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# Teaching Interaction Design & Children at University Paris 8: between French-speaking ergonomics and socio-cultural psychology

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## ABSTRACT

In this paper, the approach of teaching Interaction Design & Children at University Paris 8 in France is presented. The disciplines on which the teaching is grounded is the French-speaking ergonomics and development psychology using a socio-cultural approach. The teaching context is presented as well as theories, research methods and case studies.

## Keywords

Interaction design & children, psychology, ergonomics.

## INTRODUCTION

At the university Paris 8, at present, I teach Interaction Design & Children (IDC) in various courses which go from the 3rd license (Bachelor's degree) to the Master's degree. This teaching joins in two main disciplines, French-speaking ergonomics and psychology of development anchored in a socio-cultural approach. Ergonomics mainly centred up to here on adult (physical, cognitive, organizational ergonomics) (23), in situations of work, everyday life or in situation of training (24). My researches and teachings aim towards the transposition of concepts and methods of ergonomics to the child (14, 18, 21).

The taught perspective is anthropocentric: technical systems are thought in reference to people. The place of woman/man is first and that of technology is defined with regard to this one. The technical system is centred on the one who is going to use it, thought in reference to the activity of this woman/man, for whom it will become an instrument (34, 35). Our approach pays a big attention on the analysis of the activity of the subject: what makes the subject, how, with which resources. We adopt a double perspective:

- The analysis and the characterization of uses for the subjects at some point: synchronic approach of the mobilized or mobilizable resources.
- A developmental perspective to grasp the evolutionary dynamics: diachronic approach of the development of resources and the usage in the service of an activity.

In the current situation of teaching, IDC is taught in diverse modules within the university department (UFR) of Psychology:

3rd license (Bachelor's degree) (general field psychology - ergonomics):

- Usages and appropriation of technical devices
- Research projects: literature reviews and research activities

1st year of Master's degree ergonomics:

- Analysis of the activity and the resources to contribute to design
- Techniques and methods: clinical analysis, observations, techniques of activity's analysis, interviews, case studies.
- Interaction Design.

2nd year of Master's degree ergonomics

- Techniques and methods of design: techniques of innovation and creativity.

In a near future, the UFR intends to create a course dedicated to IDC at the Master's degree level to the students pursuing a sector in psychology of development, in ergonomics and in technology.

## 1. "Do we need theory in Interaction Design" for children?

A significant part of my teachings is dedicated to answer the question that puts Kaptelinin and Nardi (28): "do we need theory in Interaction Design"? Question that is so repeated: on what theories should we lean to design for children? The following theoretical approaches are examined:

- The concept of activity profoundly inspired by the Russian theorists of the activity (Vygotsky, Leontiev, Rubinstein), and the increasing influence of their thought which offers a systemic approach of man, fed by key concepts such as the relation subject-object, internalization-externalization, mediation.
- A psychological point of view on instrument as entity including an artefact and schemas of use

(34, 35). The notion of schema is defined from the approach of Piaget. Key concepts are discussed such as mechanisms of production, elaboration, transformation of instruments by the subject, the processes of instrumental genesis.

- The ideas of the constructivism (Piaget, 32) and the constructionism (Papert) are contrasted (1). With Papert (30, 31), the focus put on learning by means of manufacturing helps to understand how ideas are formed and transformed when they are expressed by means of different media. The accent is put on the interaction that learners maintain with their favourite representations, artefacts, or "objects to be thought" (2).
- The works of Resnick introduce the question of the creative thought. To learn is to conceive and to create. It is necessary to investigate technical devices which develop the creative thought and the expression by leaning on a spiral educational model (36, 37): Imagine-Create-Play-Share-Reflect-Imagine.
- In education, the imagination returns more and more in the heart of the debate. Is the imagination a lever or an obstacle to the fundamental learnings? At once stimulated because it favours the creative and self-fulfilment, and condemned to privilege a strictly logical reasoning, the child imagination at school is questioned. We try to place the activity of imagination in the heart of daily activities and to understand their functions as Harris does (25): dive into a fictitious world which preserves most of the causal principles of the real world; compare real results to the others that would might happen; investigate what is impossible or magic.
- The contributions of Vygotsky (40, 41) and Bruner (8) for whom the formation of mind is essentially a socio-cultural process: give a central role to the culture, to its transmission through the interactions because the children develop within several social matrices. The implications of this perspective to design are discussed: 1) The resources of the culture include information and as well cognitive structures that the child has to appropriate. 2) This process of appropriation must be active and not only passive. 3) To understand this process asks for a specific attention on the active play between the person and his/her cultural world. Three main hypotheses are abundantly studied : the general law of cultural development, the law of semiotic mediation, and the genetic method, given that they contribute to define educational objectives to design POGO (18, 38).
- The concept of Zone of Proximal Development (ZPD) and the educational programs based on this concept (7) which suggest that the active agents in the ZPD can include adults and children with

various levels of expertise, but also artefacts such as books, videos, displays, scientific equipments, computing environments (33). These studies exemplify a major theme in socio-cultural approaches of education, the execution of an educational program which takes into account or encourages knowledge co-construction.

- The theoretical perspectives of narrative activity and evaluation of narrative learning environments (6, 16, 17). The cycle of the creative activity of the imagination that Vygotsky conceptualized (40, 41) feeds our reflection on the narrative activity (5, 12). The narrative activity's model decomposed in four phases namely, exploration, inspiration, production and sharing that describes how the child experiences the external world, elaborates the impressions received, assembles them in a novel way and shares this production with others (19, 14).
- Human experience of physical space and places is a complex phenomenon that includes geographical and sensorial, as well as more social and interpersonal dimensions. We investigate theoretical insights from computing research and environmental psychology on space and place to determine the different dimensions of the experience of physical space (29).
- The digital and generational divide (3, 15), the challenges of a participative culture (27) question the use of digital technologies such as video games and their potential in connection with collaborative competences (13).

## **2. Interaction Design and socio-cultural approach**

The keys concepts and methods of interaction design are taught in particular from the book of Sharp, Rogers and Preece (39). Lessons and workshops aim at putting the students in situation to design interfaces and to lead evaluations which respect criteria of usability, accessibility and creation of experiences which could be enriching for children.

The students are invited to examine the central questions of the Interaction Design through the usage, design, and evaluation of technologies.

The design paradox which is to design for activities that do not still exist, is discussed with the students. The following questions are abundantly investigated: how to bend the design process in the direction of the child's activity? What are the necessary ingredients to approach the future activity? (9, 10). Several stages include choice of reference situations, simulation (abstract, prototypic), preparation and progress of these simulations with the users (e.g. imagine a new activity or rethink an existing activity with these concepts), the construction of recommendations, the construction of the representations by the users (14). The usage and the role of an activity's model in the design

process (14, 20) are central, as well as an understanding of the role of the child in the design process (22, 26).

### 3. Case studies

To illustrate the concepts we lean on several studies stemming from our researches on POGO (20, 21, 38); POGO in perspective with other environments such as Tell Tale and Sprite (4); the digital library for children (<http://enfants.bnf.fr>; 11); or the evaluation of tools available on the market for example Tag by Leap Frog, or environments such as Cricket or Scratch (36, 37).

For instance, concerning POGO while it is now quite old, we use it in reference to understand its design vision. In particular the design relies on an activity analysis and modelling based on the cycle of creative imagination proposed by Vygotsky. The tools have been conceptualised as cooperating devices for the construction of a narrative experience based in situated story editing supporting the entire process from exploration to inspiration, to production and sharing.

The digital library for children (*BnF*) developed by the (BNF) (French National Library), helps us to formulate orientations to study the questions of usage and appropriation of resources. Given that the objective is to attract children (from the age of 8 years) to reading, we question the meaning of reading activity for children. While exploring the device we aim: - to understand the reading activity of the child in connection with the usage of *BnF*; - to understand how the activity of young children's reading can evolve with digital artefacts; - to evaluate its use, to propose and to define concepts to improve the relation between reading competence and desire; - to contribute to build an activity of significant reading for the subject. And we explore with the students how to merge two approaches that feed each other within the process: ergonomics and interaction design, and how to include several stages: activity analysis, concept generation, benchmarking and prototyping. We try to understand the benefits of this double strands approach of merging different methods and techniques during the design process that could contribute on one side to understand the child activity, and on the other side to find innovative and creative design solutions (11).

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