

An evaluation of the Ayuujk students learning in the Xaam elementary school.

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Abstract:

In this work, the learning system of the geometry contents is analyzed, particularly in the spatial position topic, in a sample of students from the Xaam elementary school belonging to the Ayuujk culture in Oaxaca Mexico. The data for the analysis were obtained applying questionnaires to the students in the 2003-2004 school year, focusing on the learning evolution and based on the scores of the students. The student population was divided in three cycles: the cycle I integrated by the first and second grade groups, the cycle II integrated by the third and fourth grade groups and the cycle III integrated by the fifth and sixth grade groups. In Vargas-Gonzalez (2005) and in Vargas (2007) the results obtained were reported for the cycles I and II respectively. Here, only the results obtained for the cycle III are shown. It was found for each cycle that the learning of the evaluated contents was not completed, suggesting therefore focus on diversity on both apprenticeship and culture. The situation preceding this research is the delay on math-learning in this region, and, as a work hypothesis, it was established that some elements from the study programs do not satisfy the previous necessities and experiences of the students.

## **I. Introduction.**

In this research paper, it is understood that evaluate imply more than just assigning a grade, this has to consider some factors as: the professor teaching style, the students learning way, the social and cultural environment where the students inhabit, among others. In the cycle III, contents of “situation”, “map interpretation”, “map finding places” and “path instruction made and follow up” were evaluated.

In this research important and relevant aspects of the culture where the students inhabit were taken into account, and would probably release a rule to follow focusing on diversity in the classrooms. The social context where the students participate is an important factor in their development; this includes several aspects (philosophy, language, beliefs, values and norms) that condition the way of learning of each student. Hence, a general approach of the distinct existing cultures between the environment the Ayuujk students inhabit and the way the contents are taught is presented.

## **II. The Ayuujk people.**

Considering aspects from the Mixe culture is motivated by the present educational delay in the communities settled and separated from the citizen context. From this fact, several studies have been made and reflect in some way the situation found as to the educational level from the native community, for example, it is said that “*the far places where some indigenous communities are and the fact that some people can't speak Spanish made difficult that the education gets to this sector... the average educational level in the native language speakers groups is of fourth grade of elementary school*” (INEGI, 2007), this situation is below the national mean in which “*the **habitants** of 15 years old and more, have on average **8.1 years of school level**, this means a little bit more than the second year of secondary school...*” On the other hand, in Oaxaca, the

*“population of 15 years old and more on average, has concluded elementary school with a school level average of 6.4”*

Regarding the latter, it is observed the necessity of focusing on the education in Oaxaca, particularly on native communities that present a very low educational level below the national average taking into account that “the indigenous education and the rural schools, by having distinct social elements as to urban societies, register less score on reading comprehension and math. Retaking the importance of equality not only from educative texts but also considering the infrastructure of the school and the environment where children grow in scholar age” (Galeana, 2005)

Despite the recognition of multiple cultures in our country, in education this fact has had no effect, even though the different proposals made, these haven't take into account the cultural environment of the students. This fact is seen in the classrooms of the elementary schools located in the Ayuujk area, particularly in the Xaam elementary school at Santa Maria Tlahuitoltepec Mixe Oaxaca, school where this work is made.

“The adventure of teaching and learning is done on a very specific geographic, social and temporal framework” (Alsina et al., 1998). It is undoubtedly that the environment where a human being develops himself influence in the abilities and competences that performs, such abilities are not taken into account in the classrooms where the materials are made for the citizen context without considering that “a lot of the proposals or exercises suggested can result not suitable on a rural level where, on the other hand, there are other interesting situations that at a urban level are meaningless” (ibidem).

The orography where the Ayuujk culture is situated shows a contextual panorama to the students of the elementary schools, the ones who develop abilities to move inside the sector that the community occupies, having as references the sacred places, mountains, plants among others. One of this places is the Zempoaltépetl, that is not only a hill among the 20 tops but a worship and veneration center, this one serves as a reference to do different activities not only rituals but as well as that of reference in the community. The environment where the students inhabit is different to that of the cities in terms of urban design because the streets are not outlined and hence they do not make a grid.

Another very important factor that has not been taken into account either is that of the linguistic issue, and math does not escape from this fact. In a research (Isaias, 1992) made in an Ayuujk community is mentioned that there are words and expressions that denote position within the physical space and in a social-geographic context... The usual words for the spatial location are shown in the following table:

Ni'kijxy	Arriba
Apa't ki'iy	Abajo
Pa aay	A los lados
Jin tuuy	Enfrente (jin, cara)
Jixk ki'im	Atrás, por la espalda (jixk, espalda)
ika'any	Derecha
inajy	Izquierda
Jikyām	Lejos
Jinkon	Cerca
Apiky	Separado
Tu'uk muky	Junto
Kik	Hondo, profundo
Kijxm	Alto
Tukki'iyi (tu'uk ki'iyiyi)	Todo
Tu'uk tuky	Un corte (una parte)
Tu'uk apiky	Una parte (un separado)

However; some mathematical contexts taught in school, as the location of the cardinal points, has no name in the language that the students speak. In Isaias (ibidem) is mentioned that “there were not found the words in this community corresponding to north, south, east and west, despite the fact that sunrise and sunset are points of reference”.

These kinds of situations demand a bigger effort from the students to integrate such contents to their knowledge and be meaningful in their cultural context. In this way, it is necessary to know the cultural aspects that the students have, to give better attention to the diversity in the classroom. This diversity refers to both the cultural diversity and the learning diversity that go after each other in the act of teaching and learning. The cultural diversity to take advantage the frame of the student and the possible limits to face when there are no elements to understand specific mathematical contents. Taking into account these aspects, we will be collaborating in giving a stronger formation in the classrooms.

The Mixe town (Ayuujk) is located north-east in Oaxaca. At north-west it borders on Distrito de Villa Alta; at north on Distrito de Choapan and with the state of Veracruz, on south on Yautepec and on south-east with Juchitan and Tehuantepec. The Ayuujk area has been divided in three climatic areas upon their height: Height or cold, with heights above the 1800 meters over the sea level, Mid or mild, with heights from 1000 to 1800 meters over the sea level and, low or hot with heights from 35 to 1000 meters over the sea level. The section of Santa Maria Tlahuitoltepec, from the Mixe district, belongs to the north mountain range in Oaxaca. It is located north-west from the Ayuujk land, at a distance of 123 Km from the state capital and its height over the sea level is of 2400 meters, hence, it belongs to the Height zone of such district.

The orography where the Ayuujk town is located, as was mentioned before, is very hilly, between mountains, valleys and peaks. *“A lot of researches have compared this orography with a creased paper sheet and that it is because being inside the Ayuujk area means being surrounded by mountains, crags, hollows and elevations, chasm and peaks”* (Subsecretaria de Obras Publicas, 1980).

The mountainous area of Zempoaltepetl is a continuation of the Juarez mountain range, and it does not lose unity, it is a part of the Sierra Madre Oaxaqueña, called that way by being within the state of Oaxaca. This mountain range is called Zongolica in Veracruz, Colorada in Puebla, of Tamazulapan, Nochistlan, Huautla de Juarez, Ixtlan and Mixes in Oaxaca and so on. The Ayuujk mountain range spread from the county of Yalalag in Sierra de Juarez towards south-east to disappear in the hills of the isthmus or “isthmic gate”. The mountain ground of Oaxaca settles down in the Zempoaltepetl area.

The activities of spatial placement of the people from the Ayuujk culture revolve around the Zempoaltepetl, used as a central reference point. The placement process is performed considering objects and places of great religious, cultural and philosophical relevance, and from there, the position of a individual, a traveler (from start point to end point), and communities and neighbor towns.

## **II. The evaluation.**

The term evaluation is frequently confused with grading, giving raise to think that evaluating means grade, that is, assign a number to a student that has answered an exam, however, “the assigned number to a person, six, eight, ten, is independent from the object supposedly to account for... the only thing that I can affirm from a student that answers correctly a question in geography is that he answers that question. From there, to suppose that he learned geography it is something not so evident” (Diaz; 2004).

In this work it is understood that the evaluation goes further than assigning a grade to the students, this has several purposes, from having an idea of the learning development level, up to give suggestions for a better educative practice. In accordance to this concept of evaluation, this one has two functions: the most known is the social function, and it consists on assigning a number and inform on the results of the process. The other function, is the pedagogic, where the formative education is included, that primarily consists in identify the drawbacks that arise in the learning process, during the process itself in order to give the students the necessary support and hence each drawback be for them an opportunity to evolve in the construction of their knowledge (Jorba y Casellas, 1997).

The formative evaluation has let the researchers to know more about the learning process, from there it was identified that some drawbacks and some necessities are not properly the same for all the students. From this situation aroused the concept of attention to the diversity. “To give an answer to this problem imply to reviewing, moreover selecting and contextualizing the contents to teach and of the activities proposed for the learning, the organization of the class-group and, in general, everything related with the management of such activities” (Sanmarti, 2002).

This evolution of the evaluation concept and its functions generated the necessity of making other forms of evaluation distinct to the comparison among students (transversal evaluation) and of the designing instruments to collect data and to analyze them, to facilitate the identification of drawbacks and requirements of attention to diversity.

The longitudinal evaluation allows knowing the level of the learning development in the student, comparing the results obtained on a first moment with the obtained in any other moment, to identify the drawbacks presented to give a suited support. Using this concept of evaluation we will have a general panorama of what is happening in the class-group and with each student. On the other hand, the criteria evaluation specify considering in every moment evaluation of the pursued standards at the end of any activity, in this sense, a comparison is achieved as to the success to them. That is, the advances in the learning process are observed as to these standards.

The term standard has had different meanings, one of them mentions that they are “constructions (theoretical constructors) of reference useful to take ahead actions in some specific field and possess the following characteristics: They are useful as references, situated in the scope of the action, technically systematized, security sources for casting, information sources about the product, they are available for the public, indicate and delimit responsibilities, they are subjected to the submission, they are indicators of quality levels of our daily usual life” (J. Casassus, 2005)

On the other hand, Vasco (2002) mentions that “A form of checking if the quality increases is that of fixing two kinds of standards: one for the minimum acceptable or better called ‘minimum standard’ or basic, and another for the ‘excellent quality’, better called ‘standard of excellence’...” And that “*a standard is a proposition that can be used to judge the quality of a curriculum of mathematics or of some evaluating methods. Hence, the standards are propositions about what is valued*” and also mentions that “a standard codes the acceptable practice in a field of a fixed exercise”. In this work, the term standard is referred to the minimum requirements that the students

must cover (abilities, competences and skills) during their stay in the corresponding scholar grade. In the words of Vasco, it is the 'minimum standard' or 'basic standard'.

The mixing of this two kinds of evaluation (longitudinal and criteria) lets, in one side, to know the learning levels that the student has and, in the other, it let to know the "distance" and "closeness" where the student is as to the pursued standards. Knowing in this way the drawbacks that a student faces to support him as to his necessities. In this work it will be shown that the evaluation can serve to know the diversity of learning ways in a classroom, focusing on a particular content: geometry, centering on the contents of spatial location. The instruments used evaluate the learning advances that the students have to cover the standards, which have been based on the objectives, purposes and goals that are found on the 1993 student plan and in the programmatic advances for each scholar grade.

For the purposes of this research, the only contents considered are those that correspond to the field of geometry, particularly to some contents of spatial location. For the cycle III, the following standards are considered: (that the student) 1.- Interpret distinct kind of maps and use the coordinate axis to locate things or objects (introduction to the coordinate system). 2.- Posses the ability to read and interpret maps as well as to locate places in a map. The standards used, appear in every questionnaire, using the same ones to evaluate in this way the evolution of the performance of the students, achieving in this way to have the information of the ideas, abilities and skills that the students develop about the contents of location and lecture and interpretation of maps or sketches.

### **III. The data**

To confirm the sample, 10 students were selected from each scholar grade in a random way. In this way, we had 20 students, however, in the different applications of the questionnaires there was a missing person implying this working with 19. Questionnaires were applied to all these students in three different moments: returning back from vacations on December and the holy week and at the end of the scholar year.

The questionnaires were designed according to the curricular reform of the year 1993, therefore, the results reported in this research are from the students who had worked under such reform. The design of these questionnaires was made under the standards based on objectives, purposes and goals embodied in the study plan of the elementary education for each scholar grade belonging to the cycle III. With the previously defined minimum pretended requirements to achieve at the end of the scholar year, the design of the questionnaires was made and the grade criterions were constructed for the scholar year. These grade criterions are the description of the different levels of answers and their respective score levels of answer and their respective score that are assigned to the different abilities shown in the answers of the students to the questions posed.

Tables 1, 2 and 3 show the data obtained (as to the corresponding evaluation criteria). For their lecture one must consider: 1.- The scores presented in row PEE arise from the sum of the expected specific scores that a student can obtain, that is, the sum of the maximum scores for each evaluation criterion. This is compared with the row Pt that represents the scores that every student obtains and arises from the sum of the scores shown in the corresponding column. For example, in row Pt and column III.1 appears a Pt of 17, that is the sum from row 1 to row 20 of the same column. 2. - The clear shadowed rows indicate the students that obtained scores below or equal to  $\frac{Pe}{2}$  (15, 16 and 14 in each case, half of the expected value), in the same way, the Pt scores below or equal to  $\frac{PEE}{2}$  are also shadowed respectively. The dark shadow indicates the missing student.

Alumno	Contenidos específicos										Total	
	III		II		IV		I		II'			III
	III.1	I.2	II.3	IV.4	I.5	I.6	II.7.a)	II.7.b)	III.8			
Sur			Este			Oeste						
1	1	2	1	0	0	1	0	1	1	1	0	8
2	1	0	1	1	1	0	0	1	1	1	0	7
3	1	0	0	1	1	2	0	1	1	1	4	12
4	1	0	0	1	0	0	0	1	1	1	2	7
5	0	0	0	0	0	0	2	1	1	1	0	5
6	0	0	0	1	0	0	0	1	0	0	2	4
7	1	0	2	0	1	0	0	1	0	0	4	9
8	2	2	0	2	1	0	1	1	1	1	1	12
9	0	0	1	1	1	0	0	1	0	0	4	8
10	0	0	1	1	1	0	0	1	0	0	4	8
11	0	0	0	2	0	0	2	1	0	0	2	7
12	0	0	0	1	1	0	1	1	1	1	1	7
13												
14	1	0	1	1	0	0	2	1	1	1	4	12
15	2	6	2	3	1	2	3	1	1	1	4	26
16	2	0	1	3	1	2	3	1	1	1 <sup>2</sup>	4	19
17	1	0	1	0	1	0	1	1	1	1	1	8
18	0	2	2	0	0	0	1	1	1	1	4	12
19	2	0	1	3	1	2	1	1	0	0	4	15
20	2	0	1	3	1	2	0	1	1	1	4	16
Pt	17	12	15	24	12	11	17	19	13	13	49	
PEE	57	114	38	76	57	38	57	19	19	19	76	

Tabla 1.- Parrilla de evaluación. Cuestionario 1. Enero de 2004.

<sup>1</sup> Si se presentan dos ceros entonces nos indicará que existe confusión entre estas dos direcciones.  
<sup>2</sup> Utilizó oriente poniente.

Alumno	Contenidos Específicos										Total	
	III		II		IV		I		II			III
	III.1	I.2	II.3	IV.4	I.5	I.6	II.7.a)	II.7.b)	III.8			
Sur			Este			Oeste						
1	2	4	2	1	2	2	1	2	1	1	4	21
2	2	5	2	1	1	2	1	3	1	0	0	17
3	2	5	2	1	1	2	2	3	1	1	1	21
4	0	0	0	1	2	2	0	3	1	0	0	10
5	0	0	0	2	0	0	0	3	1	0	0	7
6	0	0	2	1	1	0	2	3	1	1	1	12
7	0	0	2	1	2	2	2	3	1	1	1	15
8	2	3	1	2	1	2	2	3	1	1	1	21
9	1	0	0	1	0	0	2	3	1	1	1	14
10	1	0	2	2	1	2	2	3	1	1	1	19
11	0	0	1	1	1	1	0	0	1	1	0	8
12	0	1	0	1	0	0	0	0	0	1	1	5
13												
14	0	0	1	1	1	0	0	0	0	0	0	3
15	2	4	0	1	1	2	2	0	1	0	0	15
16	1	5	2	2	1	2	3	3	1	0	0	24
17	1	0	1	1	3	0	0	0	0	0	0	6
18	1	4	1	2	1	0	0	0	1	1	1	16
19	0	0	1	2	1	0	0	0	1	0	0	9
20	0	3	2	2	1	2	3	0	1	0	0	18
Pt	15	34	22	26	21	21	22	32	16	10	9	42
PEE	57	95	38	75	57	38	57	57	19	19	19	76

Tabla 2.- Parrilla de evaluación. Cuestionario 2, Abril del 2004

Alumno	Contenidos Específicos										Total	
	III		II		IV		I		II			III
	III.1	I.2	II.3	IV.4	I.5	I.6	II.7.a)	II.7.b)	III.8			
Sur			Este			Oeste						
1	1	3	1	2	1	0	0	1	1	1	2	13
2	1	3	0	1	1	0	0	1	1	1	1	10
3	0	3	2	2	1	0	0	1	0	0	2	11
4	1	3	1	2	1	0	0	1	1	1	2	13
5	1	0	2	1	0	0	1	1	0	0	2	8
6	1	3	2	3	1	0	0	1	0	0	1	12
7	0	3	2	1	3	2	1	1	0	0	1	14
8	2	3	2	1	1	2	1	1	0	0	4	17
9	2	3	2	3	1	2	0	1	1	1	3	19
10	1	3	2	3	1	2	0	1	1	1	1	16
11	0	3	0	2	1	0	0	1	1	1	1	10
12	0	3	0	1	0	0	0	1	1	1	0	7
13												
14	1	0	2	1	1	2	0	1	1	1	2	12
15	2	3	2	3	1	0	1	1	1	1	1	16
16	2	3	2	3	1	0	0	1	1	1	3	17
17	1	1	2	3	2	0	0	1	0	0	3	13
18	1	3	2	3	1	0	1	1	1	1	1	15
19	1	0	0	3	1	0	1	1	1	1	2	11
20	1	3	2	3	1	0	1	1	0	0	1	13
Pt	19	46	19	41	20	10	6	19	12	12	33	
PEE	57	57	38	76	57	38	57	19	19	19	76	

Tabla 3.- Parrilla de evaluación. Cuestionario 3, Junio del 2004

## Results

Questionnaire 1 (table 1): 16 of 19 students present deficiencies in the contents of interpretation of paths on a map, following of instructions on paths, indications of paths on the map, location of objects in relation to others, orientation of an object in relation to a reference point, orientation and location of the cardinal points in the wind rose,

location of places on a map in relation to a reference point, the majority!! (last column). **6 of 19** students confuse the east with west (column II.7.b)). Questionnaire 2 (table 2): **12 of 19** students present deficiencies in the contents of path interpretation on a map, following of path instructions, path indications on the map, object location in relation to others, object orientation in relation to a reference point, orientation and location of the cardinal points in the wind rose, place location on a map, lecture and interpretation of maps and place location on the map in relation to a reference point (last column). **9 of 19** students confuse east with west (column II.8.b)). **3 of 9** students don't identify south opposed to north (column II.8.b) south). Questionnaire 3 (table 3): **12 of 19** students of this cycle present deficiencies in the contents of interpretation of paths on a map, following of instructions on paths, path indications on the map, object location in relation to others, orientation of an object in relation to a reference point, orientation and location of the cardinal points in the wind rose, place location on a map, map lecture and interpretation and, place location on a map in relation to a reference point (last column). **7 of 19** students confuse east with west (column II.7.b)).

To sum up, in the scores obtained by the students of this cycle is observed that their learning increased, since in questionnaire 1, 16 of 19 students presented deficiencies in the evaluated contents while in questionnaire 3 there were only 12 of 19 students. However it stills being a very big part for the cycle III. It seems that the confusion between east and west increases, at the beginning there were 6 students with this deficiency and at the end, there were 7. In general, the scores presented in each row Pt from the preceding tables indicate that, in the first and second application, the students present deficiencies in the path content, location, position and interpretation. This last issue is overcome at the end of the school year; that is, the deficiencies presented in the interpretation of maps are overcome.

With the results obtained for this cycle it is necessary focusing on the contents in which the deficiencies are presented requiring an attention to the diversity of learning for the students that present deficiencies in the evaluated contents can overcome them. These deficiencies depend not only on the students but also to different factors from we can mention the experiences of the students in relation to the evaluated contents, the teaching ways from professors, the learning materials among others. If a main influence in the contents learning is to be achieved the different factors that influence in these deficiencies must be attended, for example, to enrich the experiences focusing in the discussion of the experience, the meaning of the experience and the importance of it within a concrete and significant frame for the student.

Ordering the data in the tables below, a student is characterized by the set  $(x^1, y^2, z)$ , the first entry of this set represents the score achieved by the student in an application, the second, the score get in the next application and the third represents the advance or regression that the student presents in the following application as to the latter. With this

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<sup>1</sup> Represented by <, > or = depending if the score get by the student is smaller, bigger or equal to the half of the expected score.

<sup>2</sup> As in 1.

process, tables 4 and 5<sup>3</sup> are built, the next ones (tables 6 and 7<sup>4</sup>) indicate the sets of every possible case.

Student	Questionnaire 1 Pe, 30	Relative score	Questionnaire 2 Pe, 32	Relative score	Observations		
					Questionnaire 1	Questionnaire 2	Progress
1	8	0.2666	21	0.6562	<	>	p
2	7	0.2333	17	0.5312	<	>	p
3	12	0.4	21	0.6562	<	>	p
4	7	0.2333	10	0.312	<	<	p
5	5	0.1666	7	0.2187	<	<	p
6	4	0.1333	12	0.3750	<	<	p
7	9	0.3	15	0.4687	<	<	p
8	12	0.4	20	0.6250	<	>	p
9	8	0.2666	14	0.4375	<	<	p
10	8	0.2666	19	0.5937	<	>	p
11	7	0.2333	8	0.25	<	<	p
12	7	0.2333	5	0.1562	<	<	r
13							
14	12	0.4	3	0.0937	<	<	r
15	26	0.8666	15	0.4687	>	<	r
16	19	0.6333	24	0.75	>	>	p
17	8	0.2666	6	0.1875	<	<	r
18	12	0.4	16	0.5	<	<	p
19	15	0.5	9	0.2812	<	<	r
20	16	0.5333	18	0.5625	>	>	p

Table 4. Questionnaires 1 and 2.

Student	Questionnaire 2 Pe, 32	Relative score	Questionnaire 3 Pe, 27	Relative Score	Observations		
					Questionnaire 2	Questionnaire 3	Progress
1	21	0.6562	13	0.4814	>	<	r
2	17	0.5312	10	0.3703	>	<	r
3	21	0.6562	11	0.4074	>	<	r
4	10	0.3125	13	0.4814	<	<	p
5	7	0.2187	8	0.2963	<	<	p
6	12	0.3750	12	0.4444	<	<	r
7	15	0.4687	14	0.5185	<	>	p
8	20	0.6250	17	0.6296	>	>	p
9	14	0.4375	19	0.703	<	>	p
10	19	0.5937	16	0.5925	>	>	r
11	8	0.25	10	0.3703	<	<	p
12	5	0.1562	7	0.2592	<	<	p
13							
14	3	0.0937	12	0.4444	<	<	p
15	15	0.4687	16	0.5925	<	>	p
16	24	0.75	17	0.6296	>	>	r
17	6	0.1875	13	0.4814	<	<	p
18	16	0.5	15	0.5555	<	>	p
19	9	0.2812	11	0.4074	<	<	p
20	18	0.5625	13	0.4814	>	<	r

Table 5. Questionnaires 2 and 3.

Student	Questionnaire 1 Pe, 30	Relative score	Questionnaire 2 Pe, 32	Relative score	Observations		
					Questionnaire 1	Questionnaire 2	Progress
1	8	0.2666	21	0.6562	<	>	p
2	7	0.2333	17	0.5312	<	>	p
3	12	0.4	21	0.6562	<	>	p
10	8	0.2666	19	0.5937	<	>	p
8	12	0.4	20	0.625	<	>	p
4	7	0.2333	10	0.312	<	<	p
5	5	0.1666	7	0.2187	<	<	p
6	4	0.1333	12	0.375	<	<	p
7	9	0.3	15	0.4687	<	<	p
9	8	0.2666	14	0.4375	<	<	p
11	7	0.2333	8	0.25	<	<	p
18	12	0.4	16	0.5	<	<	p
12	7	0.2333	5	0.1562	<	<	r
14	12	0.4	3	0.0937	<	<	r
17	8	0.2666	6	0.1875	<	<	r
19	15	0.5	9	0.2812	<	<	r
15	26	0.8666	15	0.4687	>	<	r
16	19	0.6333	24	0.75	>	>	p
20	16	0.5333	18	0.5625	>	>	p
13							

Table 6. Questionnaires 1 and 2.

<sup>3</sup> In this table the performance of the students in questionnaire 3 is compared with questionnaire 2.

<sup>4</sup> As in 3.

Student	Questionnaire 2 Pe, 32		Questionnaire 3 Pe, 27		Observations		
	Questionnaire 2	Relative score	Questionnaire 3	Relative score	Questionnaire 2	Questionnaire 3	Progress
7	15	0.46875	14	0.51852	<	<	p
9	14	0.4375	19	0.7037	<	<	p
15	15	0.46875	16	0.59259	<	<	p
18	16	0.5	15	0.55556	<	<	p
4	10	0.3125	13	0.48148	<	<	p
5	7	0.21875	8	0.2963	<	<	p
6	12	0.375	12	0.44444	<	<	p
11	8	0.25	10	0.37037	<	<	p
12	5	0.15625	7	0.25926	<	<	p
14	3	0.09375	12	0.44444	<	<	p
17	6	0.1875	13	0.48148	<	<	p
19	9	0.28125	11	0.40741	<	<	p
1	21	0.65625	13	0.48148	>	<	r
2	17	0.53125	10	0.37037	>	<	r
3	21	0.65625	11	0.40741	>	<	r
20	18	0.5625	13	0.48148	>	<	r
8	20	0.625	17	0.62963	>	>	p
10	19	0.59375	16	0.59259	>	>	r
16	24	0.75	17	0.62963	>	>	r
13							

Table 7. Questionnaires 2 and 3.

It is observed in the data from table 6 that:

- 5 students present progress, they pass from low to higher scores, set (<, >, p).
- 7 students stay in the lower scores but they have an advance, set (<, <, p).
- 4 students stay in the lower scores but they have a regression, set (<, <, r).
- One student goes from higher to lower scores, presenting then a regression, set (>, <, r).
- 2 students stay in the higher scores and present progress, set (>, >, p).

From the data reported in table 7 it is observed that:

- 4 students present progress, they go from lower to higher scores, set (<, >, p).
- 8 students stay in the lower scores but present a progress, set (<, <, p).
- 4 students presents regression, they go from higher to lower scores, set (>, <, r).
- One student stay on the higher scores and present progress, set (>, >, p).
- 2 students are in the higher scores and present regression, set (>, >, r).

With the data reported on table 7, it is observed, at the end, that the majority of the students (12 of 19) are characterized by the set (<, <, p) and (>, <, r); that is, are in the lower scores. From the previous discussion, it is seemed that the learning process was not completed, while there is a necessity of covering additional activities where the students complete the pursued standards.

## V. Conclusion

In this cycle, none of the 19 students is characterized by the set (>, >, =), that means that they don't cover the minimum considered standards; this is, their learning process of the evaluated contents is not stable existing progresses and regressions. We could attribute this to the fact that some students of the different scholar grades pass to the next grade without covering the minimum pursued standards during their stay in the corresponding scholar grade; this could be also a cause that in the following scholar grades these students do not have the necessary background to understand new concepts and hence reflect a slow learning.

The observed deficiencies in this cycle depend not only on the students but to other several distinct factors such as the their experiences as to the relation of the evaluated contents, the teaching styles of the professors, the teaching materials that do not consider the cultural environment the students inhabit among others. The tasks proposed

to the students influence their performance; it is possible that there might be tasks assigned without the necessary experiences needed to perform them. If the improvement of learning is what is pursued, then the design of teaching materials would account for in the cultural environment the students inhabit. Enrich experiences promoting discussion on them, their importance and transcendence. The professor would play a role as a guide in the learning process of the students identifying the learning styles of each one and that of the group-class.

The missing names of the cardinal points in the students' language imply a bigger effort of them to give sense to the contents of positioning seen in the classroom. In the first questionnaire it was seen that, a very big part of the students confused east with west, leading the preceding to pose questionnaires related to lateral issues with the purpose of observe and write on the relation between lateral issues and positioning in the wind rose, these results are the reason of another report. The students' way of positioning geographically in their community is related to sacred places, mainly to the Zempoaltepetl from where the location of activities, actions, offerings etc is made. The latter could indicate that the positioning in this culture is made around a point, taken as a center point, then, the use of Cartesian coordinates as a main reference system on a plane, could result less suitable for these students than for those who live in a structured environment, approximately, on a grid.

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