The "Student-Centred Learning" versus "Classic Learning Style" applied in the field of Automation Systems Disciplines

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Abstract: After analyzing the systematic observation sheets for the two classes with different learning styles, we found that the students in the class where student - centred learning was used had all the evaluated characteristics (communication, collaboration, involvement, creative imagination, observance of rules and solving tasks) clearly superior to students with the classic learning style.

A new student-centred teaching-learning strategies support students, and have been used in the paper, in our pedagogical experiment, designed to compare the results obtained by students by differentiating work tasks according to learning styles, compared to the results obtained by using classical, unitary learning activities for *automation systems / elements of automatic regulation systems / flow translators lessons.* Following the pedagogical experiment, it was found that, using work tasks that took into account the individual learning styles, established by the by applying a special questionnaire designed for this purpose, all students scored higher than when the tasks work were not differentiated on learning styles.

Key-Words: learning styles; students group; automation systems lessons.

1 Introduction

The research approach was guided by objective reasons aimed at studying the psycho-behavioural manifestations of children whose parents are working abroad. The investigation presents the characteristics of a fact-finding research, focusing on the analysis of the impact of parental separation on children's emotional and social development and their school results and on the implicit or explicit indication of possible solutions and suggestions for recovery or mitigation of their long separation. The analysis of the data and their interpretation was done in two stages, namely:

The first stage which consisted of:

✓preliminary analysis of the subjects' answers to the questionnaire for establishing learning styles;

✓interpreting the questionnaire and establishing some conclusions;

✓centralization of data and information from other methods and techniques of investigation.

The second stage which consisted of:

✓ correlating the data from the preliminary analysis with the data from the other methods of investigation (conversations and interviews with professors;

✓ direct observation, analysis of school documents, information gathered from various sources) to outline eloquent conclusions when confirming or refuting the hypotheses.

Statistical data analysis was performed using the Microsoft Office 2007 and Windows 10 Pro packages. Qualitative data were subjected to content analysis.

2 Problem Formulation

2.1. Human endurance

The initial design of the research also included a sample-pair extracted from the population of parents, grandparents, guardians or caregivers who were responsible for the care of the children. Consequently, a questionnaire was developed and applied for this category of respondents. The response rate was very low, given that these questionnaires were distributed for self-administration. The number of questionnaires collected was insufficient to perform statistical analyzes and thus the decision was taken to remove this sample from the design. We appreciate that the face-to-face application of these questionnaires would have increased the response rate.

2.2. Research time

From our perspective, the time allocated to research in the context of such a paper is far too short to allow testing of certain types of hypotheses based on a particular design of research (eg. experimental design). For our research, there was interest in developing and implementing an intervention program that would help improve the situation of students whose parents are working abroad. Time has been a slow factor in achieving this goal. Also, the major interest would have been the measurement of the effects produced by this program in order to be able to discuss the research hypotheses and in terms of effect size. The adoption of an experimental intergroup design could have added value to this research, allowing the isolation and accurate measurement of the effects of migration.

2.3. Other limits

A limitation of the study is the use of pencil-paper samples that may be subject to the effect of social disability. In the future, we intend to use more rigorous experimental tasks and observe children, by video recording and coding the frequency of behaviours that describe psycho-behavioural manifestations. An important limitation that significantly influences the conduct of research and its results is free access to validated tools for measuring emotional states. The response rate of the questionnaires was very low, which is why the sample is not robust enough to allow further generalizations.

2.4. Elements of research ethics

Ethics is defined as the theory of morality, values and behaviour. The moral value of human behaviour lies in the rules and principles on which it is based [1]. In qualitative research, ethics involves identifying those principles that define appropriate behaviour of the researcher [2]. Significant ethical elements in qualitative research are:

✓Consent based on information - the agreement of the participants to take part in the research, after the researcher provided them with relevant information about his study and their role in the research, the implications of participating in that study [3]. No research can be conducted without the consent of the participants, as this is covered in various laws [2].

✓Confidentiality and anonymity - the researcher must guarantee the confidentiality of the participants' personal information and ensure the anonymity of the information obtained from them ([3].

✓Reciprocity and partnership - qualitative research is based on the researcher's ability to create a relationship with participants, a relationship based on trust, openness and reciprocity [2]. Qualitative research encourages and enables the development and focus on interpersonal relationships between the researcher and the research participant.

✓Fraud - it is forbidden for participants to be deceived with the intention of achieving the goals of the research ([4].

✓Accuracy - use of data that is as accurate as possible. Distortion of messages or the use of insecure, vague, ambiguous materials are prohibited and unethical. In the context of the study, the use of data collection tools was made for purely scientific purposes, subject to law no. 677/2011 for the protection of individuals with regard to the processing of personal data and the free movement of such data and of law no. 285/2004 for the amendment and completion of law no. 8/1996 on copyright and related rights. The research carried out complies with the norms of law 206/2004 on good conduct in research activity.
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3 Problem Solution

Following the lessons, the application of worksheets (classic and differentiated by learning styles) and the initial and final assessment sheets, the centralized grades in table 1 and table 2 were obtained. Based on the data from these tables, the progress graphs represented in figures 1 -5 have been prepared, the interpretation of which is presented below.

Table 1. The results obtained in the experiment applied to the students group 1

Number of paper work	Initial Test	FL1 (classic)	Final Test
1	5	7	9
2	5	7	8
3	6	8	9
4	5	7	9
5	5	5	7
6	4	6	9
7	6	8	8
8	4	4	6
9	4	5	6
10	6	7	8
11	5	7	9
12	4	4	6
13	5	6	6
14	5	5	6
15	4	6	9
16	3	5	7
17	7	8	10
18	5	6	7
19	3	5	6
20	5	6	6
21	5	7	9
22	5	6	9
23	4	4	6
24	5	6	7
25	4	5	5
26	6	8	8
27	6	7	9
28	7	8	10
29	5	6	6
Average	4,93	6,17	7,59

Number of paper work	Initial Test	FL1 (classic)	Final Test
1 -V	6	9	9
2 - V	5	8	8
3 -V	6	8	8
4 - V	5	7	9
5 -V	5	7	8
6-V	4	6	8
7-V	7	8	10
8 - A	5	6	6
9 - A	4	5	6
10 - A	5	7	10
11 -A	4	7	9
12 - A	4	4	6
13 - A	4	6	6
14 - A	5	7	8
15 - A	4	6	9
16 - A	5	8	8
17 -P	7	8	10
18 -P	4	5	6
19 -P	4	7	7
20 -P	5	7	7
21 -P	6	7	6
22 -P	5	6	9
23 -P	5	7	7
24 -P	5	8	9
25 -P	6	9	10
26 -P	5	8	9
Average	5,00	6,96	8,00

Table 2. The results obtained in the experiment applied to the students group 2

In Fig.1 corresponding to the classical learning style it can be observed that most grades below 5 were registered in the initial assessment sheet, in which no student managed to obtain a grade between 8 and

10. At the opposite pole are the grades obtained. in the final assessment sheets, in which no student obtained a grade below 5 and the number of high marks, between 8 and 10 is quite high, over half of the total number of marks.
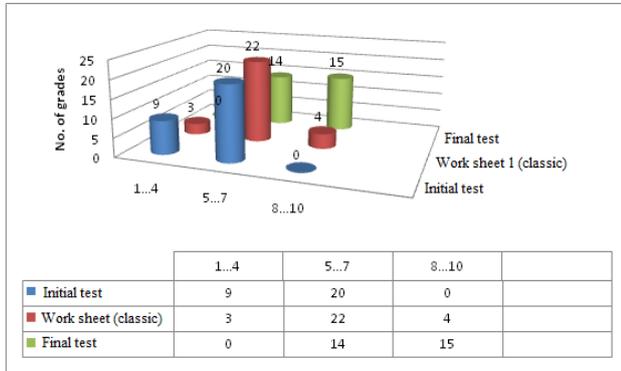

	1...4	5...7	8...10
■ Initial test	9	20	0
■ Work sheet (classic)	3	22	4
■ Final test	0	14	15

Fig.1 Diagram of progress according to the number of grades-classical learning style

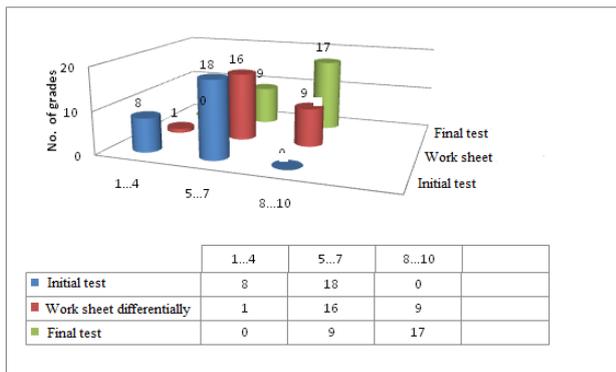|	1...4	5...7	8...10	
■ Initial test	8	18	0	
■ Work sheet differentially	1	16	9	
■ Final test	0	9	17	

Fig.2 Progress diagram by number of grades-student-centred learning style

In diagram 2 corresponding to the student-centred learning style, it can be seen that most grades below 5 were recorded on the initial assessment sheet, in which no student managed to obtain a grade between 8 and 10. At the opposite pole is the marks obtained at the final assessment sheets, in which no student obtained a grade below 5 and the number of high marks, between 8 and 10 is quite high, about 60% of the total number of marks.

Comparing the two diagrams, it can be seen that the best results are obtained using the student-centred learning style.
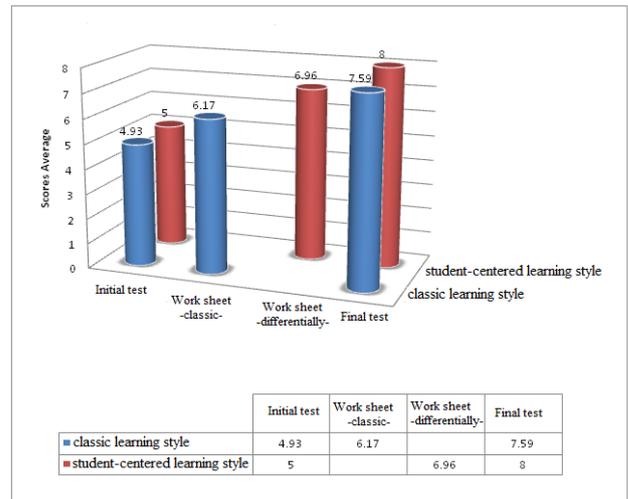

	Initial test	Work sheet -classic-	Work sheet -differentially-	Final test
■ classic learning style	4.93	6.17		7.59
■ student-centered learning style	5		6.96	8

Fig.3 Analysis diagram of learning styles according to the average of the tests In Fig.3, the analysis of learning styles according to the average of the tests, higher learning efficiency can be observed in the case of using worksheets differentiated by learning styles, which ultimately lead to superior learning outcomes materialized by final tests applied in class.
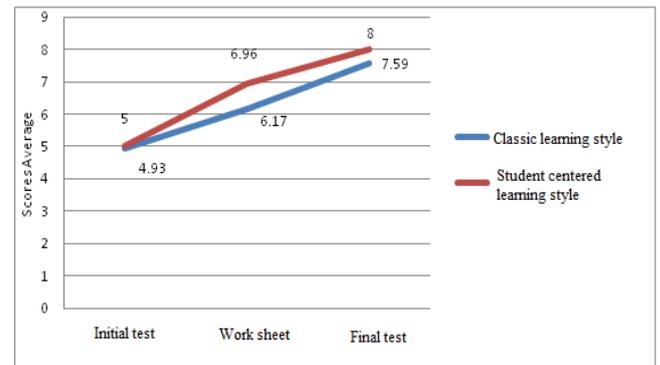

Fig.4 Graph of analysis of learning styles according to the average of the tests

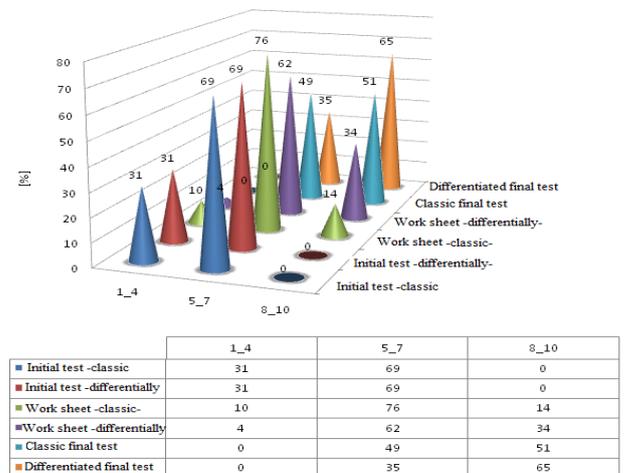|	1_4	5_7	8_10
■ Initial test -classic	31	69	0
■ Initial test -differentially	31	69	0
■ Work sheet -classic-	10	76	14
■ Work sheet -differentially	4	62	34
■ Classic final test	0	49	51
■ Differentiated final test	0	35	65

Fig 5 The graph of making notes (%) in function of the number of students and learning style

From the analysis of figures 4 and 5 it can be seen that most average grades, between 5 and 7 were obtained in the classic worksheets, where the high grades are quite few, which demonstrates the usefulness of worksheets differentiated by styles of learning.

However, compared to the initial assessment sheet, there is a real progress, the average of the final test being higher by 38% when applying the differentiated test on learning styles and by 35% when applying the classic test.

It should be noted that in the final evaluation sheet the results are not spectacular, the marks obtained in the differentiated worksheets are kept almost identical, with a slight increase in the number of average grades to the detriment of high grades, which leads us to conclude that students it is about what they have learned in class, and the differentiated worksheets should be combined with homework, projects or other portfolios, which will help students to further improve their level of theoretical and practical training.

In order to evaluate the performance of students but may chose to conduct emotional attitude I used sheet of observation systematic of students work.

The systematic observation of the students' behaviors towards learning and school activity in general was materialized by completing the systematic observation sheets presented in tables 3 and 4.

After analyzing the systematic observation sheets for the two classes with different learning styles, we found that the students in the class where student-centered learning was used had all the evaluated characteristics (communication, collaboration, involvement, creative imagination, observance of rules and solving tasks) clearly superior to students with the classic learning style.

Table 3. Statement of systematic observation of the students 1 group activities

No	Student's first and last name / learning style	Communi-cation	Collabo-ration	Involvement / Action	Creative imagination	Observance of the rules	Solving tasks
1	BCC / classic	0	X	X	0	X	0
2	BDA / classic	X	0	0	X	0	0
3	BVM / classic	0	X	0	X	0	0
4	CC / classic	X	0	X	0	0	0
5	CDG / classic	0	0	X	X	X	0
6	CMS / classic	X	0	0	0	X	0
7	CEB / classic	0	X	0	X	0	0
8	DAY / classic	0	X	0	X	0	0
9	IAM / classic	X	0	X	0	X	0
10	MID / classic	0	0	X	0	0	0
11	MER / classic	X	X	0	0	0	0
12	MEL / classic	0	0	X	X	0	0
13	MOC / classic	0	X	0	0	0	0
14	MAR / classic	X	A	0	X	X	0
15	PDD / classic	X	X	0	X	0	0
16	PER / classic	0	X	0	0	X	0
17	PVR / classic	0	X	0	X	0	0
18	PS / classic	X	0	X	0	X	0
19	PAC / classic	0	X	0	X	0	0
20	PMC / classic	X	0	X	0	X	0
21	PAI / classic	0	0	0	X	0	0
22	RMC / classic	X	0	X	0	X	0
23	REB / classic	0	X	X	0	X	0
24	SDD / classic	X	0	0	X	0	0
25	SMB / classic	X	0	X	0	X	0
26	SIC /classic	0	X	0	0	X	0
27	TVG / classic	0	X	0	0	0	0
28	VMM /classic	X	0	X	0	0	0
29	ZAB / classic	0	X	X	X	0	0
	Number of "YES"	16	15	17	16	17	29
	Number of "NO"	13	14	12	13	12	0

Mode / unit of learning / lesson : automation systems / elements of automatic regulation systems / flow translators; Quick recording of students' activities (YES = 0 NO = X)

Table 4.Statement of systematic observation of business students group 2.

No	Student's first and last name / learning style	Communi-cation	Collabo-ration	Involvement / Action	Creative imagination	Observance of the rules	Solving tasks
1	BDD / practical	X	0	0	0	0	0
2	BBI / visual	0	0	X	0	0	0
3	BCD / practical	0	0	0	X	0	0
4	BEC / practical	0	0	X	0	X	0
5	CIR / auditory	0	0	X	0	0	0
6	CAE /practical	0	0	0	0	X	0
7	CAM /visual	0	X	X	0	0	0
8	CAN /visual	0	0	X	0	0	0
9	CDR /practical	X	0	0	0	0	0
10	EMC /practical	0	0	0	0	0	0
11	CGD /visual	0	0	0	X	0	0
12	DIA /auditory	0	X	X	0	X	0
13	DIS /auditory	X	0	0	X	0	0
14	GEM/practical	X	a	0	0	X	0
15	GAI /auditory	0	X	0	0	0	0
16	IEA /auditory	0	0	0	0	0	0
17	MCG /auditory	X	0	0	X	0	0
18	MDA /practical	0	0	0	0	0	0
19	MMA / visual	0	X	0	0	0	0
20	MED /visual	X	0	0	0	0	0
21	MIS /auditory	0	X	0	0	0	0
22	NEA /practical	A	0	0	0	0	0
23	PSA /visual	X	0	0	X	0	0
24	PLL /practical	0	0	0	0	0	0
25	UDM /auditory	0	0	0	X	0	0
26	VVA /auditory	X	0	0	0	0	0
	Number of "YES"	18	22	20	20	22	26
	Number of "NO"	8	4	6	6	4	0

Mode/unit of learning/lesson: Automation systems/elements of automatic regulation systems / flow translators. Quick recording of students' activities (YES = O / NO = X)

4 Conclusion

Considering both the scientific and the pedagogical aspects treated in the paper, the following conclusions can be drawn:

1. In order to increase the level of preparation of the students, it is indicated the use in the classroom of the differentiated worksheets, but also of some didactic strategies that to stimulate the individual work at home.

2. Regarding the assimilation by students of knowledge, the formation of skills or competences specific to the topic, the training methodology provides the with a wide range of teaching strategies, teaching aids and assessment techniques, dealt with extensively in the paper, with which each student, regardless of his psycho - pedagogical profile, should be able to reach at least an average level of training.

3. The didactic experiment also highlighted the fact that students prefer to learn as much as possible in the classroom, which requires the professor to establish homework tasks as compressed as possible, which only complement or correct what has been done in class. These results from the interpretation of the results of the pedagogical experiment, from which it can be observed that the average of the class at the summative evaluation is close to the average of the class at the evaluation sheets differentiated on learning styles, solved in class, after teaching.

4. The analysis and interpretation of the obtained data indicates a positive tendency to improve students' school results in favor of the experimental class, an evolution in oral and written expression, in activating and nuanced vocabulary, transforming the professor-student relationship into a modern and democratic one. enjoying an efficient communication based on collaboration, mutual help, freedom, initiative, due to some methods, such as: the didactic game, the bunches, the mosaic, the cube, etc.

5. The presented data highlight sufficiently the advantages of the introduction in the didactic technology of the student-centred training, by using the learning activities differentiated on the students' learning styles.

We can say that this research was a challenge for me, an opportunity to study both the literature and the psycho-pedagogical literature, to deepen and enrich my knowledge about creativity and student-centred learning as a complex but current phenomenon which is vital for the future.

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