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CONCEPT MAPS AS TOOLS TO AID IN THE UNDERSTANDING AND STRUCTURING OF RESEARCH PROJECTS AND AS A SUPPORT TO TEACH RESEARCH METHODOLOGY IN SOCIAL SCIENCES

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Abstract. This paper reflects on the usefulness of concept maps as an aid in teaching research methodology in social sciences in Mexico, based on our extensive experience. The paper discusses the need for methodological instrumentation to support the body of research based on reality and its reconstruction through specific problems. It claims that in this way, reality can reclaim the central role it must have in the scientific development of sociology. We argue that to describe and characterise a phenomenon it is useful to have methodological processes that simplify it. In this sense, concept maps show the nature of the relationships between processes showing how scientific knowledge is developed. A concept map is a technique used to make a graphic representation of knowledge, showing the webs of interrelated concepts and explaining their nature. If we understand a concept as an abstraction of a process, then a concept map is a schematisation and representation of it, generating and organizing the methodological processes of social research.

1 Introduction

When we were studying sociology at university we learned how to do research under the assumption that research is a continuous process. We learned that the methodological processes are sequential and are interrelated, at least accumulatively.

We learned that we had to:

a) Define an appropriate research topic by creating a statement and justifying it
b) Develop a conceptual framework
c) Design a fieldwork guide, to gather information
d) Carry out fieldwork, through fieldwork practice, where students carried out interviews and registered data
e) Systematise the information gathered in a fieldwork report
f) With help of direct information, theory and our research problem we would differentiate a hypothesis system. We would reduce our hypothesis into variables, indicators and items, and as a result would come up with a questionnaire to be implemented in the field
g) Process the quantitative information and present results in a quantitative research report
h) Gather all our material to try to arrive to conclusions in a final research report

These experiences were interesting because they taught us that:

1) Formal research is a process made up of stages
2) These research stages were serial and cumulative
3) Each step was always dependent on the previous one
4) Research is a process, whose parts are related in a lineal sequential and cumulative way

As sociologists we found that the only way to describe social reality was through direct research. In our experience, fieldwork is in essence a set of processes geared towards selection, recollection, registry and elaboration of a direct research report, aided by social research techniques and methodological processes that are carried out through qualitative and quantitative instruments.

Through years of experience we formed a general, sequential and cumulative idea of research and the interrelationships between its parts. This came with the help of concept maps.

2 Concept maps

Concept maps show the constitutive nature of the different parts of a process as well as a view of the entire process altogether. Maps show the nature of things in a simple way and the interconnection between them. This is due to the way in which the human brain recognizes the characteristics of the objects that surround it in its initial perceptions and representation in the process of learning (Novak, 1998). Novak (1998) defines a concept map as a graphic resource that helps us represent a group of conceptual meanings included in a structure of propositions that work as a tool to organize and represent knowledge.

Concept maps show the nature of relationships between processes and hence how scientific knowledge is developed. This means looking for new relationships between objects and processes through establishing problems and questions or thinking about the relationships of another group of processes or phenomena.

The researcher states, establishes, elucidates and/or explains the relationships of two or more phenomena and its direct or indirect connections with other processes. The relationships between things are not always evident or observable at first glance. In fact, the relationships between things are frequently imperceptible or unimaginable.

Concept maps become a mental tool to simplify the thinking process required by any methodological approach to science. The importance of the concept map for research is essential because a) it provides a general and specific vision of processes; b) it provides a clear view of the relationships between processes and; c) it clarifies the connections between processes.

3 Concept maps as a tool to help students learn

We have realised that with the help of concept maps students can integrate and structure a research process (Ausubel, 2002). This is because of the relationship between maps and their impact in the instrumentation of the whole process and the different types and ways of acquiring information needed in research.

In recent times, as researchers and lecturers we have looked for ways of applying concept maps to research methodology as a tool to comprehend and structure research projects as well as an auxiliary tool for courses on methodology in social sciences (Arellano, 2005). We think that the methodology of social research can be represented with conceptual schemata and/or maps making its learning more accessible to students.

Concept maps can be useful to the teaching-learning methodology because they show the nature of the relationships of the processes being studied. Furthermore, concept maps are a technique used for graphic representation of knowledge that form networks of concepts where relationships are implicitly presented (Dutra, Fagundes, et al, 2004: 217).

Describing the pedagogic experience by using concept maps in the everyday context enables students and teachers to arrive at conclusions regarding the educational practice of teaching how to conduct research. In the Faculty of Social and Political Sciences of the National University of Mexico (UNAM), where we have lectured for more than 30 years, written texts are still the main way to transfer knowledge. The essay has been prioritised as an ideal way to put together acquired knowledge and to clarify the foundations of an individual's opinions and/or perspectives about a matter or event. The result is that every time a student writes an essay, their thinking becomes abstract. This conceptual form is appreciated by the academic community that sees the use and implementation of concepts as a means of understanding the theoretical propositions in social sciences. When we encourage students to use concept maps the aim is not to abandon texts (Aguilar, 2002), but to make them interact with a graphic representation of knowledge.

In our courses, concept maps have a double use. On one side, they are used as a methodology for teaching and learning. On the other side, they are used as a methodology for social research. We use concept maps so that students learn schemata. Students are therefore able to create the concept maps of their own research and its implementation.

Each student has to develop maps of their a) research problem, b) literature review, c) research concepts, d) qualitative instruments, and f) strategy of analysis. We ask students to think in terms of schemata, not in terms of texts.

Students also design three maps to show the problem formulation, the statement and its justification (Arellano, 2005). In class, students elaborate each of these maps from the methodological perspective, both of their contents and of the relationship between the elements of the process. On the other side, they elaborate maps regarding their specific research, applied to a particular and concrete reality, which in this case would be their dissertation.

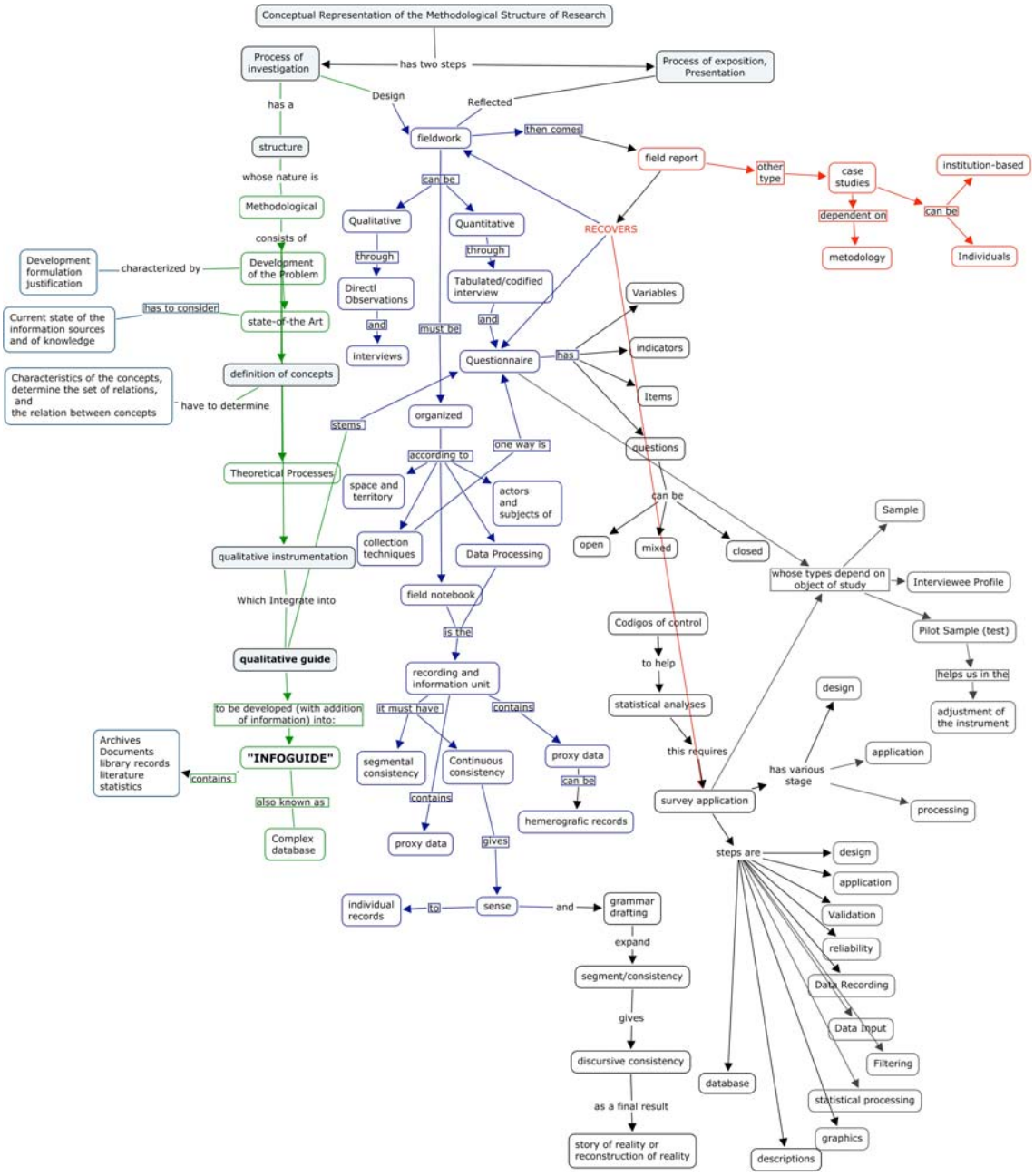

Figure 1. In the Conceptual Representation of the Methodological Structure we can distinguish each of the methodological steps independently, as well as understanding each of the phases and parts that integrate the methodology both individually and together in the research process. Concept map designed by José Arellano Sánchez and mapped by Fernando Luna using CmapTools.

Our work with students is focused on going through implied relationships in the methodological processes. From a global perspective, the work carried out with students aspires to achieve a total vision of the methodological relationships. However, this is complemented with the specificity in the concept maps of each and every part of the methodological process. Their concept maps show the sequence of relations and interconnections within their research, demonstrating both simplicity and complexity. They also allow both student and teacher to see the entire research problem and its interrelated processes in one graphic representation.

Synthesising the characteristics of reduction processes and their relationships with characteristics of the observed reality into databases are processes that require rigorous systematisation. This is especially important when such processes are confronted with reality to be then reinserted in the conceptual world. The mental maps

of the qualitative and quantitative instruments, and the subsequent gathering, selection and systematisation of data are interesting and are illustrative of the relations of these methodological processes.

To move from the written text to a concept map and vice versa, as a dialectical process, is an effective way to carry out scientific work. Methodologically, using maps is an excellent resource to elaborate objects under study.

Concept maps help us to achieve clarity in our research and allow us to find new relationships between concepts and processes, which make it easier to understand the new contributions to science.

4 Bibliography

Aguilar Tamayo, M. F. (2002) *Los mapas conceptuales de enfoque: Una técnica para aplicar al hipertexto educativo.* En: Méndez Vilas, A., Mesa González, J. A. Y Zaldivar M, I. S. De, *Educational technology: Conferencia Internacional de TIC's en la Educación*. España: Junta de Extremadura / ICTE 2003. (Págs.1398-1403).

Arellano Sánchez José. 2007. "El Practicum en Sociología". Las Prácticas de Campo Cualitativas. MEMORIAS. IX Simposium Internacional sobre el Practicum. Pontevedra, España, Junio, 2007

Arellano Sánchez José. 2005 Los Esquemas metodológicos de la investigación social, ed. SyG editores, México.

Arellano Sánchez José "Los esquemas para la Investigación Social", http://www.dgcs.unam.mx/gacetaweb/historico.html

Ausubel, D. P. (2002) Adquisición y retención del conocimiento. España: Paidós.

Crandall, B., Klein, G. & Hoffman, R.R. (2006): Working Minds: A Practitioner's Guide to cognitive Task Analysis. Cambridge: MIT press.

Cañas, A. J., Hill, G., Carff, R., Suri, N., Lott, J., Eskridge, T., et al. (2004). CmapTools: A Knowledge Modeling and Sharing Environment. In A. J. Cañas, J. D. Novak & F. M. González (Eds.), *Concept Maps: Theory, Methodology, Technology. Proceedings of the First International Conference on Concept Mapping* (Vol. I, pp. 125-133). Pamplona, Spain: Universidad Pública de Navarra.

Chacón Ramírez, S. (2006). "Entre Conector y Conector, un Pensamiento". In A. J. Cañas & J. D. (Eds.), *Concept Maps: Theory, Methodology, Technology. Proceedings of the Second International Conference on Concept Mapping*. San José, Costa Rica: Universidad de Costa Rica.

Dutra, I., Fagundes, L., Cañas, A. J. (2004). Applications of Concept Maps in Education as a MetaCognitive Tool. In A. J. Cañas, J. D. Novak & F. M. González (Eds.), *Concept Maps: Theory, Methodology, Technology. Proceedings of the First International Conference on Concept Mapping* (Vol. I). Pamplona, Spain: Universidad Pública de Navarra.

Novak, J. D. (1998) Conocimiento y aprendizaje. España: Alianza.

Novak, J. D., Gowin, D. B. (1988) Aprendiendo a aprender. España: Martínez Roca.