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Impact of the sudden change of the approach in sciences on the teaching-learning process in the first pedagogical humanities of Lubumbashi

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Abstract
This article presents the situation of the teaching and learning of sciences (physics and chemistry) among pupils of first year of pedagogical humanities.
This article is particularly interested in teachers holding the science course (physics and chemistry) and the impact of the sudden change from the Situation-Based Approaches (SBA) to the Objective-Based Approach (OBA) on the development of basic skills and the teaching-learning process among students in the first of the pedagogical humanities in the Lubumbashi I sub-division. It first presents some weaknesses of the OBA and some interesting innovations of the SBA. Then, he is interested in the descriptive data taken from the questionnaires intended for students and teachers concerning two fields of information: 1) the success rate in science in the OBA 2) the perception of science by students in the OBA. The article also examines the relationships between the abrupt change of approaches and the variables of these two fields.

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1. Introduction

For several years, the Congolese government has been concerned about the quality of science learning. This attention emerges from the importance that science has taken on in the industrial development of countries (Conseil économique du Canada, 1990; Larochelle and al, 1995; Herry, 2000) [1, 7, 2]. In any case, the ability to master and apply science is an indispensable factor in the process of modernization and development of educational systems and hence of economic systems in any country (Programmes éducatifs du Domaine d'Apprentissage des Sciences, classes de 7ère et 8ème années des Humanités Scientifiques; Sous-domaine d'apprentissage: Sciences Physiques et TIC, 1ère édition, Kinshasa, 2018) [10]. A first analysis made by the Technical Team the of Education Project for the quality of Higher and University Education (EPQHUE) on the old programs (approach by objective) revealed that among many others, the weaknesses The following characterize the said programs: The learning according to the approach by the situations is only theoretical; the profile to which the student should end up at the end of the training program is hardly defined; the content has little quality and relevance due to the lack of consistency between them; not taking into account the concept "Situation" to develop the student's skills; the absence of precise instructions in the processing of the evaluation.
It is by taking into account all these shortcomings that the Technical Team of the Project (EPQHUE) has embarked on a profound reform for the development of new educational programs for the learning of sciences.

Since 2016, the Congolese government has implemented the process of reforming the education system, which began with the drafting of innovative educational programs for the Field of Training of Sciences (FTS) for the Final Cycle of basic Education (FCBE). Unfortunately, this reform is only generalized at other levels of the scientific humanities (Service National de Formation, 2019) [11]. In the other options of the humanities, the same sciences are taught according to an old pedagogical approach based on the objectives resulting in the lack of efficiency in the transmission of disciplinary content.

The reformed educational programs are centered on the Situation-Based Approaches (SBA): they essentially target the student's activity in situations that allow him to act on essential knowledge. The same educational programs present the teacher with the elements he needs to manage this student activity in the classroom. Unfortunately, the students of the other options are victims of the sudden change from the Situation-Based Approaches (SBA) to an objective Based Approach (OBA) during their school career.

KASANYA *et al.* (2022a) [3] concluded on the disappointing contribution of the abrupt generalization without assessment of the state of the essential prerequisites in terms of regulatory texts, capacity building of human resources and infrastructure of FTS programs for the FCBE and for the other levels of the scientific humanities to the intellectual as well as socio-emotional training of the learners. Because among the basic skills defined in the programs of the physical sciences and technology learning area by the Ministry of Primary, Secondary and Technical Education, only less than 25% are developed by students in the final cycle of education in base in physical sciences and more particularly in the discipline of chemistry. For the Ministry of Primary, Secondary and Technical Education, educational programs centered on SBA play a preponderant role in the activity of the student in situations that allow him to act on essential knowledge in the teaching process/learning and making him able to concretely use school knowledge in everyday situations. It has been shown that the sudden change from one approach to another in an educational structure resulting in the lack of efficiency in the transmission of disciplinary content has a negative impact on the intellectual and socio-affective formation of learners and on the development of their skills. (Meq, 2001; OCDE, 2013) [8, 9].

The sudden change in approach from SBA to OBA during their school career could have a perverse effect on students' attitudes towards science and on their performance in science. Because according to the results of the international survey on the teaching of mathematics and science by the IEA and summarized by Herry (2000) [2], French-speaking students in Ontario in Canada who had experienced a change in approach found science boring.

This article is particularly interested in teachers holding the science course (physics and chemistry) and the impact of the sudden change from the Situation-Based Approaches (SBA) to the Objective Based Approach (OBA) on the development of basic skills and the teaching-learning process among students in the first of the pedagogical humanities in the Lubumbashi I sub-division. It first presents some weaknesses of the OBA and some interesting innovations of the SBA. Then, he is interested in the descriptive data taken from the questionnaires intended for students and teachers concerning two fields of information: 1) the success rate in science in the OBA 2) the perception of science by students in OBA. The article also examines the relationships between the abrupt change of approaches and the variables of these two fields.

The article aims to verify the impact of the sudden change in the approach to science on the teaching-learning process and on academic performance in science (physics and chemistry).

2. Materials and Methods

To collect our data, we carried out an investigation with semi questionnaire open and directional. This method of investigation was supported by the techniques of interview and documentary analysis.

2.1 Sites of study and Sampling

2.1.1 Sites of study

We undertook our research in the subdivision of Lubumbashi I, one of the subdivisions of the educational province of Haut-Katanga I in Democratic Republic of Congo (DRC). The reason which pushed us to retain this subdivision among so many others is the facility to reach the majority of schools being in the center of the city and its surroundings. During our pre-investigation we had counted with the complicity of the persons in charge of the subdivision 63184 pupils and 4499 teachers for all sections and confused classes. And for the classes of 1st pedagogical humanities only, we had counted 3012 pupils and 146 teachers teaching in 7th and 8th of basic education.

2.1.2 Sampling of the schools and teachers of the physical sciences and technology

The 229 schools of the Lubumbashi1 subdivision function in management modes. To make our study, during our pre-investigation, we had counted with the complicity of the persons in charge of the subdivision six management modes. To this end, each mode of management was represented by the number of schools which it contains divided by six (a number of modes), we assigned at each school a number by mode of management. After we cut and folded these numbered papers, then we carried them in a ballot box. We operated a pulling randomly. At the end, the random sampling showed the names of 38 schools selected. Curiously in each selected school, the course of the physical sciences and technology of 7th and 8th were taught by a same professor. The sample size of the teachers finally retained is 38 (with more than 89 % of teachers evolving/moving in the private schools) who constitute the small-scale model drawn from all the teachers of the subdivision of Lubumbashi I who form together the universe of investigation (the population mother). In the table1, we represent the number of schools and teachers selected by management mode.

Table 1: Sampling of the schools and teachers

Network	PA	NC	CC	PC	AC	KC	Total
Number of schools	206	9	8	3	2	1	229
Number	34.3	1,5	1,3	0,5	0,33	0,16	38,09
Rounded number	34	2	1	1	0	0	38

PA: Privates Approved**; NC:** Not Conventional**; CC:** Catholic Conventional**, PC:** protestant conventional**; AC:** adventist conventional **& KC:** Kimbanguist conventional.

2.1.3 Sampling of pupils

The time constraints and the reasons of convenience on the ground pushed us to retain 5 pupils per school. For each class we assigned with all the names of the register of call a number. After we cut and folded these numbered papers, then

carried in a ballot box. We operated a pulling randomly. At the end, the random sampling showed the names of the pupils selected. The sample finally selected is of 190 pupils (at a rate of 5 pupils per selected school) who constitute the small-scale model drawn from all the pupils of the subdivision of Lubumbashi I who form together the universe of investigation (the population mother).

2.2. Statistical analysis

The asked questions offered to the respondents a choice of answers of which the number varied from four to six. The averages obtained were subjected to univariate variance analysis (ANOVA) with statistical software XLSTAT-Pro7.5.The independent variables were the studied variables and the choice of the scientific option to humanities constituted the dependent variable.

3. Results and Discussion

The results relating to the area of training of the survey conducted among 38 teachers responsible for the physical sciences and technology course are shown in Table 2 below.

Table 2: Area of teacher training

Training Fields	Options	Frequency	%
Applied pedagogy	Chemistry-physics	3	7,89
	Biology- Chemistry	9	23,68
	Mathématics-physics	5	13,16
Medicine	Human	2	5,26
Faculty of sciences	Pure chemistry	3	7,89
polytechnique	Industrial chemistry	10	26,32
	Métallurgy	5	13,16
Agronomic Sciences	Foodstuffs chemistry	1	2,64
Total		38	100

The question concerning the field of training was asked to determine the number of qualified and unqualified teachers in the sample. Reading Table 2 shows that 17 out of 38 teachers sampled, so that only 44.73% of teachers are qualified and the remaining number constitutes the list of under-qualified teachers. More than half of our sample would not ensure teaching practices by training but by nature and situational difficulties.

It should also be noted that 3 out of 17 qualified teachers, so that only 17.6%, are well placed to teach the physical sciences-technology course because they have had a rich curriculum in chemistry and physics courses. These results corroborate those of KASANYA et (2022b) [4] who also found that only 3 out of 17 teachers taught the physical sciences-technology course.

Table 3: Seniority in 1st pedagogy Humanities classes

Seniority	Frequency	%
≤ 3years	7	18,42
3-10 years	13	34,21
More than 10years	18	52,63
Total	38	100

Table 3 presents the results relating to the seniority of teachers holding the physical sciences course in 1st Pedagogical Humanities **(**PH).

It appears that most of them have a seniority of more than 10 years or even (52.63%). Just by this element, we think we know that they have experience in the analysis of the educational system of children. And they could have an idea about the quality of the results obtained by the learners of the old program and that of the results obtained by the learners subjected to the new program.

Table 4: Degree of love for science

Degree of love for science	Frequency	%
I don't like sciences (chemistry and physics)	117	61,6
I like well science (chemistry and physics)	73	38,4
Total	190	100

Table 4 presents the results of students who like science (chemistry and physics). It appears that:

- More than 60% of students do not like science
- Only 38.4% of students like science (chemistry and physics). This could be explained by the negligence that some students have for courses that are not of their option. This low degree of love for science could also be explained by the fact that society continues to make students who are not scientific humanities believe that chemistry and physics are difficult, resulting in disgust at being interested in science.

We have identified a relationship between the perception that students have of their level of love for science and The greater difficulty of science in 1st PH than in 7th and 8th basic education [$F(3.2874)=6.0$; $p<0.001$]. Pupils who found the sciences more difficult in 1st PH than in 7ème and 8ème of basic education actually say that they are not very interested in them. This finding parallels that of Meq (2001) [8] in Canada, who found that successful learners in science showed a desire to study science and tended to choose science faculty.

Table 5: Boredom of science in the 1st pedagogical humanities

Boredom of science	Frequency	%
Yes	65	89
No	8	11
Total	73	100

Table 5 shows that 89% of pupils find science more boring in 1st PH than in 7th and 8th of basic education. This can be explained by the sudden change from the OBA to SBA during their low school career, causing a perverse effect on students' attitudes towards science and on their performance in science. These results are similar to those of the IEA International Mathematics and Science Education Survey summarized by Herry (2000) [2]. The IEA had found that French-speaking students in Ontario (Canada) who had experienced a change in approach found science boring. We found a relationship between students' perception of science boredom and academic performance in science. The few students who are not bored with science actually do well in science [$F(3.4335)=7.0$; $p<0.001$]. This relationship was also identified by Kasanya *et al.* (2022a) [3].

Table 6: The greatest difficulty of science in 1st PH than in 7th and 8th basic education

The Greatest Difficulty of Science	Frequency	%
Yes	67	91,8
No	6	8,2
Total	73	100

Table 6 presents the results for science difficulty. It shows

that more than 90% of learners find science more difficult in 1st PH than in FCBE. This can also be explained by the sudden change of the OBA approach to SBA during their school career, causing a perverse effect on students' attitudes towards science and on their performance in science. Since this attitude is related to science performance, it has a negative effect on average learner performance. Laflamme and Dennie (1990) [6] made similar observations on the career choices of Francophone adolescents in Ontario in a book whose title "L'ambition démesurée" reflects the results of their survey.

Table 7: The results of tasks performed in groups

The results of tasks	Frequency of professors	%	Frequency of pupils	%
Excellent results	0	0	3	4,1
Good results	21	55,3	37	50,6
Pretty good results	12	31,6	16	21.9
poor results	3	7,8	4	5,4
Bad results	5	5,3	3	4,1
Total	38	100	73	100

After a careful analysis of table 7, it appears that more than 50% of students obtain good results when they work in a work group. As for physics and chemistry teachers, the finding is the same, because more than 55% think that learners do well when they work in groups. This could be explained by the fact that group work has become a habitual situation for them since 7th and 8th in SBA. These results corroborate those of Tourigny (2004) [12] who found in Canada that the children of the rising promotions experienced pleasure in working in a group.

Table 8: The results of the tasks carried out individually

The results of Tasks	Frequency of Professors	%	Frequency of Pupils	%
Excellent results	0	0	2	2,7
Good results	6	15,8	11	15,1
Pretty good results	9	23,7	15	20,1
poor results	9	23,7	15	20,0
Bad results	14	36,8	30	41,1
Total	38	100	73	100

Table 8 shows that 41.1% of pupils obtain poor results when they work individually. This could be explained by the fact that in OBA, they are disconnected from the teamwork and mutual assistance to which they were accustomed in SBA at the FCBE. On the side of the physics and chemistry teachers, the finding is the same, because more than 36% think that the pupils obtain bad results. These results are similar to those of Koretz (1994) [5] who found that the more a task is handled in a work group, the more the resulting work flourishes.

We found a relationship between individual or workgroup results and academic achievement in science. [F (3.5986) =8.5; $p<0.001$]. Learners who work in groups do well in science.

4. Conclusion

Our research entitled "the impact of the abrupt change of approach in science on the teaching-learning process" has the general objective of verifying the impact of the abrupt change of approach in science on the teaching-learning process learning and academic achievement in science (physics and chemistry).

The abrupt change from the SBA approach to the OBA approach during a short school career has had a perverse effect on pupils' attitudes towards science and on their performance in science, since more than 80% of pupils find the more difficult sciences boring in 1st PH than in 7th and 8th of basic education.

The descriptive data drawn from the questionnaires intended for students and teachers indicate that learners who are disconnected from teamwork and mutual assistance to which they were accustomed in SBA in the Final Cycle of Basic Education, while more than 70% of students do not achieve good results when working individually.

It should be noted that the science program of the FCBE described in the field of science learning has never been unanimous, both within the world of education and the political class. Indeed, the development of this program took place in a highly politicized context. The generalization of programs in all schools was carried out without careful assessment of the state of the essential prerequisites in terms of regulatory texts, capacity building of human resources and infrastructures in order to guarantee the expected efficiency of both teaching staff and administrative than learners, the main beneficiaries of the reform.

Based on our results, we were able to confirm that the sudden change from SBA to OBA approach during a low school career had a negative impact on students' attitudes towards science and on their performance in science resulting in an unhealthy teaching-learning process.

This article shows the impact of the sudden change from the SBA approach to OBA during a low school career on the teaching-learning process. It constitutes an orientation for future researchers who should think about verifying this impact in the last 3 classes of pedagogical humanities.

5. Suggestions

It is true that taking our suggestions into account would not systematically lead to an improvement in science performance. But it will still be a step towards improving the teaching-learning process and academic performance in science.

We propose to carry out a careful assessment of the state of the essential prerequisites in terms of regulatory texts, capacity building of human resources and infrastructures in order to guarantee the expected efficiency of both teaching and administrative staff and learners, the main beneficiaries of the reform.

We propose to the Congolese state to extend the generalization of science education according to the SBA to other areas of learning.

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