



## STUDY ON STUDENTS' CRITICAL THINKING CAPACITIES DURING SEMINARS OF THE DIDACTICS OF GEOGRAPHY

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**Abstract:** In this study we tried to find answers to the following question: What is the effect of cognitive organisers (schemes, graphical organisers, quintets) on developing capacities characteristic of critical thinking? The hypothesis we wanted to test was the following: restructuring information through cognitive organisers did not suppose compulsory critical thinking, but restructuring while observing certain explicit tasks. We tested the hypothesis during a seminar of the Didactics of Geography in 2008. The sample was represented by 64 students in the second year at the Faculty of Geography. The task was to realise a poster about a country. That poster should have included a quintet, ten keywords, a graphical organiser, a sigle, a schematic map, and the essential ideas about the respective country. After analysing students' results we noticed the following: restructuring information in quintets, realising the sigle and identifying ten keywords about a country required and proved use of critical thinking as a result of observing explicit or implicit tasks; when restructuring information into graphical organisers and into lists of ideas, students used certain capacities characteristic of critical thinking, but they did not assess all ideas according to the same criteria and, therefore, restructuring that information should be realised on the basis of observing certain explicit tasks.

**Key words:** country, quintet, cognitive organiser, sigle, poster

### 1. Introduction

Researchers consider the competency to employ critical thinking as one of the main ones that European citizens should have. People can acquire this competency in a long period of time during the learning processes developed in schools and universities. Teachers take care of planning and organising diverse learning activities where students have the opportunity to acquire this competency or capacities characteristic of it. In this paper we analysed the development of critical thinking to students during university courses by means of elaborating posters. The methods we employed were similar to the ones we used during the optional pluridisciplinary course "*Fundamental Issues of the Contemporary World*" (Dulamă, Lăpuște, Ilovan, 2006).

In this study we tried to find answers to the following question: What is the effect of cognitive organisers (schemes, graphical organisers, quintets) on developing capacities characteristic of critical thinking? The hypothesis we wanted to test was the following: restructuring information through cognitive organisers did not suppose compulsory critical thinking, but restructuring while observing certain explicit tasks. By means of this research we offered teachers several pieces of information on the concept of critical thinking and on the methodology of developing it to students in pre-university and university systems.

### 2. Theoretical basis

The theoretical basis of our paper consisted of several aspects on the critical thinking paradigm. The term *critic* came from the Greek *kriticos*, meaning "asking yourself questions", "searching for

meaning”, being able “to analyse” (Flueraş, 2003, p. 49). In the *Delphi Report* they mentioned that “critical thinking was an intentioned self-regulating judgement that resulted into interpretation, analysis, assessment and inference, as well as in explaining obvious, conceptual, methodological, contextual considerations according to the criteria that judgement was based on”. Similarly, Fisher & Scriven considered that “critical thinking supposed active and skilful assessment and interpretation of observations, communication, information, and arguments” (Flueraş, 2005, p. 47).

While productive-creative thinking was meant for elaborating as many solutions as possible, critical thinking focused on testing and assessing possible solutions and explorations (Moore, McCann & McCann, 1985, p. 5). Critical thinking structured according to the terms of logical rules and led always to predictable results, while creative thinking developed according to a series of non-logical rules, and the new, produced by this type of thinking, was not necessarily predictable (Zlate, 1999, p. 280). “Creative thinking and critical thinking are two faces of the same medal as one is of no use without the other” (Moore, McCann & McCann, 1985, p. 361). If we were not able to produce new ideas we would be doomed to stay “in the crowd”, not to be remarkable through anything. If we acted using creative ideas and we did not test them, we did not assess them, we would surely make mistakes for which circumstances and people would punish us (Zlate, 1999, p. 280). “The ability to think critically is vital, our life depends on it. The way we live our life depends on our convictions, on what we pretend to accept. The better we succeed in assessing an assertion and in separating its relevant and irrelevant aspects, the more critical is our thinking.” (Moor, B. N. & Parker, R., quoted by Flueraş, 2005, p. 30).

People employed critical thinking when they asked certain questions, when they analysed perceptions and representations, when they researched and compared alternatives, when assessing the results of their own thinking and of others’ in order to reach the most plausible conclusions, to make the best decisions or to internalise/validate the best attitudes. During the process of developing and employing critical thinking people made operations situated on different cognitive levels: analysis, comparison, assessment, decision, and argumentation (Dulamă, 2009).

### 3. Method

We tested the hypothesis during a seminar of *the Didactics of Geography* in 2008. The sample was represented by 64 students in the second year at the Faculty of Geography that took the courses of the pedagogical module and got training to be teachers. The contents sample included texts in school textbooks in the secondary school (the 6<sup>th</sup> grade), each text including information on a certain European country.

The independent variable in this research was the task (the stimulus method) when we asked students to elaborate posters according to requirements referring to cognitive organisers. The dependent variable of our research was represented by the cognitive organisers included in the posters that students elaborated, resulting their answer to the stimulus and the efficiency of using them in developing critical thinking.

During this experiment, students formed groups of four. Each group received two copies of the support material, a blank sheet of paper, carioca, and coloured pencils. The task was to realise a poster about a country. That poster should have included a quintet, ten keywords, a graphical organiser, a sigle, a schematic map, and the essential ideas about the respective country. In order to avoid constraints and because students were already familiar to the necessary techniques, they received no explanations on how to realise the components of their posters.

The quintet was defined (Steele, Meredith, Temple, 1998) as a five line poem where the author synthesized the idea contents of a text, his or her feelings and convictions upon the approached subject. The quintet was *an instrument of verbal organisation* that expressed several capacities necessary to critical thinking: to understand the subject, to compare, to assess, to decide, to abstract, to synthesise, to have creativity, and sense of humour. The quintet had five lines: the first one was a word (the keyword) that named the subject to be described (usually a noun); the second line was made of two words (adjectives) that described the subject; the third line was made of three words that

expressed actions (verbs); the fourth line was made of four words that expressed personal feelings for the described subject (a syntagm or a sentence); the last line was made of a word expressing the essence of the subject.

After the working phase (1,5 hours), we exhibited posters and students had a *gallery tour*. Each group assessed their own poster with a grade and their colleagues' posters without using any assessment sheet. After the gallery tour we analysed the entire activity, the learning process and its results. During the seminar we did not assess together with our students the capacities characteristic of critical thinking.

#### 4. Results

We analysed and assessed students' quintets: if in a quintet we could include maximum 11 words, we counted the ones that researchers considered a result of a critical thinking process and we attributed one point to each such word or syntagm. Groups got the following results: two groups got seven points each; other two got eight points each; seven groups got nine points each; five groups got ten points each. Students created the following quintets:

**Table 1.** *Quintets that students elaborated*

<p><b>Group 1</b> <b>Sweden</b> Rich, industrialised, Producing, exploring, developing, Admiration, respect, model, prosperity, Richness.</p>	<p><b>Group 2</b> <b>Sweden</b> Northern, cold, Travelling, exploring, winning, Inspires safety, richness, mystery. Volvo.</p>
<p><b>Group 3</b> <b>Norway</b> Rich, cold, Mining, exploring, exporting, Silence, coldness, remoteness, courage. Fjord.</p>	<p><b>Group 4</b> <b>Norway</b> Beautiful, forested Fishing, sailing, learning Making Norway proud Vikings!</p>
<p><b>Group 5</b> <b>Norway</b> Strong, productive, Trembling, fishing, sailing, Darkness, coldness, developed, mineral oil country, Fjords.</p>	<p><b>Group 6</b> <b>Finland</b> Beautiful, cold, Living, processing, getting rich, Developed and innovative tourism, Laponia.</p>
<p><b>Group 7</b> <b>Spain</b> Dry, low fertility, Mastering, growing, producing, Strawberries, sea, richness, tourism,</p>	<p><b>Group 8</b> <b>Spain</b> Exotic, touristic, Growing plants and breeding animals, progressing, Voyage, flamenco, joy, carnival,</p>

Torero.	Corrida.
<b>Group 9</b> <b>Belarus</b> Marshy, level, Draining, cultivating, exporting, I admire people's strength to overcome hardships, Postcommunism.	<b>Group 10</b> <b>Belarus</b> Cold, humid, Influencing, mixing, capitalising, Beauty, shine, richness, spectacular, Grandeur.
<b>Group 11</b> <b>Russia</b> Gigantic, cold, Possessing, going out front, being, Land of geographic superlatives. Power.	<b>Group 12</b> <b>Russia</b> Huge, rich, Producing, exploiting, developing, Cold, rigid, populated, Federation.
<b>Group 13</b> <b>Ukraine</b> Seaside, urbanised, Producing, transporting, exporting, Touristic, fertile, big cities, Rich.	<b>Group 14</b> <b>Holland</b> Rich, modern, Daring, loving, conquering, The Dutch, tulips, love story, Libertine!
<b>Group 15</b> <b>Austria</b> Beautiful, classic, Singing, skiing, escalading, Eulogy to music, elegance, nature, Tourism.	<b>Group 16</b> <b>Greece</b> Historic, insular, Visiting, celebrating, sailing, Origin of culture and civilisation, Past.

In order to assess keywords, main ideas about a country and the contents of the graphical organisers, we selected from posters the information that one could have assessed as a result of critical thinking processes. We counted the pieces of information in the table and offered one point for each accepted piece of information.

**Table 2.** *Keywords, essential ideas on a certain country and on the contents of the graphical organisers*

<b>Group 1</b> <b>Sweden:</b> rich country in iron ore; advantages as result to its seaside to the Botnic Gulf and to the Baltic Sea; low population density due to its harsh climate and mountainous relief; developed agriculture only in Svealand as the rest of the territory was subject to harsh climate and a mountainous relief; well-known because the very	<b>Group 2</b> <b>Sweden:</b> the Scandinavian Mountains, moraines and fjords, iron ore, uranium, coniferous woods, hydroenergy, Swedish Laponia, tundra, paper, Volvo.
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<p>good Volvo automobiles; half of its surface covered with woods; the richest and most industrialised northern country; one of the highest living standards in the world; well-known cities for their museums and monuments; good social insurance system; taxes increased with income.</p>	
<p><b>Group 3</b></p> <p><b>Norway:</b> Laponia, fjords, mineral oil, fish, Vikings, Amundson, Oslo capital city, aurora boreal, the Scandinavian Alps, natural gas, official currency – Norwegian crown, Protestant religion, official language – Norwegian.</p>	<p><b>Group 4</b></p> <p><b>Norway:</b> some of the oldest mountains in Europe; first place for oceanic fishing in Europe; second place for mineral oil mining in Europe; fourth place for ship building in the world; temperate oceanic and subpolar climate; hosting short rivers with great hydroenergetic potential; largest surface covered with glaciers; longest fjord in Europe; official currency – Norwegian crown; hosting the most northern settlement in the world; Vikings – ancestors of the Norwegian people; marzipan; monarchy.</p>
<p><b>Group 5</b></p> <p><b>Norway:</b> sea, indented shores, animal breeding, hydroenergetic potential, coniferous woods, ship building, aurora boreal, fishing, permanent glaciers, fjords, Oslo, mineral oil, natural gas.</p>	<p><b>Group 6</b></p> <p><b>Finland:</b> landscape of forests and glacial lakes; cold climate with cold summers and harsh winters; short rivers with cascades; the national epic “Kalevala” national epic; low number of people; exploiting the hydroenergetic potential of rivers; car building industry; animal breeding; 1000 lakes; reindeer breeding; woods, eroded mountains; industry of wood; cold climate; short rivers; Laponia.</p>
<p><b>Group 7</b></p> <p><b>Spain:</b> corrida, torero, strawberries, Meseta, Don Quixote, telenovelas, Madrid, the Mediterranean Sea, highly productive agriculture, intense tourism, the Catholic religion, developed economy, low prices, the Pyrenean Mountains, dry climate, member of the EU.</p>	<p><b>Group 8</b></p> <p><b>Spain:</b> torero, seaside, sheep breeding, citric, commerce, olive trees, palm trees, vineyards, Escorial, Zorro.</p>
<p><b>Group 9</b></p> <p><b>Belarus:</b> swamps, European bison, potatoes, cereals, peat, member of the CIS, the Orthodox and Catholic religions.</p>	<p><b>Group 10</b></p> <p><b>Belarus:</b> member of the CIS, former member of the USSR, temperate continental climate, large peat reserves, mineral oil, natural gas, field, steppe.</p>
<p><b>Group 11</b></p> <p><b>Russia:</b> the longest borders; the deepest tectonic lake; the Pacific Ring of Fire; the coldest winters; first steel producers in the world; the Orthodox religion; influence of Byzantine civilizations; well-known in the world for the caviar production; the Volga; natural gas – first place in the world; the Trans-Siberian Railway; the Caspian Sea, the largest lake; the largest European city – Moscow.</p>	<p><b>Group 12</b></p> <p><b>Russia:</b> largest country in the world; the most numerous neighbours; the longest borders; the largest lake – the Caspian Sea; the longest railway – the Trans-Siberian Railway; the largest European city – Moscow; plenty of resources: mineral oil (third place in the world), natural gas (first place in the world), superior coal, iron ore, manganese, nickel, copper; caviar production; endemic element – the still water seal in Baikal Lake; the river with the longest estuary – the Obi.</p>

<p><b>Group 13</b></p> <p><b>Ukraine:</b> sugar cane, uranium, the Dnieper, Donetsk, Odessa harbour, natural gas transit, Chernobyl, steppe and forest steppe, former USSR member, CIS member.</p>	<p><b>Group 14</b></p> <p><b>Holland:</b> cheese, the Rhine, wind, bicycles, polders, diamonds, tide, Philips, windmills, Catholic, land of tulips, land of cheese, land of windmills, land of polders, land of wooden shoes.</p>
<p><b>Group 15</b></p> <p><b>Austria:</b> Danube country, Alpine country, neutral country, prosperous country, land of classical music – Mozart, republic, coniferous woods, sheep breeding, temperate-continental climate, glacial lakes, the Vienna Basin, the Rhine-Main-Danube Canal, Vienna – the UNO headquarters, the Schönbrunn Palace, national currency – shilling, the Vienna Music Academy, EU member, Vienna capital city, developed industry, mountain and cultural tourism, winter sports.</p>	<p><b>Group 16</b></p> <p><b>Greece:</b> insular and peninsular country; mountainous country; rich history; important touristic destination; commercial exchanges by means of navigation; cultivating olive trees – third place for olive oil production; Athens as the most important and most visited city; Mediterranean climate; variety of landscape and cultural objectives; characteristic architecture; the Orthodox religion; mythology; ancient civilisations; Zorba the Greek; sports competitions; the Mount Olympus; marine; sea transport; Spartans, Mount Athos; philosophers, geographers, vineyards.</p>

In table 3 we presented the total number of points that students got for quintets of the countries and for naming their features.











**Table 3.** Total number of points that students got for quintets of the countries and for naming their features

Group no.	Total number of points for the quintet 0-10 points	Total number of points for naming features	Total number of points	Group no.	Total number of points for the quintet 0-10 points	Total number of points for naming features	Total number of points
1. Sweden	10	11	21	9 Belarus	7	8	15
2. Sweden	9	10	19	10 Belarus	10	8	18
3. Norway	10	13	23	11 Russia	7	13	20
4. Norway	8	14	22	12 Russia	9	17	26
5. Norway	10	12	22	13 Ukraine	9	10	19
6. Finland	9	16	25	14 Holland	9	14	23
7. Spain	9	16	25	15 Austria	9	21	20
8. Spain	10	10	20	16 Greece	8	24	32

Groups obtained the following results: one group - 15 points; another group – 19 points; two groups each with 19 points; three groups each with 20 points; one group – 21 points; two groups each with 22 points; two groups each with 23 points; two groups each with 25 points; one group – 26 points; another group – 32 points.

In table 4 we presented the sigles that students realised, and in table 5 we presented several schemes, and in figures 1 and 2 we presented two posters that students realised.

**Table 4.** Sigles that students realised

<p><b>Group 1 Sweden</b></p> 	<p><b>Group 2 Sweden</b></p> 
<p><b>Group 3 Norway</b></p> 	<p><b>Group 4 Norway</b></p> 
<p><b>Group 5 Norway</b></p> 	<p><b>Group 6 Finland</b></p> 
<p><b>Group 7 Spain</b></p> 	<p><b>Group 8 Spain</b></p> 
<p><b>Group 9 Belarus</b></p> 	<p><b>Group 11 Russia</b></p> 




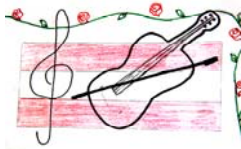

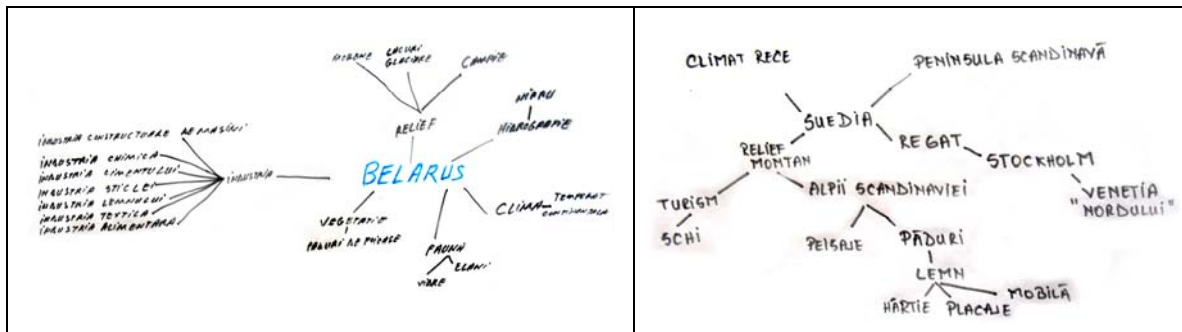
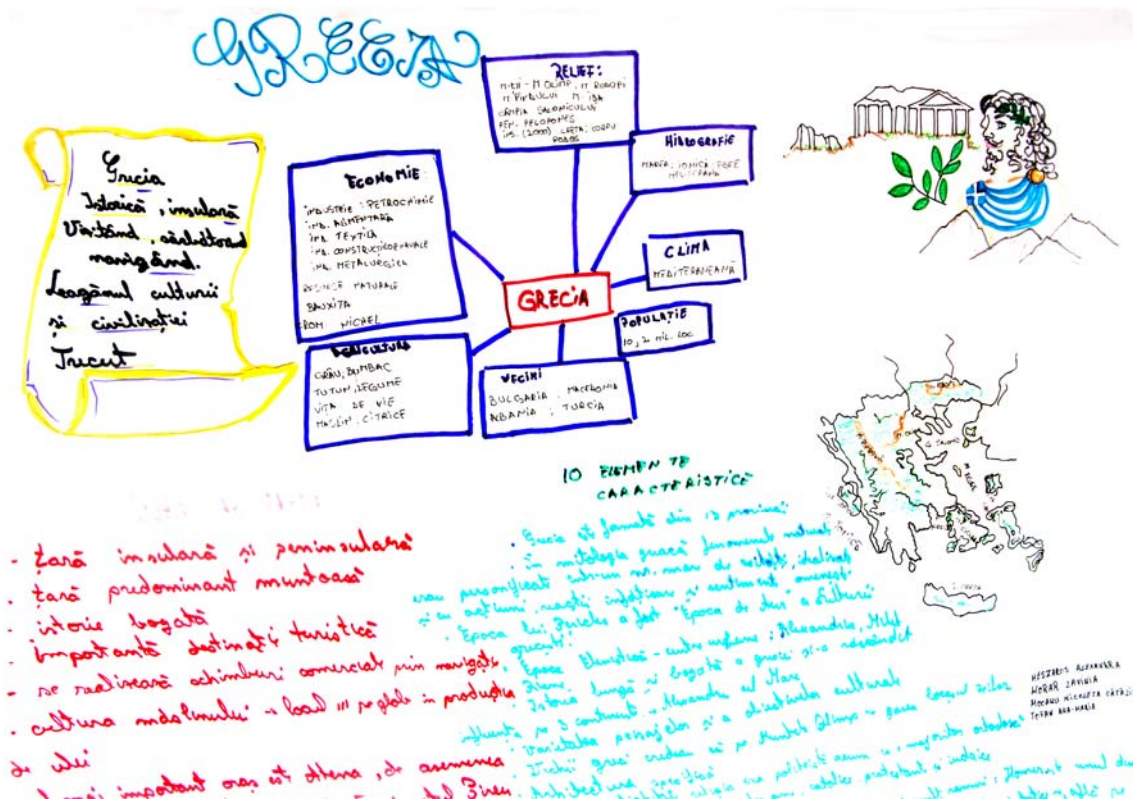
<p><b>Group 12 Russia</b></p> 	<p><b>Group 13 Ukraine</b></p> 
<p><b>Group 14 Holland</b></p> 	<p><b>Group 15 Austria</b></p> 
<p><b>Group 16 Greece</b></p> 	

Table 5. Schemes that students realised







Picture 1. Greece - poster that students realised



Picture 2. Holland - poster that students realised

## 5. Discussions

While assessing *quintets* we noticed that the groups that used link words and syntagms were at a disadvantage as these got a smaller number of points. Surely students would have got the maximum number of points if we had asked them to use only words separated by commas and each word to name a feature of the country or people they described. After reading quintets we noticed that those underlined students' perceptions and representations on a certain country, not only the geographic information they selected from the given text. For students, Greece was "the past, the origin of culture and civilisation", Austria was a country that brought a "eulogy to music, to elegance", Holland was "a libertine love story!", as they referred to laws on marriage, drugs, and not taking into account that an authentic love story could not be a "libertine" one. Students made comparisons and analogies, for instance they expressed their admiration for Belarus ("we admire people's strength to overcome hardships") for which the essence was "Postcommunism". One group perceived Russia as "gigantic, cold, powerful", similarly to another one that perceived it as "huge, rich, cold, rigid". For Spain, surely that strawberries were not the representative element, but as many Romanians left for Spain in order to pick strawberries as a job, students attributed them a great value, although the citric would have been more appropriate. The words that students chose for the essence of each country had the value of a prototype: torero and corrida for Spain, fjords and Vikings for Norway, Laponia for Finland. In conclusion, we considered that restructuring information into quintets required and proved critical thinking capacities.

Students analysed the contents of the three products (keywords, main ideas about a certain country and the contents of the graphical organisers) together as not all groups realised all products and they repeated some pieces of information from one group to another and that could have determined getting points repeatedly for the same piece of information. First, we noticed that there were differences between groups in what the number of keywords and that of the features identified by students were concerned and that could be attributed to a certain country for several reasons: some countries had themselves more features that made them well-known in the world or at the European level; some countries were more familiar to students from diverse reasons (countries neighbouring Romania, previous access to information about a certain country, contents of the lesson in textbooks). After analysing keywords, main features and ideas that students presented, we identified several *criteria* for them to use in order to choose information:

- *geographic superlatives*: thus, Russia was named as the largest country in the world, it had the largest number of neighbours, it had the longest borders, it had the largest lake – the Caspian Sea, it had the longest railway – the Trans-Siberian Railway, it hosted the largest European city – Moscow, it had the

deepest tectonic lake – the Baikal; Norway had some of the oldest mountains in Europe, it had the largest surface with glaciers, it had the longest fjord in Europe, it had the most northern settlement on the Earth; Sweden had one of the highest living standards in the world, it was the richest and most industrialised northern country; Athens was the most important and visited city;

- *hierarchies*: Norway – second place for mineral oil mining in Europe, fourth place for ship production in the world, first place for ocean fishing in Europe, Russia – first steel producer in the world, third place in the world for mineral oil production, first place in the world for natural gas production, Greece – third place for olive oil production;

- *quantitative assessment*: Sweden – half of the surface of the country was covered with woods;

- *appellatives?*: Austria – Danube country, Alpine country, neutral country, prosperous country, country of the classical music; Holland – land of tulips, land of cheese, land of wind mills, land of polders, land of wooden shoes;

- *important natural geographic elements*: the Rhine (Holland), the Scandinavian Alps (Norway), THE Meseta (Spain), the Baikal Lake and the Caspian Sea (Russia);

- *important anthropic geographic elements*: the Trans-Siberian Railway (Russia), the Odessa harbour (Ukraine), capitals;

- *famous places*: Schönbrunn Palace (Austria), Escorial (Spain), the Athos Mountain and the Olympus Mountain (Greece).

- *endemism*: still water seal in the Baikal Lake (Russia);

- *famous characters*: Zorro, Don Quixote (Spain); Mozart (Austria), Amundson (Norway), Zorba the Greek (Greece);

- *well-known firms*: Volvo (Sweden), Philips (Holland);

- *belonging or former belonging to a state or union of states*: Ukraine – former member of the USSR, member of the CIS; Spain – member of the EU;

- *government type*: republic or monarchy;

- *religion*: Orthodox, Catholic, Protestant.

Identifying ten keywords about a country required critical thinking as it supposed certain aspects, analysing and assessing them according to certain criteria. Students could not realise the list of keywords about a country at random. When elaborating the list of main ideas about a country they used certain capacities characteristic of critical thinking, but not all ideas could be assessed according to the same criteria, therefore, students had to restructure information observing certain explicit tasks. For instance, teachers could ask students to complete a table with specific data: surface, population, capital city, official language, government form, religion, official currency, etc. Teachers could also ask students to research for the following: most important past and present personalities (minimum 5) and mention what they were known for in the world; the most interesting issues concerning a country; superlatives (the most...); touristic objectives; natural parks; economic development (ranking the first, the second, or the third for certain branches in the world or in Europe), etc.

Realising the *sigle* - symbol-drawing – required using critical thinking in selecting the most significant representations for a certain country. As time for elaborating posters was short, students had not the opportunity for research and for successive reflections in selecting information.

For realising graphical organisers (schemes), students used general pieces of information that they structured into clusters with a single chain of rings, so they did not represent the criteria according to which they selected information. This way of restructuring information involved using critical thinking at an inferior level of competency. So that somebody restructured information in schemes as a result of critical thinking, one should have enunciated the tasks. Thus, in the case of countries, teachers could have asked students to group information around several satellites chosen according to the information to be included in the other cognitive organisers in order to avoid repeating information.

In order for students in pre-university and university systems to develop their critical thinking through elaborating posters that included the contents elements presented before, after choosing information they had to give arguments why they chose those pieces of information.

## 6. Conclusions

After analysing students' results we noticed the following:

- 1) Restructuring information in quintets, realising the *sigle* and identifying ten keywords about a country required and proved use of critical thinking as a result of observing explicit or implicit tasks;
- 2) When restructuring information into graphical organisers and into lists of ideas, students used certain capacities characteristic of critical thinking, but they did not assess all ideas according to the same criteria and, therefore, restructuring that information should be realised on the basis of observing certain explicit tasks.

In conclusion, our research confirmed the tested hypothesis: restructuring information through cognitive organisers did not suppose compulsory critical thinking, but restructuring while observing certain explicit tasks.

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