

Symposium: Productive tensions in CSCL: Should design be driven by theory, research or practice?

Angelique Dimitracopoulou Intervention

LTEE lab, University of the Aegean

(first thoughts/ May 17, 2009)

In order to explore answers to the question “Should design be driven by theory¹, research or practice?” we have firstly to clarify on which design we refer about.

⇒ *Design “object”*: It is needed to distinguish among: (a) design of technology based learning environments (technology part), (b) design of learning activities themselves, (c) design of interventions in ‘educational’ systems (implementation approaches of innovative environments). The distinction is needed, even if in most of the cases of rich and innovative learning environments all those three design “aspects/parts” are involved.

In case that I could focus on the design of the technology based learning environments, we have to take into account that there are many different categories of them:

⇒ *Categories of technology based learning environments*: there are different categories of learning environments that usually require different design approaches, as well as foundations. For instance, it is different to design “content independent tools”, and tools for specific subject matters. In addition, the design process of new technological environment or simpler tool depends upon (among other factors) their ‘proximity, ‘familiarity’ or not to the existing practices and artifacts of the involved actors.

I think that I could start by providing brief examples of three , four different design process of technology-based learning environments, that concern collaborative learning (environments produced by LTEE laboratory, where I was the leading person, in the design endeavor).

- (i) *“Playing with Maps and Spaces”*: It is a learning environment with a serie of learning activities for young children, around the idea of “Signifie-signifiant Play”. The environment include mobile technology, GPS, software, and other materials (e.g. walkies-talkies) and allow a serie of activities between a “field-group” (that walk in real spaces, porting the GPS), and a base group (that read in maps or empty screens the traces of motion of the field group). In this design case, we were based in the well known difficulty of people to read and/or to create maps, but “the activity” itself was inspired by the “Distributed Cognition Theory”. This inspiration allowed us to go beyond the individual cognitive operations during map reading or map construction activities, to attribute to the map its communicative status among the cartographers and the map readers/users, and to conceive a serie of cognitively distributed activities among two group of children that use a number of artifacts and communicate between them orally. After the design and development of the involved

¹ It is also needed to clarify what do you mean by “Theory”? In this “first thoughts text”, I understand “ Learning Theory”, but maybe is not what you want to mean ?

software (its design is good but without particular specificities) the same theory was applied (among other methods/analytical lenses) so as to analyse children practices (interactions and learning phenomena) during all sessions of these engaging learning activities. This is a special case of a strong relation between learning theory and design, .. but it is not the most frequent case.

- (ii) *MODELLING SPACE related activities*: MODELLINGSPACE software (a rich environment) allows modeling activities for young students, in a synchronous, asynchronous or even stand alone mode. In this case, the main rationale of the technology based learning environment was derived by principles and very detailed research results related to Science and Mathematics Education. Only the very general design principles are directly related to a serie of recent learning theories, under the umbrella of socio-constructivism. The design process of the technological environment, the learning activities, as well as the implementations in different educational systems, was long (years): it was done via iterative processes, applying ecological approaches (taken into account the context and working in naturalistic conditions). This process, has enriched the design principles (flexibility, adaptability, etc)
- (iii) *“Teachers Community of Aegean”* that contains a platform, with tools, “ rules”, edu materials, and learning activities: In this case, it was applied the “Activity Theory” after a first design prototype, and a first period of community functioning, so as to analyse practices, interactions, phenomena, that appear during the community life cycle with the available tools, the actors and the proposed and emergent ‘rules’.
- (iv) *Computer based Interaction analysis tools for selfregulation and moderation*: In this case, it is the practice of the tools (after its initial design) and the detailed analysis of users’ needs and behavior that inform the full development. In addition, given that these tools constitute just a part of a learning environment, there are specific theoretical issues that must be used as analytic lenses (e.g. selfregulation, metacognition, group regulation, etc), while detailed studies could contribute in how regulation in small and in wider groups- communities occur, and what internal phenomena may appear.

I will take the point of view of a designer that her core interest is to design, develop and implement learning environments for use in current contexts (educational for students, as well as for teachers- professional development). My specificity is also the design of learning activities in Sciences. (so the “practice part” in your text, as fas as it concerns my intervention is the ‘practice” of a designer, working on education, and especially for Sciences (not only, but... it is interesting here to present it, in this way, I think).

A few statements:

- The main purpose (in the case of LTEE lab) is not to approve the theory, or to contribute to the learning theory . I accept a statement such as “ *the goal of designing learning environments and developing theories or prototheories of learning is intertwined*” (The design-based research collective, 2003). However, I consider it as a nice goal, a goal to try to achieve every time, but in the same time a very ambitious goal, and a goal that may create constraints and conflicts (especially among teams) during a design-development process; where we have to take into account pragmatic conditions.
- Regarding the question that seems central in this symposium: “ The nature of theories, their relevance for research and practice”:

- (i) My intention is to focus on the first stages of design. I will explain that there is always a “main- central” idea of a design: the design rationale. The rationale is central, and rarely it has to do directly with a learning theory (however it can happen; the case of ‘Maps & Spaces”). In addition, when we design new and innovative learning environments, it is not possible to use grounded theories so as to derive basic design principles.
- (ii) There is an umbrella related to learning theories, that concerns some basic and common design principles that all of us accept, and take into account: the general principles of design that are in accord to the socio-constructivist theories(e.g. principles related to the open, interactive, exploratory learning environments, principles related to the role of argumentation, to the social construction of knowledge, to the need of scaffolds, to the need of authentic learning activities, etc). These basic principles have nicely affected the design of the learning environments. However, when we go beyond the basic features, to the details (significant details) of the main functionalities, and of the interface, in the case of collaborative environments for sciences , we have to take into account not general theories of learning but detailed research results on Science Education (students misconceptions, representations and the cognitive difficulties of children, conceptual change, but also, epistemological analysis of the content, “social practices of references /of scientists”, etc). So, in the case of learning environments for sciences and mathematics learning, there is legitimate dominance of specific foundations that derive from science and mathematics education, than from general learning theories.
- (iii) Regarding the Process of the full/complete design, development, implementation- integration cycle, regarding an educational context: In all cases of learning environments (including design of the technology part of the learning environment, design of the learning activities (that may involve technological environment and other media/material), as well as the integration mode => the general methods /approach that take into account the context, such as “Design-based research”, “Activity centered- design” (ecological approach, Gay & Hembrooke) are needed, are applied or must be applied. However, the status, and the order in each cycle of the various iterative trials is not fixed and cannot be fixed.

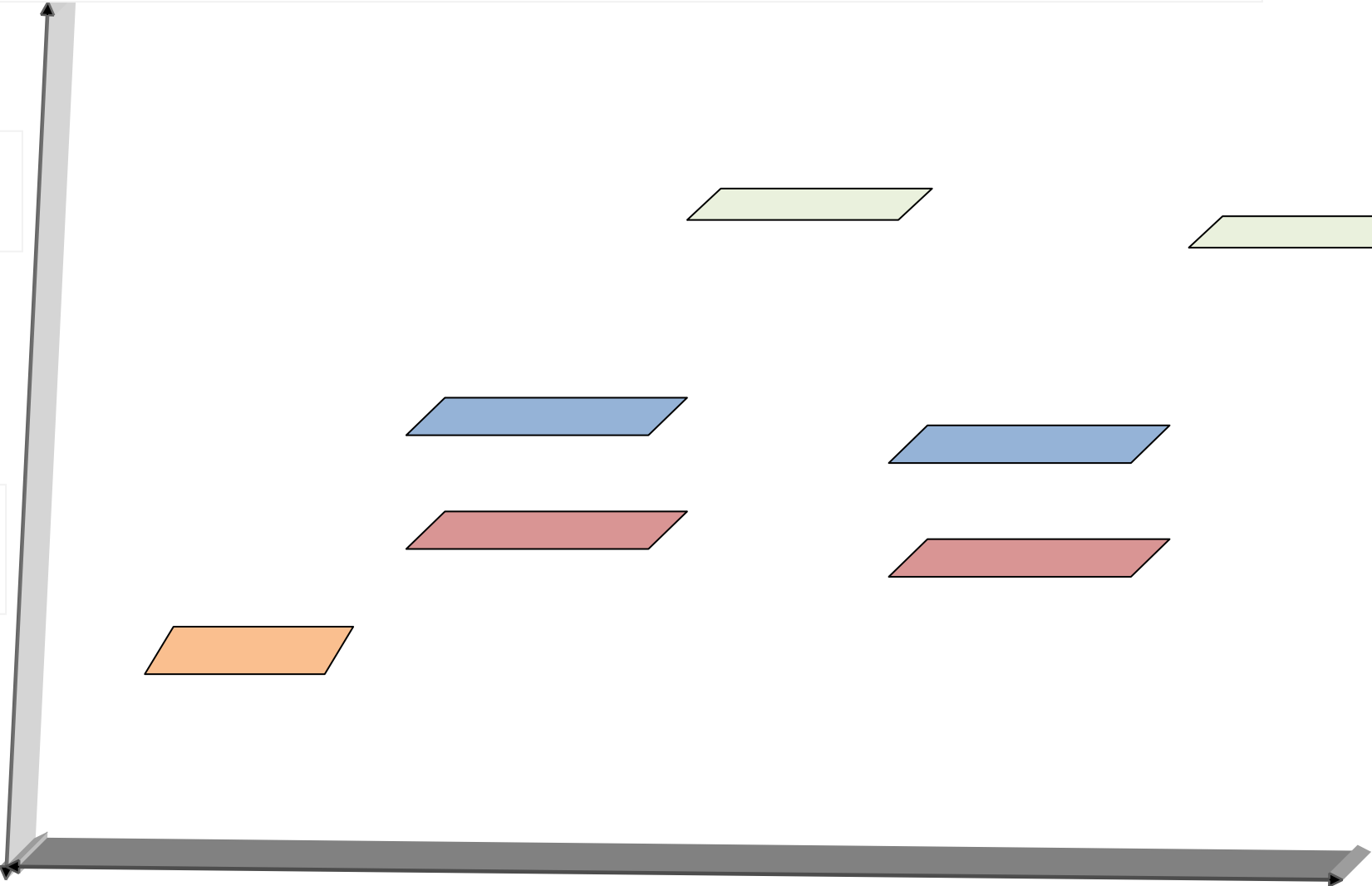
Example: Design & Learning Theories: in the case of a specific environment: Maps and Spaces

“Distributed Cognition” as analytical lense

Maths education research results

Descriptive Learning Theory: “Distributed Cognition Theory”

Socio-constructivists theories



Time Dimension of Design Process