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THEORETICAL BENCHMARKS OF GEOGRAPHY AS RENEWAL RESOURCE FOR EDUCATIONAL CURRICULUM

Octavian Mândruț¹

Abstract. This paper represents an attempt of transferring and adapting, from the Theoretical Geography, some key elements useful to a substantial renewal of the Educational Curriculum. The specific curriculum fields where the key, selected new elements of Theoretical Geography may play a significant role are as follows: the study field, the methodological elements (the cartographic method and GIS), the internal taxonomy of Geographical science (organised on elements, phenomena, processes, systems, structures and interactions), the undertaken definition of the modern Geography, the conceptual system and specific terminology, the taxonomic organisation of the geographical space, the dual nature of Geography (physical and human), the integrated nature of Geography, the elements of the paradigmatic dimension, the educational development and the achievement of an innovative framework. The dual nature of Geography (as a natural science and as a science related to the society) gives it distinctive opportunities of integrating some transdisciplinary and interdisciplinary elements into the educational curriculum as well as into the educational process as a whole.

Keywords: Theoretical Geography, Epistemology of Geography, Educational Curriculum, Curriculum of Geography

The intention of producing a summarizing document on this topic, as well as a larger work, is based on the current situation of geography in the context of contemporary sciences and as an educational subject.

In the current structure of sciences, geography is predominantly perceived either as a natural science, or as a social science, but rarely is it deemed an integrated science, both natural and social. This finding creates important difficulties in asserting geography as a significant contemporary science.

This reflection on the current epistemology of geography aims to accurately present the current state of geography, as well as all scientific, educational, social, expertise, or decision-making stakeholders; it is a summary of a more extensive theoretical work (Mândruț, O., 2014).

1. Origins and legitimacy

The integrating concept of general geography (*"Geographia generalis"*), coined by Varenus (1650), comes as a natural synthesis of geography; the modern reading of *Geographia generalis* is highly suggestive of the past, as well as present possibilities of this science.

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As for the legitimacy of geography, the main historical element resides in its origin and dual quality (as both a natural and social science) and in how this origin can still be integrated into a unified structure, combining elements of the two major areas (each studied by a large number of sciences and subjects). The primary epistemological dilemma is whether *to accept that a science can be both natural and social, but neither exclusively natural, nor exclusively social*. From this point of view, there are several options in terms of its object of study, methodology and axiomatic dimension (in the sense of pertaining to both areas).

The main theoretical and epistemological dilemma, reflected in the **curriculum**, is that of accepting that a science can be both natural and social, but neither of them exclusively. From this point of view, there are several options. A new curriculum (or a renovated curriculum) should have to consider the fact that geography is “dual” at its origin, but “unitary” as a subject.

2. Elements of epistemology of geography

Epistemologically speaking, *a science has legitimacy if it deals prevalently with a particular object of study (or subject area), has a certain methodology, a system of assertions (i.e. an axiomatic system) and laws, as well as, if possible, a system of inference (derivation) of truths*. From this point of view, geography should relate to epistemological requirements of a legitimate science both through a critical synthesis of significant concerns so far, and by assuming a certain path in the exploding area of science.

The reflection of above-mentioned ideas on **school curriculum** is the critical analysis of current educational geography, from the perspective of its multilateral relation with all new elements that have intervened in all social and educational processes in recent times, with a view to identifying an improved structure. Thus, keeping geography descriptive and encyclopedic makes no sense, but geography based on scientific/logical reasoning and on the analysis of interactions is in agreement with the new benchmarks.

A serious analysis of current educational geography (at least in our country) would result in multiple elements being justified only by their persistent character, brought from a self-maintained tradition. The radicalness of the epistemological endeavour indicates elements of novelty for school curriculum, such as: supra-disciplinary and trans-disciplinary views, as well as closer links with subjects within the same field of study, methodology transfers, and a new, integrated view on surrounding reality and the endeavour of analysing it.

3. Defining elements of current geography

Geography is perceptible today in the field of science, society and information, by means of the following areas:

- a) **Informational geography**, which requires vectorization of any geographical information, whether structured or not, developed by disciplinary specialists (or others), presenting (circulating) elements assumed by geography as a science;
- b) **Educational (school) geography**, which presents, in a structured way but a relatively stabilized (and "traditional") form, the possible elements of training through geographic content;
- c) **Everyday (empirical) geography**, representing the entirety of information conveyed by the media, which has a certain directly identifiable or inferable geographical content;
- d) **Research geography**, which aims to present innovative elements, theoretical and pragmatic solutions, as well as their applications in the field of other sciences and human practice.

In relation to the above-mentioned fields, educational geography has a certain identity, relatively distant from research geography. However, a certain infusion of geographical knowledge is observed in day-to-day activity, in an empirical and frequently ignored form in its essential elements. For school curriculum, the main inference is to identify elements of “scientific geography” (research-based/academic) for school curriculum components. This would translate in a maximum essentialisation of significant fields, making them accessible to learning. In a particular way, geography in schools should be learned as a process and not as a product; this way, it could be benchmarked in the general development of knowledge and would better emphasize the process of knowledge in relation to its results.

4. Geography as a field of human knowledge

A legitimate question that can be asked of geography is: “Does geography make a specific contribution to human knowledge and to the development of this knowledge?”.

The current public perception of geography is predominantly reductionistic (and undeserved), i.e. that it deals mainly with providing (mostly encyclopedic) information on countries, travel, nations, regions, cities, continents, etc., mediated or not by a cartographic support. This “everyday geography” has a certain structure and rationality in the case of educational geography. But public perception fails to take the step from here to the topics being currently addressed.

A geographical approach can refer to any attempt to explain the phenomena, processes, facts which have to do with living space, possibly with cartographic representation. This specific explanation is a particular method of human knowledge.

The main consequence of **school curriculum** is the induction of the integrated character of reality (both natural and human) through learning, as well as the coherent endeavour of a large field of knowledge (geography as a whole) on objective reality, with an integrated character.

It is very possible for geography to even induce a certain mode of human knowledge. This has not yet been demonstrated, but there are minimal elements of opinion. If this hypothesis is valid, geography, through the elements it entails (characteristics of knowledge and the subject of study) may provide an interactional dimension of studied phenomena and an overview of the planet, with an important number of interactional phenomena taking place at the surface of the Earth’s crust.

5. Contribution of geography to scientific progress and human knowledge

The specific contribution of geography to scientific progress and knowledge has been achieved predominantly (significantly) by means of the following areas:

- construction of a *referential objective* (consisting of the cartographic system, the planet as a whole, continents, regions, countries, settlement systems, space, territory, geosphere, etc.), which can relate to elements and processes, various systems and structures of different sciences and practice areas; this referential system connects different spatio-temporal universes (from physics, mathematics, biology, chemistry, history, philosophy) to the human experiential dimension unfolding on the concrete terrestrial surface;
- identification of *findings (and truths) resulting from the interaction of components of the natural terrestrial environment* (elements, phenomena, systems) *with those of the human society* inhabiting it, as well as from the global human – nature interaction. The list of these results is diversified (which limits its enumeration) and forms the axiomatic structure of geography;

- investigation of *geospheres* in a specific form;
- solving *specific issues resulting from human practice*, where geography and geographers were involved (environmental projects, urban projects, spatial organization, etc..)
- building up a pool of research outcomes (through treaties, books, articles, cartographic materials, data, images, etc.), significant “per se”, useful in perceiving the progress of “geographical” knowledge of reality and the theoretical evolution of geography as a science;
- in relation to theory, geography has contributed by *deepening knowledge of the earth's surface* and by identifying elements of progressive complexity of the interaction between society and its life environment.

School curriculum can be enriched by two types of elements derived from this matter:

- a) the knowledge endeavour (as a very complex process, with its own self-regulating elements);
- b) the fields of progressive knowledge of the Earth's crust;

Currently, there are sufficient examples for both situations, which can be integrated into a multivalent and self-generative curriculum.

6. The object of study and school curriculum

In terms of its own research, geography should aim to study, for the most part, phenomena, processes, systems and structures resulting from the interaction between the natural environment and human society, in a taxonomic and hierarchical organization situated between the planetary level and the level of elementary space.

Antropo-geosphere comprises the “vertical” space between ± 10 km from the surface of land elevations (prolonged into oceanosphere), between the ozone layer (ozonosphere) and the lower variable limit of asthenosphere.

From the above it follows that:

- a) geography must analyze **interactions** between natural elements, on the one hand, and human society (through general geography, theoretical geography, physical and human geography), on the other hand; the integrated interactional object is the “environment”, approached from the perspective of geographical paradigm;
- b) these interactions refer to **elements, processes, phenomena, circuits, structures and systems**, through all specific subjects, ranging from geomorphology to the geography of tourism;
- c) interactions take place at **different scales** (ranging from planet down to site), through integrated regional geography, regional physical geography, etc.

For **school curriculum**, identifying a subject in this form (physical geography, human geography and integrated geography) impacts internal thematic overlaps. The stabilising existence of a “natural” geography and a “human” geography justifies the preservation of these two divisions in structured form, at significant levels of learning.

Unlike narrative geography, predominant in the first part of schooling, the two divisions stabilise scientific geography, as it is manifested in the two large fields of study.

Subsequent to these major divisions, integrated geography would be necessary, as currently assumed by the subject called “fundamental issues of the contemporary world”. One needs to identify a place in which (interactional) geography can be theorised as the science of

a new reality, created by the link between nature and society. This suggests the individualisation of a theoretical geography module.

7. Elements of a definition

There are currently a large number of definitions of geography, as well as of constituent sciences and subjects (stated in most of the works cited in the references). There is also feedback on how the definitions of geography have evolved over time, from its natural dimension to the environment, landscape, region, space (Holt – Jensen, A., 1999 etc.), to the exhaustiveness of human components (P. Claval, 2007).

A simplified definition including meta-scientific elements could be: *Geography is the science that deals with the study of interactions between society and its life environment, resulting in different spatial and functional forms (elements, processes, systems, structures), from the maximum level of the planet as a whole, down to the elementary levels, using a methodology where the specific element is cartographic representation (facilitating scale shifts), with a consolidated conceptual terminology and an axiomatic system centered on geographical zoning.*

The consequences for the **curriculum** are easy to identify in this definition:

- curriculum centred predominantly on interactional elements;
- identification of objective natural and human structures in reality;
- spatial and functional hierarchy of “geographic” reality;
- analysis of geographic reality components (elements, processes, systems etc.);
- scale transitioning from locality to planet and vice-versa;
- modern methodologies (in investigation and learning);
- conceptual learning (learning also structured on constructing concepts);
- demonstrability of assertions in the context of axiomatic system demands.

8. Current characteristics of geography

In relation to classic and traditional approaches, contemporary geography has particularly evolved in the last three decades in several identifiable directions, such as:

- a) the apparent sliding of geography into social sciences, through the great increase in human geography approaches, so that geography is currently perceived rather as a subject in the field of social – human sciences;
- b) the use of modern methods (derived from the spectacular evolution of technology) have boosted geographical research through instrumental vectors, which have considerably surpassed approaches used so far (software, satellite imagery, data processing);
- c) an area of high innovativeness in geographical research is represented by GIS, which greatly boosted the quality of the cartographic method and which allowed the qualitative and quantitative expansion of geographic data processing;
- d) the development of regional studies and regional geography in a modernized and evolved form.

School curriculum can identify many elements of interest among the above-mentioned characteristics, such as:

- using modern methodologies (including GIS);
- accessing new directions, resulting from current societal preoccupations;
- increasing the level of interest in geography.

9. Geographical terminology

Geographical terminology is a consolidated area of geography as a science, as it can be ordered and organized in a well-articulated and particularly rich taxonomic system.

There is a well-structured conceptual core (location, space, territory, region, environment, landscape, geosphere, geosystem, zoning etc.), which is associated with general terms, specific terms and a significant number of concrete terms (appellations and geographical names). However, each concept is defined by constituent elements, phenomena and processes, through a spatial and functional structure, and can be customized cartographically.

As far as the integration of concepts into the curriculum is concerned, there are two possibilities:

- a) referencing them as such, throughout the development of themes or modules;
- b) describing methodological dimensions of “the didactics of forming concepts”.

It is important to underline that the conceptual dimension of geography brings this science quite close to the demands of philosophical thought. In this sense, geography offers significant examples through its concepts (space, time, interaction etc.) and gnosiological reflection.

10. The axiomatic system and curriculum

In the case of geography, several categories of truths (which together form the “axiomatic system”) can be identified, such as the following:

- a) Natural phenomena are organized in latitudinal, zonal structures, as an effect of interaction between various features of the planet as a whole (latitudinal geographical zoning).
- b) The natural environment, differentiated as a result of the type of interaction, is organized in hierarchical and taxonomic superordinate structures (from site to planet).
- c) Anthropization of the natural environment is an accelerated phenomenon.
- d) The environment, landscape, regions, geographical space and geosystem are identifiable embodiments of the interaction between natural and anthropogenic elements.
- e) The interactional terrestrial macrosystem (anthropo-geosphere) has (yet) a self-regulating character, able to ensure the future existence of human society.
- f) Sustainable development (integrating human initiatives in relation to the life environment) should be the basis for environmental transformation.
- g) Territorial reality is objective, identifiable (what is it?), locatable (why is it there?), and explicable (why is it so?), with the aid of disciplinary approaches that pertain to geography.

The main consequence of this theoretical dimension of geography is, for **school curriculum**, the attempt to include confirmed theoretical elements, a dimension corresponding to scientific thinking and the capacity to build investigative systems based on a stabilised internal logic.

11. Taxonomic organization

The explanation of the various elements of integrated territorial reality has started to be based on the analysis of very different (in space) and distant (in time) interactions, which previously could hardly be included in an explanatory reasoning.

In this context, integrated reality (and the one related to the natural part or the human part of spatial reality) can be ordered in a taxonomical scale from planetary level down to very small sizes, as follows:

Scale	Spatial sizes	Reference surface	Elements derived from interactions
Megascale	50 - 510 million km ² 7 · 10 ⁸ inh.	Earth as a whole Land relief and oceans Continents and oceanic basins	Atmosphere and ocean circulation Planetary interaction of geospheres (anthropo-geosphere) Geographical zoning
Macroscale	1- 50 million km ² 1 · 10 ⁸ - 1 · 10 ⁹ inh.	Major subdivisions of continents and oceans Tectonic plates Planetary mountain systems	Types of climates and biomes Macrorelief Phenomena associated to tectonics
Mesoscale	0.1 – 1 million km ² 1 · 10 ⁷ - 1 · 10 ⁸ inh.	Major relief units (mountain ranges, depressions, plains) Homogeneous natural regions	Zoning nuances (types) Differences due to mesorelief and hydrography Perceptible anthropogenic impact
Microscale	0.1 m ² - 0.1 million km ² 1 · 10 ¹ - 1 · 10 ⁷ inh.	Relief units of medium and small stretches Types and forms of land relief	Climate, topoclimate and microclimate nuances Significant anthropogenic impact

The variety of integrated concerns is very wide and differentiated, depending on the scale of approach. It is possible to imagine a more detailed taxonomic scale (with multiple levels).

In terms of **curriculum**, this four-level scheme (which could be turned into a taxonomy with a few extra levels) can be reflected in the simultaneity of reflection on the spatial dimensions of the considered reality: the world as a whole, continents (and regions thereof), countries (and divisions thereof), local and proximal horizon.

The current 4th grade school subject aims at an endeavour pursued **from home locality to planet**, and the other subjects succeeding it should repeat the successive spatial transitions, or even entail, by means of syllabi, corresponding reflections of learned phenomena, at all levels.

12. Geographical methodology and study methods

Modern methods have considerably boosted the type of approach to the studied reality. These methods come *from outside geography*, as results of the general progress of knowledge, of the progress of specific sciences and technological developments.

In this context, geography is now very much computerized (as a way of processing and presenting data), and through GIS, reality can be perceived in real time and in real space.

At the same time, complementary methods (both traditional and emerging), as articulated in methodologies, can accelerate the depth of knowledge of reality addressed by geography: the interaction between society and its existence. Geography as a science, with a high theoretical potential, will also remain an area of philosophical and epistemological reflection.

The methodological dimension of **geography** can find corresponding expressions in methodological suggestions within syllabi, as well as the training process.

13. Geography as interaction between society and the environment

Geography cannot analyse all elements of surrounding objective reality (this is done by all sciences together). Also, by tradition it cannot confine itself only to the natural dimension or the human dimension of objective reality. Its specificity resides in the very interaction between the terrestrial environment and the society that inhabits it.

The legitimate question is whether this interaction can become a prevalent area of a science (such as geography) or whether it must focus on objective results (regions, landscapes, types of environment, etc.). In this respect, the assumable option can be the prevalence of the interactional dimension in relation to the objective one, even if many results of interactions have this objective character (landscapes, etc.).

If geography is to be considered both as a natural and a social science, and especially as a science of the interaction between society and its life environment, a legitimate question appears: would geography be the only science of this kind (“dual”) or are there other similar areas in this regard?

In our opinion, there are at least the following areas of human knowledge:

- (A) **philosophy**, through reasoning that applies to both nature (dialectics, the philosophy and epistemology of natural sciences, etc.) and society (social philosophy, political philosophy, etc.)
- (B) **psychology**, by means of the “natural” origin (resulting from the functioning of psycho-physiological phenomena based on natural mechanisms) and social reflection (social psychology).

The same could be said of **ICT**, through the opportunities of application to the scope of both nature and society (even if it is more of a methodology and does not build scientific value judgments).

Philosophy, psychology and geography all share the “dual” character (nature and society) of their area of study and an evident theoretical dimension (including geography).

Consequences on geography curriculum

Philosophy, psychology, geography (and possibly ICT) all have in common this “dual” character (nature and society) of their field of study and an evident theoretical dimension (including geography).

The above-mentioned elements are not sufficiently veridical to allow the development of a supra-disciplinary structure (or of a field of study) aiming at elements of both nature and society, as well to reunite them into systems of thought reflecting this integrated objective reality. A “man – nature” field of study, consisting of the above-mentioned subjects (philosophy, psychology, ICT, geography), would have higher legitimacy than current curricular areas.

14. Towards an integrated epistemological approach to geography

Compared to previous concerns and the multiple definitions associated to geography, we may ask, and rightly so, if an epistemological approach facilitating the perception of the specificity of geography as a science and field of reality is actually possible.

This epistemological dimension is based on the following assertions:

- a) the predominance of the *interactional and unitary character* of reality, even if it is materialized in demonstrably objective elements, phenomena, processes, structures and systems;

- b) *disciplinary fields of geography* (geomorphology, climatology, geo-demography etc.) each share insight and ties with components of *terrestrial geospheres* and very different levels of materialization; each significant subject area aims to identify its features through interactional superordinate systems: geosystems (Christopherson, R., 2006);
- c) the *cartographic method*, accelerated by GIS, remains the specific core of geographic methodology for investigation of reality;
- d) the *system of truths* (axiomatic system), so far reducible to some findings of maximum generality, may in reality be much more complex and nuanced;
- e) the *conceptual system* of geography, currently focused on several major coordinates (location, area, region, etc.) must be stabilized and ordered taxonomically, so as to better reflect the interactional nature of reality;
- f) a *more accentuated formalization of geography* would be useful, to replace the great length of some texts and identify ways of inference from known areas in lesser known fields and realities.

The above-mentioned conceptual and theoretical structure of geography provides sufficient indication on how it can be transferred into **school curriculum**.

Each mentioned element can be reflected into the official curriculum (without needing actual detailing), but also into the educational process.

They provide a framework for **school curriculum** where geography-specific elements can be organized into super-ordinate structures. At the same time, each previous assertion can constitute an element to materialise any theme.

It is worth mentioning, for example, that the geo-ecological paradigm is a corresponding reflection in terms of what school curriculum calls “geo-ecological factors”. Likewise, scale transitions, sustainable development, and spatial vision are found in the current school curriculum under the form of included topics. The training process can greatly develop these dimensions at all significant levels and themes.

15. Possible scenarios

The future development of geography may occur in one of the following directions:

- a) Retention of its characteristics as a *unitary and integrated science*, whose main object of study is the interaction between society and its life environment, with developments in *major areas* (general geography, physical geography, human geography, environmental geography, regional geography) and *subjects* (ranging from geomorphology to the geography of tourism).
- b) Pronounced shift of geography’s center of gravity *to human geography* (keeping physical geography as a “scene” for social action), while preserving the apparently “unitary” character of geography (by not dissociating the object of study).
- c) *Institutionalized shift of “academic” geography towards natural sciences*, while developing classical areas of physical geography (geomorphology, etc.), some areas of interaction (environment, organization of geographical space, etc.) and studies of human geography, in a form (and content) that does not overlap corresponding social sciences.
- d) “Breaking” geography into *its two major areas*: physical geography (attachable to “natural sciences”) and human geography (attachable to “social sciences”).
- e) The *theoretical reorganization of geography* around interactional paradigms (geography as a science of interactions between society and the environment), for its components (elements, phenomena, processes, structures, systems), at different

scales of analysis, in the prospect of increased contributions to the sustainable development of living space.

In all cases (1-5), geography retains its specific methodological core (cartography and GIS). Considerable differences may occur in other components of geography as a science: the prevalent object of study, the axiomatic system, the scale vision, the scientific purpose. Also, any option impacts the educational position.

Each scenario can lead to different forms in which geography is presented within **school curriculum**.

In the hypothesis of future construction of supra-disciplinary fields in the last part of schooling, it would be possible to include geography in them, without it keeping its nominal identity.

16. Educational developments

The direct consequence of an assumed option induces a particular behavior of “scientific” (“academic”) geography with respect to its “educational” dimension (as a presence in education, the media, etc.). Especially in the structuring of modern school subjects, the “theoretical” option influences the major components of building a predominantly disciplinary curriculum: the assumed system of competences (organized taxonomically), the criteria for constructing the school subject, the curricular model, the organization of skill-associated contents, the structure of significant disciplinary chapters, specific training opportunities etc. It is easy to imagine the consequences of each scenario on the position of geography in the National (and local) Curriculum. A model of educational geography, based on the above criteria and on the option of the integrated character of geography, was recently developed (Mândruț, O., 2014), reprising previous theoretical constructions.

Building a framework for designing a new or a renovated curriculum, includes:

- Analysing the theoretical design framework (which now exists in an elaborate form);
- Applying the design hypothesis on the structure of pre-university education;
- Building a curricular model of geography and a system of goals (general competences, values and attitudes);
- Elaborating curricular macrostructures by learning types, levels, ages, groups of classes, classes and modules;
- Assuming general competences and constructing a hierarchic and genetic system of specific competences;
- A modular geography curriculum;
- Variants for designing a new curriculum;
- Variants and a probable hypothesis (with negotiation elements);
- Subjects, overlaps, modules;
- Transversal supra-disciplinary elements;
- A training methodology associated to a new curriculum;
- A derived regulatory system.

References

1. Bailly, A., Ferras, R., 1997. *Éléments d'épistémologie de la géographie*, Armand Colin, Paris.
2. Claval, P., 2007. *Épistémologie de la géographie*, Armand Colin, Paris.
3. Clifford, N., Halloway, Sarah, Rice, S., Valentine, G. (ed.), 2011. *Key Concepts in Geography*, Sage, London
4. Cristopherson, R., 2006. *Geosystems*, Pearson, Upper Saddle River, New Jersey, U.S.A.
5. Gregory, D., 1996. *Geographical Imaginations*, Blackwell, U.K.
6. Holt – Jensen, Arild, 1999. *Geography – history, cencepts*, Sage Publication, London.
7. Marconis, R., 1996. *Introduction à la géographie*, Armand Colin, Paris.
8. Mândruț, O., 2014. *Elemente de epistemologie a geografiei*, „Vasile Goldiș” University Press, Arad, <http://www.uvvg.ro/cdep>.
9. Mândruț, O., Ardelean, A., 2016. *Contribuții la teoria curriculumului*, „Vasile Goldiș” University Press, Arad, <http://www.uvvg.ro/cdep>.
10. Mândruț, O., Dan, Steluța, 2014. *Didactica geografiei*, Editura Corint, București.
11. Mândruț, O., Dan, Steluța, 2016. *Geografie - curriculum școlar*, Editura Corint, București.
12. Scheibling, J., 1994. *Qu'est-ce que la Géographie*, Hachette, Paris.
13. Tarbuck, E., Lutgens, E., 2006. *Earth Sciences*, Pearson, Upper Saddle River, New Jersey, U.S.A.
14. Varenius, B., 1650. *Geographia generalis*, Amsterdam.
15. Vidal de la Blache, P., 1921. *Principes de la géographie humaine*, Alcan, Paris.