

Analysis of Interactions Based on Computer Use from Cognitive and Cultural Perspectives: An Exploratory Study in Mexico

Bertha Salinas, Jorge Márquez, and Rigoberto León

Educational Sciences Dep., Universidad de las Américas-Puebla, Mexico

Abstract

This study presents diagnostic information on Educational Software (ES) in the context of Mexican primary education. It is part of the exploratory phase of a broader study analyzing current computer use and proposing alternative strategies promoting collaborative learning, thinking skills and cultural identity. Due to the limited space of this talk and the lack of basic information on this topic in Mexico, we will only sketch out an overview of the conditions in which computer use and ES take place. Thus, we will not make methodological statements on the way in which the information was obtained, but we could explain this in the discussion period. The purpose is to give the reader an idea of the beginnings of computer use in the Mexican primary school (specifically, in Puebla) and discuss with our colleagues in order to share our questioning and searches for the development of the broader study.

Keywords — Cultural identity, cultural representations, cognitive, educational computing, primary school, Mexico, classroom interactions.

1. Problem and General Objectives

In Mexico the computer was introduced widely in the primary schools approximately ten years ago, but since there has been no defined educational policy nor any regulations of the use, purchase, and acquisition of systems and software. We could say that the different official programs have been and continue to be experimental in nature. The private schools are in much the same state, where computers are being introduced gradually according to the resources of each school, but without normative or orienting criteria. It might be said that computers in Mexican primary schools are no longer something strange, but neither are they a generalized reality, and that there are clearly differentiated patterns of use between the public and private

schools. And among the latter there is great diversity among the different schools.

The lack of policies, the small amount of research which has been done and the uncritical desire to introduce information technology in the schools makes it necessary that both the computer and ES should be incorporated as a way of making children think, allowing them to interact in a collaborative manner without doing damage to our cultural identity and patterns. There is a real danger that the market should determine educational styles, contents, and cultural values. A great amount of the ES sold in Mexico is a simple translation or adaptation of that which is produced in other countries. Moreover, the teachers lack the necessary training to exploit these resources educationally in order to make a critical and creative application in their classrooms, assuming the role of true mediators in this process.

2. Characterization of Public and Private Schools

Our documental and field research allows us to describe the main differences between public and private schools.

2.1. Public schools

This sector attends to the majority of the school population at all educational levels (more than three quarters of Mexican students). In the public primary schools only ES produced in Mexico specifically for this level is used, primarily tutorials which reinforce the required curricula. There is no use of commercial software. In the classroom, the computer is used as a "blackboard", aiding the teacher in the exposition of content; it has a module at the front of the classroom and one computer is used with large groups (30-50 students) in infrequent sessions. Usually there is only one computer per school, and there is not always technical support available in case of problems.

2.2. Private sector

As opposed to the foregoing case, there is no pattern of use or consumption of commercial software, which is the predominant category. The official ES of the public schools is not used, but some schools produce their own. Instruction in computer skills predominates as an approximation to the use of the computer in education. There is a great variety of levels of availability of equipment, generally much greater than that in the public schools. The groups are small, and the frequency of computer sessions is higher (2 or 4 hours/week). But in many schools the presence of computers is due to a fetish for modernization and as a marketing strategy to attract students. There is too much heterogeneity.

2.3. Most frequent interactions: teacher-computer-group

The analysis of the interactions was carried out in 10 groups at the fourth-grade level in 5 public schools and 5 private ones, selected randomly among those which use computers as an instructional resource in the city of Puebla. We attempted to find tendencies in schoolroom behavior, during interactions among the teacher, the computer, and the group (of children); above all we tried to show how the different stages of information processing: entry, elaboration or reasoning, and exit took place. From the data obtained from these observations and compiled in a table of frequencies, we conclude the following: In the interaction Teacher-group predominated behavior in which the teacher asked questions to the group, after giving examples, and gave instructions; the explanation of content took place, but not often. Among the group there was an emphasis on asking clarifying questions, in order to improve their interpretation at the beginning and a little in order to support their reasoning. In the public schools the teacher took the initiative in asking questions, to the point that the group did not ask questions; while in the private schools, the group took the initiative more often to ask questions, and the teacher seldom explain content.

The interaction Group-Computer occurred fairly frequently, but it showed up the substantial difference in the way computers are used between public and private schools. In the public schools, they centered on all the children going at the same pace (with a single computer), while in the private schools each child could progress at his/her own pace, respecting individual cognitive process a little more. The interaction Teacher-Computer was infrequent, generally with the purpose of supporting the process of some child during entry into information. In the private schools this behavior is more marked, and it is used also to favor the reasoning process in itself. Both tendencies are expected, given the number of computers available.

The least frequent interaction was Group-Group or Child-Child(ren); this gives us to suppose that the present modes of computer use do not favor "collaborative

learning" experiences and the social construction of knowledge. This is more often the case in the public schools, in which this type of interaction is virtually nonexistent. In the private schools the frequency of this type of interaction is similar to that between the teacher and the group, and shows up as group work or an interchange among children, peer mediation.

In conclusion, in the private schools there is a better balance among the different types of interactions; actions or behaviors are shown which tend to favor better conditions for cognitive development, but we suppose that they occur more spontaneously and favor certain experiences of "collaborative learning".

2.4. Perceptions and opinions of the children

In an attempt to find out about the children's perceptions of the computer in relation to their context and cultural practices, we found that children in the public schools perceive it as an educational support which is easy to understand in its language and structure. This is due to the tutorial nature of the official ES and its close ties to the curriculum, as well as the fact that it is in Spanish. In the private schools opinions were more varied, and occasionally the children expressed lack of comprehension of the computer language and the frequent instructions in English.

Almost all the children interviewed (12 in all) both in public and private schools give greater authority and credibility to their parents and teachers than to the computer, since they consider that it is a machine and not the same as people. Half of the children said that they did not understand the visual images, nor did they find any similarity between the objects and images on the computer screen and those they see on the television. In general they showed interest and liking for using computer, without showing any marked fascinations with it.

In synthesis, the language and authority represented by the computer would seem, as a working hypothesis, not to have caused any substitution of the cultural patterns of a strong tradition cultures (Bowers, 1988), nor a predominance of the rationalist-Cartesian thinking implicit in the computer. This must be further studied in a broader and more controlled study, keeping in mind the limited access which Mexican schoolchildren still have to the computer.

2.5. On the commercial supply of ES in Mexico

This exploratory study showed the lack of a general catalog showing the ES which comes into the country or is produced there for sale. There is a great dispersion of informations in this respect. Most distributors sell everything from systems to software, and the vast majority do not specialize in ES, still less for the primary level, so that it was difficult to identify the universe of those who produce or distribute for this level. In almost all cases, the personnel are not trained to give information, and there is little or no technical data (type of ES,

level, context of use, manual, foreign or national production), nor are there counseling services for acquisition or training of users. The consensus is that parents are the ones who buy most ES, on an intuitive basis or according to price, since they have no criteria or guidance for deciding what to buy, what it contains, what it develops, how and why to use it, etc.

3. Basic Theoretical Support for Computer Use in Education

3.1. Cultural and epistemological implications.

We take as a given the non-neutrality of technology and computer use in education, using as our principal source the work of Bowers (1988) and Flores & Winoograd (1986). We claim that the computer is a "cultural mediation" which acts as a vehicle for the ways of thought of the system of ideas, symbols and languages of Western philosophy, based on rational empiricism. ES has an effect on the symbol and value systems of the child. Children do not learn only content, but rather are exposed to the acritical legitimation of a form of thinking and category structures, whether or not they are close to their own cultural context.

It is important to analyze the way in which computers influence the patterns of communication, the structure of knowledge, the mediation between the sensory relationships of the individual with his/her environment, recodifies cultural vocabulary, exercises a selective influence on what is retained and what is lost in the process of transmission. The cultural implications of computers in education acquire a greater relevance in Third World countries because the acultural nature of the rational process, technology and language is assumed. The cultural presuppositions of information technology at a cognitive level and the main points of alert which should be considered are:

- (a) A Cartesian focus of Western philosophy which determines the way in which the programmer represents the objects of knowledge and establishes relationships within the subjects.
- (b) A rationalist view of information technology, based on the mind's ability to objectivize the external world and see language as a system of symbols organized in patterns which correspond to objects in the real world.
- (c) A conception of knowledge as the power of the individual, which is transmitted to the detriment of socially constructed knowledge.
- (d) The predominance of rational authority over moral and conceptual authority.

Western thought and its conception of science and technology underestimates all types of conceptual or

moral authority except for that based on empirical evidence. But this forms of authority are those which regulate interpersonal relationships, the relationship individual-environment and individual-community. This leads to an underestimation of tradition and intuition as sources of knowledge in favor of innovation and quantification. In Third World countries this can take a turn which abandons history, collective memory and the holistic vision in order to privilege advance planning and isolated temporary facts (Bowers, 1988, p. 124).

3.2. Elements to be considered and integrated for a cognitive approximation

In the first place we begin by considering knowledge as something which is socially constructed, implying processes of cultural mediation, and which therefore requires a cognitive approach from a compatible focus. In this sense we assume the mediating action proposed by Vigotsky's "cultural psychology" (Crook, 1991) to be deposited in the software. Thus his Theory of Social Development of Higher Psychological Processes, his idea of the Proximate Development Area, and instrumental mediation, it offers element to tie together both approaches, since it says that the higher functions and other abilities of cognitive competence have a mediated structure. In the second place, although these concepts allow us to think about the cognitive nature of the problem, since this is centered on the classroom interactions during the use of ES as a unit of analysis, this requires a greater degree of operativity. Therefore we consider it relevant to incorporate R. Feuerstein's proposal on Cognitive Modifiability and Instrumental Enrichment (Beltrán, 1992), particularly in reference to the expression of abilities which are manifested in the stages of entry, elaboration, and exit during the processing of information. In the third place, together with the foregoing, we feel that J. Nava's (1992) proposal is relevant, in the sense that the elementary abilities acquire meaning if they are integrated with commonly-used intellectual processes, as a valuable product and a motivating degree of difficulty, referring to what he considers to be intermediate abilities of interpretation, justification and expression; which in turn can be associated with the aforementioned stages of entry, elaboration and exit. Finally, in order to facilitate the analysis if the interactions understood as the search for intentional processes of cognitive mediation, another focus adopted to schematize it is Bossuet's (1990) proposal, in which the relationships within the triad Teacher (mediator) - Computer (ES) - Group (children). All the preceding was taken into account in the elaboration of the instruments for registering the observations in Mexican schools.

4. Questions and Points to be Discussed

- (a) Can the differences found between public and private schools be explained as a simple consequence of the difference in resources between the one and the other?
- (b) Is it viable for there to be a greater articulations between the cultural and cognitive perspectives, dealt with separately in this first approach? Perhaps establishing a greater convergence with respect to concepts such as criticality, language, mediation processes.
- (c) According to Bossuet's proposal on the "computer ball" or that suggested by C. Crook on the limitations in acces to computer technology. Does this ask us or condition us to opt for a pedagogy centered on processes of "collaborative learning"?
- (d) A greater congruence with Vygotsky's and others' epistemological principles as to socially constructed knowledge. Would this reduce the risks stated by Bowers in the incorporation of computers in cultural contexts with their own traditions?

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Authors' Addresses

Bertha Salinas, Jorge Márquez, and Rigoberto León:
(Educational Sciences Dep., Universidad de las Américas-Puebla. Mexico)

E-mail: bsalinas@udlapvms.pue.udlap.mx. jmarquez@udlapvms.pue.udlap.mx. Phones (5222) 29-2052, 29-2627, 292074 Fax: (5222) 29-2635, 29-2074. Address: Apartado postal 100, Cholula, Puebla. C.P. 72820.