

Action Research and Telematics Technology to create technological and research capabilities to solve a social research problem

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Abstract. Action Research as a knowledge construction process in the context of collective problem solving is linked to Telematics Technology because it makes possible to create and operate the necessary virtual context for the researching-teaching-learning interaction process to take place.

Today Latin America and the Caribbean, Mexico City in particular, require a strong development of scientific and technological capabilities in order to increase opportunities to access more and better spaces of knowledge representation and thus be able to compete in the global world, especially by designing and proposing the use, appropriation or development of technologies to solve social problems.

The transformation process of the action scheme is explained from a constructivist perspective as the theoretical basis for a social science academic group that transforms the capacity to design technological prototype software application, during the solution of a research problem.

In particular, we describe the TIDI-LAOMS prototype, which is fundamentally our study instrument, because it was designed in the Action Research by the analyzed group in Mexico City, and used as a virtual context and interaction means in the knowledge construction process of the same group.

Keywords: Action Research, Technology & Education; Social & Telematics Research; Technological Capabilities in Latin America and the Caribbean.

1. The need to create technological capabilities in Mexico City within the Latin American and Caribbean context

Social transformation triggered by the evolution of science and technology must ensure sustainable development. It must also meet the basic needs and rising aspirations of the inhabitants of a region, and ensure employment availability in the face of technological changes. Latin America and the Caribbean, however, have reported low levels of attention to science and technology. The region is considered one of the most inequitable regions in the world since the little attention that is paid to science and technology focuses on small segments of the population.

Since the academic context is one of the areas that is transforming in contemporary society, strong scientific and technological development is required to help counteract social inequality. Because at a national level Mexico has lost a major part of its capacity to compete internationally, it needs more than the 14,681 researchers recognized by the National Research System in 2007. Mexico thus needs more than twice the current annual number of students graduating from PhD degrees in science (2,000). [7]

In general, explaining, discussing and finding solutions to this situation requires a solid education in science and technology that promotes democratic citizen participation to achieve the common good, and a valuable and fair country.

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Knowledge development in particular is required for technology use, appropriation, and research and development. In the current situation, however, it is necessary to observe the interrelationships in the social system as a complex system to promote interdisciplinary studies and generate knowledge from the perspective of action around social phenomena.

For these reasons it is top priority to promote the development of technological capabilities among researchers and faculty members in order to influence the transformation of the current situation in Mexico City and the country as a whole, particularly if we consider that they are responsible for training students and new scientists.

Research was therefore conducted to explain and implement processes to create technological capabilities from an Action Research perspective. The hypothesis is that AR and Telematics Technology² play a key role in the transformation of action schemes to analyze and solve social problems because they make it possible to create virtual contexts and means of interaction in the knowledge construction process.

2. Action Research as an action scheme reconstruction process in knowledge construction

We understand Action Research (AR) as a perspective to practicing the teaching-learning process. It is characterized by dynamic processes of knowledge transformation based on reflective analyzes and action transformation aimed at problem solving. [9][10]

AR considers action as a resource to observe learning processes because acting in relation to an object of reality is the manifestation of a cognitive stage called Action Scheme (AS). Piaget [5] explained the transformation process of this AS in the theory of genetic epistemology. García [6] observed it as a complex system in the theory of constructivist epistemology.

AS is described as an organized whole, the components of which define individual action in relation to objects in the environment in terms of the motor, sensory, perceptive, affective and volitional functions. The organization of a whole is the result of a dynamic interaction, differentiation and successive integration process. [5] The AS structure adopts the form of a logic of significance that enables humans to grasp external objects.

The process of transforming the AS is possible through object assimilation, which is the result of repetitive subject-object interactions.

Interaction is thus fundamental in knowledge construction processes because it promotes the understanding of the different objects of reality, making it possible to grasp external conceptions as “the other”.

Located within this framework and in the context of formal research, AR is assumed to be the result of a permanent and dynamic open process of restructuring meanings and relationships that emphasize perspectives and actions from other fields of knowledge. AR as a strategy is assumed to promote the transition of Action Schemes in individual and collective cognitive structures when a group interacts during the search for a solution to a problem. Therefore the creation and transformation of technological capabilities was studied in an academic group using AR as research methodology.

3. The social science research problem

Because social scientists throughout the world have studied events linked with collective action and social movements, it is necessary to study and analyze the ideas guiding the theories and methodologies used to understand and explain these phenomena.[8][4]

Social organizations or collectives have their own objectives, strategies and structures, which is an interesting research topic. The way this topic is taught reveals the professor’s conceptions and imaginary.

² Telematics Technology is understood as a distance application of ICT.

As established by the functional structure of the Universidad Nacional Autónoma de México, the activities that researchers carry out include the teaching of subjects linked to their scientific field.

For that reason our interest in current social phenomena and the technological context led us to create a multidisciplinary research group to study three parallel dimensions. The first dimension is to grasp the historical process through which social movements and action developed; the second dimension is to get to know the perspective, theory and methodology used for the study and how professors teach the subject to students. The third dimension is to observe and develop capabilities for technology use, appropriation or development in social research. [3][4]

In this paper we specifically describe the telematics prototype as a preliminary result of the third dimension of our study.

4. Telematics prototype to operate Action Research

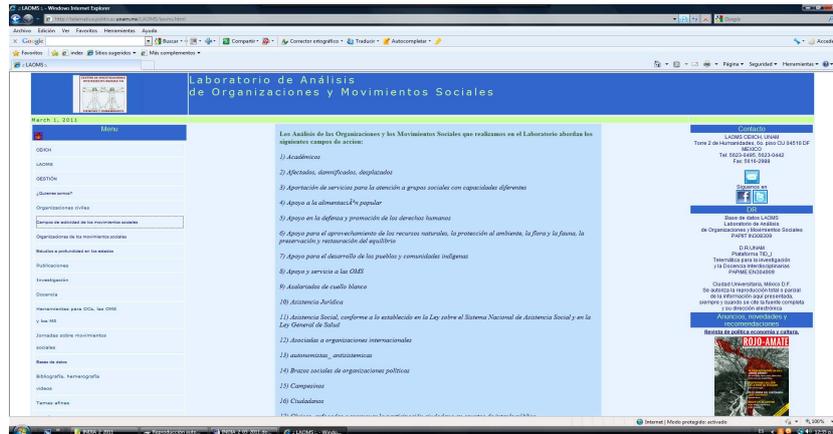
We observed the AS transformation process in a multidisciplinary group in which the researcher-professor and students interact. Their technological capacity is transformed as they solve a theoretical-methodological research problem, that is, their understanding of categories of the activity of Mexican social organizations is transformed as they learned develop a telematics observatory.

To solve this problem simultaneously they conduct Research (R) in social and technological topics and They Act (A) to reformulate concepts, theories and methodologies and to design the telematic sprototype in order to make them explicit.

We emphasize it because the telematics prototype is our instrument to learn and teach collective action and social movement topics from scientific basis and is our instrument to study the research dimensions because is an explicit representation of research results. This is due to the fact that the platform was designed in the AR by the analyzed group and at the same time is used as a virtual context and means of interaction to knowledge construction in individual and collective cognitive dimensions. We consider that it is a research result because interaction is fundamental in knowledge construction processes as it promotes the understanding of different objects of reality, making it possible to grasp external conceptions and therefore understand them like “the other”, transforming from an individual AS to an collective and multidisciplinary AS, thus making it possible to analyze and solve social phenomena from an interdisciplinary perspective, finally we are impacting in the capacity to compete of Mexican students, researchers and professors.

AR is evident from Figure No. 1 that shows a prototype that the group uses as a means of interaction because it is an explicit representation of knowledge created in the social and technological dimensions of our study.

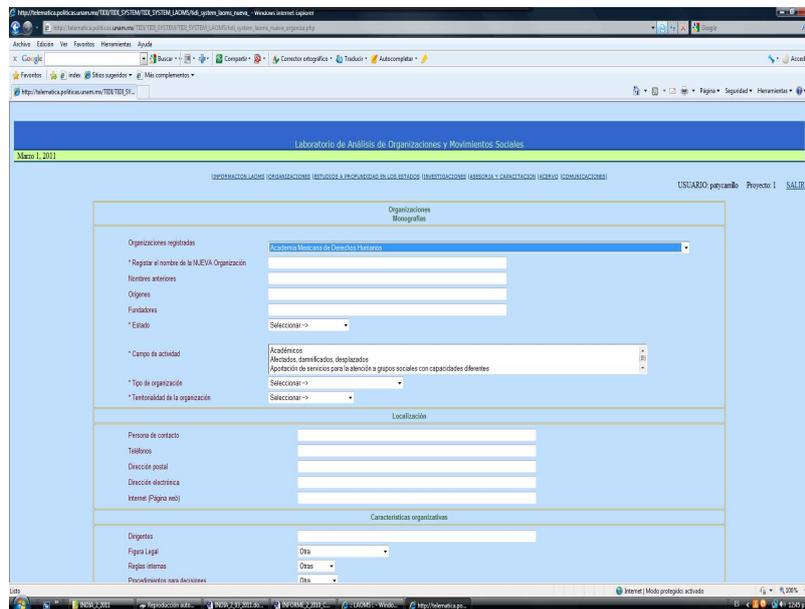
Figure No. 1
Categories of Analysis
Activity of Mexican Social Organizations
TIDI-LAOMS. Telematics Platform



Carrillo V., L. Patricia. 2010.
<http://telematica.politicas.unam.mx/LAOMS/laoms.html>
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AS transformation is observed in Figure No 2 that shows the designed prototype as a technological development in software application.

Figure No. 2
Software Application for Social Research
TIDI-LAOMS. Telematics Platform



Carrillo V., L. Patricia. 2010.
<http://telematica.politicas.unam.mx/LAOMS/laoms.html>
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5. Final considerations: Telematics prototype as intellectual capital

Finally we considered the telematics platform as a research instrument in two different ways: a) for social research, because it makes it possible to observe a social phenomenon, and b) for educational technology, because it makes it possible to observe the learning-teaching process from an Action Research perspective.

We also considered the platform as an intangible resource, because it is an academic and technological product that can be registered as an academic organization's intellectual capital and as a research group's intellectual property.

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