as a source of challenges but enabling to find and work with equals, so to feel safe in taking risks	**Tools** open and flexible in order: - to allow and to make visible the various levels of organization; - to allow adjustments to the unexpected and access to diversity	To allow a **flexible** back and forward **between formal and informal** structures (ex. small and temporarily interest groups working in a semi-public space)
Be attentive to the **cultural diversity that bring different needs and purposes** for teachers (eg, technical or pedagogical) and for children	Present **clear aims** for the proposals, but in an open way that can be easily adjusted to the various habits and ways of doing	Awareness of **the conditions** needed for work (eg. time for kids to be familiar to tools, strategic relevance of the proposals within the whole context of action)
Individual and/or group motives can facilitate or difficult; adherence to processes is vital for inclusiveness and for transparency	**Proposals** (projects, challenges,…) as tools – can adjust to various aims, but should not be applied without analyzing the conditions available (and pedagogic culture)	Making **visible ≠ levels of organization** but with **easy access** to what it matters (visible and easy navigation)
Awareness of an audience that is ≠ from us demands trust for allow pleasure to cross the boundaries	Bring to the front the **strategic relevance** of proposals and/or ways of working within each the knowledge domain	**Language** being an issue can be taken both as a constraint and a resource