GALAXY INTERNATIONAL INTERDISCIPLINARY RESEARCH JOURNAL (GIIRJ)
ISSN (E): 2347-6915
Vol. 10, Issue 2, Feb. (2022)

# EDUCATION IN THE DIGITAL AGE: REALITIES, CONTEXTS, CULTURES

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## ABSTRACT

This article aims to help formalize a socio-critical approach to digital technology in education. As we conceive it, this approach consists in studying the relations between the profile and the socio-cultural context of the pupils and their disposition to educate and train with digital technology. It is located at the crossroads, on the one hand, of the sociology of uses, which has little developed the educational dimensions of digital technology, and on the other hand, of educational sciences, which have weakly linked the proposed digital uses. to students in the classroom with those developed in an extracurricular context. It falls within the theme of digital educational usesand is intended to be complementary to the didactic and psycho-educational approaches mainly used.

**Keywords**: pluridisciplinarity, educational research, ICT for education, socio-critical approach, epistemics

## INTRODUCTION

Field of practice, technologies in education and training have given birth to a field of research organized into a set of small communities of researchers and innovators. In each, the design and implementation of devices located on the wave front of modernity (currently digital tablets, the Semantic Web ...) arouses great interest at all times, no doubt because that is where they are the social demand and the supply of funding from the various institutional partners interested in results likely to guide their action. However, certain research themes have a very important stability over time, such as media education, educational technology or distance training...

The following lines aim to summarize the French-speaking part of this field of research by updating a reflection carried out for more than ten years (Baron, 2003), (Baron et al., 2007). Marked by the French situation and inspired by the sciences of education, they are intended to be a contribution to be discussed and criticized. First, a retrospective type analysis is carried out; then forward-looking considerations are presented.

When examining the issue of digital accessibility, most attention is paid to the issue of infrastructure, their availability and the terms of their provision. This reasoning, which is easily accepted as obvious, applies in all sectors of activity. Education is no exception and, both nationally and internationally, in both northern and southern countries, the main indicators used to measure the development of educational uses of information technologies express pupil ratios. -machines or connection rates of schools to the internet. Admittedly, the existence of functional and efficient equipment in sufficient quantity is a prerequisite without which no practice is possible, but it seems increasingly imprudent to be satisfied with it.

Wherever this first step has been taken or is in the process of being, new questions appear which deserve the great attention of everyone, from the political or institutional decision-maker to the practitioner and the researcher. Two of them can, as a first approach, structure an overall reflection on digital accessibility in the field of institutionalized education and in particular in school systems. The first consists of evaluating actual practices and elucidating the mechanisms for their deployment in order to put into perspective the equipment efforts made and the land uses. The second relates to the specificities of the communication tools used. Contrary to a widely held view, the process of media coverage of communication and access to information is not neutral. Students' relationship to knowledge and the nature of their exchanges with each other and with the various members of educational communities are deeply affected. These changes are, therefore, all elements likely to affect access to information and communication technologies (ICT). Finally, it seems essential and urgent to look at the meaning that can and should be given to the instrumentation of education with digital information and communication technologies. The use of such tools cannot be justified by a simple technological alignment of the school and the world. Many other innovations have not penetrated our education systems and it is important that the reasons, and even the justifications, which today push most countries to the generalization of the use of ICT are clearly explained.

This raises the question of evaluation, which is difficult to specify since it refers us to that of the objectives assigned to the development of the use of ICTs, objectives which remain little or poorly elucidated. In addition, it raises complex scientific issues, particularly of a methodological nature. Serious and sufficiently large studies are therefore rare. One of them, carried out under the auspices of the OECD, is on the way to completion. It concerns 20 member countries of the OECD and relates as much to these methodological issues as to the production of field results.

Multidisciplinarity has most often been asymmetric, one discipline being in a situation of initiative. For example, computing has always played a leading role in computer-assisted education and then in computing environments for human learning (ILE); the information and communication sciences are the driving force in the study of instrumented communication phenomena, psychology plays a leading role in the study of possible learning gains, the "learning outcomes". As for the sciences of education, a crossroads discipline whose pioneers came from other university specialties, they were interested in learning technologies from their inception by focusing on strictly educational issues.

The asymmetry of disciplinary commitment is productive as long as a reciprocal communication and a stable division of labor are established between the different actors, which allow everyone to find their account. This is sometimes difficult when cultures and research practices are far apart. The extreme cases are when specialists in so-called "hard" sciences cooperate with researchers in the human and social sciences, considering that the latter's task is to propose "metrics" making it possible to measure the efficiency of a given system and, conversely, the one where specialists would consider computer scientists as simple code developers. In practice, continuing cooperation for a certain period of time often makes it possible to find, by successive adjustments, a mutually satisfactory solution.

Ten years ago, several research directions were easily identifiable. The main ones were the design of learning environments (we now tend to talk more about resources) and the study of

their educational uses. This last field covers a very broad spectrum ranging from what comes under educational technology, where software systems incorporate didactic programming, to the use for teaching software instruments, whether general or been specially designed for disciplines (such as dynamic geometry systems, computer-assisted experimentation, geographic systems, etc.).

What is related to instrumented communication also gave rise to active research. In addition, a community was formed in the 1990s around the modalities of open and distance learning (ODL) and a small French-speaking community interested in the didactics of computer science itself and the didactic issues of software packages was founded in the late 1980s. Never have schools received so much support to acquire modern communication and information processing equipment. Despite significant intra-community differences, all European countries have initiated investment policies on an unprecedented scale to this end. In the end, that is to say in the field of teaching and learning, the arrival of these new material devices and especially that of the Internet, has caused a very significant increase in uses. But can we speak of generalization today?

Although they are linked, we cannot confuse the level of equipment and that of use. Thus, to announce that one hundred percent of a given category of schools are equipped with microcomputers connected to the Internet does not mean anything other than that these establishments have a technical infrastructure favorable to uses. The example of Finland bears witness to this distinction. While this country is considered the European country with the most developed social and educational use of ICT, Riva Kivi, head of technologies at the Finnish National Board of Education estimated in 2000 "that only one fifth of teaching staff are serves new technologies as a teaching aid "and that," although the use of ICTs for educational purposes has been successful in pilot projects, so far it has proved difficult to put more largely in practice the constructive lessons learned from these tests ". The question of moving from equipment to uses and therefore that of accessibility therefore arises in terms that exclude equipment and uses from being linked in a mechanical cause and effect relationship. It seems that many education systems and in particular those of the countries of the European Union are looking for an effective model for the development of the use of ICT which takes into account different factors such as the nature of the educational activities suggested or teacher training, for example.

The strategies implemented are located on a continuum between a prescriptive, top-down, often rather timid logic, which is based on reforms of teaching programs and competition and exam regulations, and another, bottom-up logic. in essence, the dissemination of initiatives in the field. The choice to promote so-called pioneering practices aims at dissemination according to a contagion model whose limits are now being measured although it remains the dominant model today. It is only fairly recently that political discourse has somewhat relativized the scope of such an approach. Thus, Viviane Reding observed in the speech she gave on April 10, 2000 at the ministerial conference on the knowledge and information society that "the challenge is not limited to the question of equipment. . […] On both sides of the Atlantic, innovative educational practices remain experimental in primary and secondary education. "

The concept of paradigm proposed by T. Kuhn (1983) has highlighted the considerable influence of social and contextual determinations in establishing consensus among scientific communities

around their objects, purposes, theories and methods. M. Callon and B. Latour (1991) cite in particular "the instruments (...) the role of know-how, measures (...) the influence of incorporated knowledge" (ibid., P. 19). They also underline the implicit capacity for influence enjoyed by a discipline when it occupies a dominant position in a scientific field. They show that any consensus around a set of instruments, know-how and knowledge automatically invalidates others and ends up justifying monopoly positions. They conclude that: "the arguments, the proofs, the research problems cannot be separated from the social game in which they are involved" (ibid., P. 18). It is important to remember this fact as the continuously increasing power of science and technology could end up leading them to work for themselves without any consideration of the consequences for the society that carries them.

As views on reality, the two explanatory-objective and subjective understanding paradigms are not necessarily contradictory and should be able to complement each other usefully in research. However, their rationality and their methods imply such opposing practices that they remain hardly compatible in the field. The antagonism therefore remains, mainly in the SHS and in particular in the training technology sector. In this area, the effective reification of mental processes contributes to blurring all the questions and the domination of economic and political interests leaves no room, except in the event of an imminent disaster, neither for critical reflection on the consequences nor for questioning (Dupuy, 2005 ).

In the field of training technologies, work related to objective sciences which seek to provide causal explanations of phenomena, technical solutions to problems or practical responses to needs, therefore continue to be opposed (and vice versa) to those related to the subjective sciences which seek to understand the underlying social, psychological and cultural processes that generate and support human activities, including science and technology. In France, the EIAH current trends, for reasons that can be analyzed, to take charge of most of the questions relating to technologies for the learning of knowledge. Associated with cognitive sciences, computer sciences are in fact in an overhanging position which allows them to exercise ideological and institutional hegemony over many political and social decisions. However, their paradigm of reference leads them precisely to neglect these dimensions in their analyzes, not by ignorance but by method. The presupposition that cognitive science is sufficient to understand the role and place of technologies in education and in society thus encloses action and reflection in a self-referencing circle which ends up eliminating any preoccupation of an epistemological, sociological, psychological or sociocultural nature. . In this context and from a strictly scientific point of view, the development of research supporting other paradigms appears all the more relevant.

The distinction proposed by P. Rabardel (1995) between technocentric and anthropocentric approach is operative to establish a typology of work. This differentiation not only reveals a form of interest, it identifies a radical opposition in objects, methods and their very epistemology. From a technocentric perspective, the analysis favors the technical object, its characteristics and properties, its functionalities and potential for development. The subject and its activity are perceived as neutral entities responding to an "effect" generated by the technical object and producing a "result" in reaction to the intention materialized in the designer's programming. For P. Rabardel (ibid.), Subject and activity are in this case considered as "residual", second and without proper status. The corresponding work favors research of an

experimental, exploratory or comparative quantitative type, which combines knowledge of the technical object, theoretical models from didactics and / or cognitive psychology. From an anthropocentric perspective, the work, on the contrary, favors the study of phenomena captured in the activity situation of actors, whether professional, learning or exchange. To do this, they use a variety of qualitative methods combining observation data in a situation, the formal and informal verbalizations of the actors about their activity and the traces of these activities on various media.

At the epistemological level, the technocentric approach is structured around an ontological and deterministic type of positioning. It postulates the existence of a reality (technical object, situation, targeted knowledge) independent of the subject and the existence of a causal determinism (if the technical object is efficient, then the subject learns). The anthropocentric approach is based on the phenomenological and teleological type positioning which, according to J-L. Le Moigne (1994) characterizes constructivist epistemologies. It postulates a subject-environment coupling and knowing subject-object to be known which considers the "real" not as an external given, independent of individuals but as the "construct" (Bachelard) or the internal "construction" (Piaget) which results for each of his subjective and intersubjective (Vygotsky) experience of the real of which he is a part. In this case, knowledge is perceived less from the angle of its objects reified into knowledge to be acquired, than from that of the cognitive processes and projects of the subjects who develop it. Mediated or not by technique, the act of learning and knowing is thus grasped in its intentional, finalized and finalizing dimension (Linard, 1990). Some work in psychology and ergonomics has attempted to reduce the separation of the two approaches by taking into account the actual uses of technical objects by their active users. They offer theoretical frameworks and concepts that make it possible to go far beyond this opposition (Theureau, 1992; Rabardel, 1995; Leplat, 1997; Clot, 1999).

Studies of an empirical nature are carried out in both the techno- and anthropocentric approach. The speculative work is oriented either by the analysis of the purposes of the development of technical objects and devices carried out according to an anthropological, sociological or philosophical approach, or by the study of the conditions of production of knowledge and knowledge with or on technical objects in a more epistemological approach. These are much less numerous and linked to personalities in the field. The disciplines and the nature of research do not necessarily overlap and some sectors tend to favor one or the other orientation with methods of investigation that are not always clearly explained.

These different perspectives correspond either to disciplinary affiliations, or to aims of understanding the uses of the technical object in their social contexts, or to theoretical ambitions, or to a pragmatic purpose. The first perspective produces research structured by the theoretical and methodological framework predefined by the reference discipline. This is the case with certain works in anthropology, economics, history or philosophy that can be found disseminated in a wide variety of publications. The second perspective is rather pluri-, inter- or transdisciplinary in nature. It produces works that focus on the uses of a technical object in a given time or place, diachronic or synchronic studies depending on whether they relate to an observation at a time of social use or over a longer period. The third perspective is favored by conceptual research which proposes models or explanatory systems. The fourth perspective numerically corresponds to the greatest amount of work. It guides research aimed at technical

and / or engineering development or even the optimization of training practices with technologies.

What about prospects? “Digital” is socially well identified as a new and evolving field, posing important questions for education and training. The current field will therefore continue to exist in the medium term. This being the case, the balances between the different communities tend to fluctuate and the evolution is not easy to predict. A number of questions already asked are reformulated in a new framework. For example, in the name of connectivism, a modern theory if there is one (Siemens, 2005), to what extent are we moving towards the development of community learning, without the traditional figure of the teacher, based on use of network resources, on peer intervention, even on flipped classrooms or on the use of massively open courses? With what types of resources, what IT architectures and what educational programs? What new modes of peer learning can develop? With what effects?

This extreme diversity of objects, approaches, methods and purposes hinders the development of common benchmarks and frameworks likely to be discussed within the scientific community. The tendency of the sectors to empowerment further obscures the picture and constitutes an obstacle to the accumulation which is essential to the constitution of a real field of research.

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