Influence of the Residence and Disturbance (School Violence) on the Study of Chemistry at Secondary Level

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Abstract: The decreasing of the number of students interested in studying chemistry needs immediate measures to stop this trend. The profession that we have chosen and especially the fact that we teach chemistry force us to take action and try to find out the origin of this phenomenon. A teaching experiment was conducted at two schools in the county of Iasi, Romania, focused on two important issues in the study of chemistry: *Chemistry*, seen from the student's point of view, as a discipline of study in secondary school; *Violence*, a disturbing factor in the educational process and not only.

Introduction

This study aims to achieve two important issues related to the study of Chemistry: *Chemistry*, seen from the student's point of view, as a subject of study in secondary school and *Violence*, a disturbing factor in the

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educational process and not only. The study was conducted from March to April 2008 and it involved two schools: "*Costache Negruzzi*" College, Iasi where 42 students from the 8th class were questioned and "*D. D. Patrascanu*" School, Tomesti where 54 and 56 students, respectively, from the 8th class were questioned. The first issue of the study, and the most important one, requires conducting sau to undertake some studies because the number of students interested in this subject has decreased lately. This requires taking immediate measures that could stop this decrease. It has been considered necessary to take into consideration the subject: "*Violence - the star of the Romanian mass media*". The notion "violence" includes a wide range of forms which describe a continuous line, in terms of intensity. Thus, for example, at its lowest intensity, violence means visual confrontation, nicknaming, teasing, and mocking, while high-intensity forms of violence are refusal to provide aid, physical attack, injury produced with different objects, pushing, stabbing and shooting.

As sources of aggression we are mentioning those regarding the individuals (frustration, physical and moral pain, alcohol, drugs, attacks, crowding, heat, stress, pornography), family (behaviour models, social/economic problems, marriage problems, divorce, separation, beating, incest), and mass-media (TV programmes, newspapers or magazines).

The purpose of this study is to establish the followings:
- If there are major differences between students from rural and urban backgrounds, considering the process of education and the equipment that each institution has.
- If the pupil's living environment has an impact on his decisions on future education.

- If the attitude of the prospective high school pupil and his interest in the study of nature sciences - Chemistry are linked to the teaching educational system.

- If aggressiveness forms are involved in the teaching process.

- If regardless of the environment he comes from, the pupil is capable of taking decisions about his future profession/job without taking into consideration all the educational factors involved.

- If violence forms are the same, no matter the environment the pupil comes from.

Two types of questionnaires were distributed to the subjects nominated from the above mentioned schools: *Questionnaire I*, which refers to the teaching methods preferred by students, and also to the implication of this subject in their educational future, and *Questionnaire II,* which raises the problems regarding violence and behavior in different occasions, with children between 14 and 15 years old.

Questionnaire I

A. In the chemistry classes, do you prefer:

   1. real experiments?   2. virtual experiments?

B. In understanding specific chemistry phenomena, do you prefer/ are you helped by:

   1. explanations from educational software?

   2. explanations from the teacher?

   3. mixed explanations?

C. Is chemistry involved in your educational route?

   1. Yes   2. No   3. I don't know

Questionnaire II

A. Do you think that seeing aggressive movies and TV programmes frequently influences the behaviour of the aggressive people?

1. Yes   2. No

B. Can frequent exposure to violence make people insensitive to violence?

1. Yes   2. No

C. Have you ever been a victim of an aggressive behavior in school?

1. Yes   2. No

D. Have you ever received observations from your classmates because of your inadequate behavior?

1. Yes   2. No

E. From various forms of aggression (hitting a classmate, hitting an object, intimidation, obscene words, strong language, offenses, threats, noise, indiscipline), choose three that you consider the most frequent in your school.

The results of these questionnaires will be analysed using the χ^2 test. The test implies the association of 2 nominal variables. The χ^2 test was elaborated by Karl Pearson (1857-1936), a British mathematician, statistician and biologist. The test aims to determine if there is a significant difference between non-numeric categorical variables that are expressed numerically. We aim to evaluate hardly measurable variables through this non-parametric test. The scales of measurement for the variables can be *Nominal* (used in the case of these questionnaires), *Ordinal, Of interval, Of proportion, and Absolute.* A measure scale should be *Exhaustive* (it should measure all entities it is designed for) and also *Mutual-exclusive* (each entity receives just one value through measurement). Applying the χ^2 test we will

find out if our nominal variables are associated or not. The conditions of applying this test are that no more than 20% of the table's elements have fewer than 5 elements.

The statistical arguments consider the formulation of 2 hypotheses:

- ***The null-H_0 hypothesis***: variables **a** and **b** are not associated;

- ***The alternative-H_1 hypothesis***: variables **a** and **b** are associated;

- ***The null-H_0 hypothesis***: $\chi2$ *calculated* $< \chi^2$ *theoretical* for an allowed risk coeficient;

- ***The alternative-H_1 hypothesis***: $\chi2$ *calculated* $> \chi^2$ *theoretical* for an allowed risk coefficient.

The sizes that appear in this test are: α– allowed risk coefficient ($\alpha=0.05$) and *df* – degree of freedom [calculated by (r-1)(s-1)], where: r – number of modalities of the **a** variable and s – number of modalities of the **b** variable.

Results and Discussions

The results obtained after applying the questionnaires to the target students are listed in the Tables 1-5:

Questionnaire I (Chemistry)

Table 1. School results

	Number of students questioned		
Option Question	1.	2.	3.
A	51(41)	3(1)	-
B	15(10)	27(15)	9(17)
C	27(20)	7(16)	20(6)

Table 2. Classes results

Option Question	Class VIII A (C): 22(21) students			Class VIII B(D): 18(21) students			Class VIII C: 14 students		
	1.	2.	3.	1.	2.	3.	1.	2.	3.
A	21(21)	1(0)	-	16(20)	2(1)	-	14	0	-
B	7(3)	11(13)	3(5)	3(7)	11(2)	2(12)	5	5	4
C	15(12)	1(7)	6(2)	9(8)	1(9)	8(4)	3	5	6

The number out of brackets represents the number of students questioned from "D. D. Patrascanu" School from Tomesti and the number in brackets the number of students from "Costache Negruzzi" College.

Questionnaire II (Violence)

Table 3. School results

Option Question	Number of students questioned	
	1.	2.
A	40(30)	16(12)
B	51(29)	3(13)
C	24(20)	32(22)
D	14(9)	41(33)

Table 4. Classes results

Question \ Option	Class VIIIA(C): 24(21) students		Class VIIIB(D): 18(21) students		Class VIII C: 14 students	
	1.	2.	1.	2.	1.	2.
A	15(15)	9(6)	15(15)	3(6)	10	4
B	23(15)	0(6)	17(14)	0(7)	11	3
C	5(8)	19(13)	12(12)	6(9)	7	7
D	9(8)	15(13)	3(1)	15(20)	2	11

For question number 5 from this questionnaire, answers have been given by the students of the 8th grade in Table 5.

Table 5. Classes results

Form of aggression encountered in school	Class VIII A(C)	Class VIII B(D)	Class VIII C
Loud noise	10(12)	3(16)	1
Intimidation	5(6)	4(8)	3
Hitting with an object	1(8)	4(8)	1
Swearing	6(17)	4(18)	1
Threatening	6(10)	5(13)	6
Offending	12(13)	7(14)	8
Obscene words	6(12)	8(16)	8
Lack of discipline	7(9)	3(9)	2

The Application of test χ^2 for questionnaire I (Chemistry)

In these two schools, the 96 students were classified by the following two variables a), b) of each question, as described in the Tables 6-8.

Question A:

Variables: a) residence environment:

a1) urban

a2) rural

b) experiment type preferences:

b1) real

b2) virtual

Table 6. Association table for "*preference for experiments*"

Variable	Urban	Rural
Real experiments	41	51
Virtual experiments	1	3

Conclusions: Because 2 of the variables have fewer than 5 elements, the test is not applied. From what we can observe, both rural and urban environment students *prefer real experiments*.

Question B:

Variables: a) residence environment

a1) urban

a2) rural

b) explanations received from various sources

b1) from software

b2) from teachers

b3) from combined sources

Table 7. Association table for "*explanations from various sources*"

Variable	Urban	Rural
Software explanations	10	15
Professor explanations	15	27
Combined explanations	17	9

$\chi^2 theoretical$(α=0.05 and df=2) =5.99; $\chi^2 calculated$ =6.04

α- recognized risk factor; df – degree of freedom.

Because $\chi^2 calculated > \chi^2 theoretical$ for the risk factor 0.05, we accept *the alternative hypothesis, H₁,* according to which the variables *a* and *b* are associated, which means that there is a connection between *"The residence environment"* and *"explanations received from various sources"*, in the sense that those from the *urban environment* prefer the explanations given by the teacher, plus the combined ones, and those from the *rural environment* prefer also the explanations given by the teacher, as well as those from educational software. The students from the *rural environment* are still dependent on the explanations given in the classroom (27), which demonstrates that they do not have access to many means?? of information.

The students from the rural environment prefer probably the computer because they have less access to it than those from urban area.

Question C:

Variables: a) residence environment:

a1) urban

a2) rural

b) Involving chemistry in choosing an educational route

b1) yes

b2) no

b3) I don't know

Table 8. Association table for "Involving chemistry in choosing an educational route"

Variable	Urban	Rural
Yes	20	27
No	16	7
Don't know	6	20

$\chi^2 theoretical$ (α =0.05 and df=2) =5.99; $\chi^2 calculated$ =11.

Because $\chi^2 calculated > \chi^2 theoretical$ for the risk factor 0.05, we accept *the alternative hypothesis, H_1,* according to which the variables *a* and *b* are associated, which means that there is a connection between *"The resident environment"* and *" Involving chemistry in choosing an educational route",* in the sense that:

➢ those from the *urban environment* have access to many more sources of information and they know that they will choose a scientific section, where Chemistry has a higher share or a humanistic section, where Chemistry has a smaller share;

➢ those from the *rural environment*, either appear disinterested (20 of "I don't know") or they have access to fewer means of information; but just as with the previous question, for them Chemistry has a higher share in choosing an educational route.

The application of the χ^2 test for questionnaire II (violence in schools)

In these two schools, the 98 students were classified by the following 2 variables a), b) of each question, as described in Tables 9-11.

Question A:

Variables: a) residence environment:

a1) urban

a2) rural

b) watching aggressive movies and TV programmes frequently induces aggressiveness:

b1) yes

b2) no

Table 9. Association table for „*aggression induced by movies, TV*"

Variable	Urban	Rural
Yes	30	40
No	12	16

$\chi^2 theoretical$ ($\alpha = 0.05$ and $df=1$) $=3.84$; $\chi^2 calculated =0$

Because $\chi^2 calculated < \chi^2 theoretical$ for the recognized risk factor of 0.05, we accept the null hypothesis, H_0, which states that variables *a* and *b* are not associated, in other words no association exists between *"Residence environment"* and *"Watching aggressive movies and TV programmes frequently induces aggressiveness"*, in the sense that aggressiveness provokes aggression, regardless of the urban or rural residency.

Question B:

Variables: a) residence environment:

a1) urban

a2) rural

b) exposure to violence induces insensibility to violence:

b1) yes

b2) no

Table 10. Association table for "*violence induces insensibility to violence*"

Variable	Urban	Rural
Yes	29	51
No	13	3

$\chi^2 theoretical(\alpha=0.05$ and $df=1) =3.84; \chi^2 calculated =10.96$

Because $\chi^2 calculated > \chi^2 theoretical$ for the risk factor 0.05, we accept *the alternative hypothesis, H₁,* according to which the variables *a* and *b* are associated, which means that there is a connection between *"The residence environment"* and *"Exposure to violence induces insensibility to violence"*, that is the closer they are to violent images transmitted through mass media, to people from their own entourage which have a deviant behavior or use a vulgar and aggressive language, they are becoming themselves violent persons, insensitive to the violent actions around them.

Question C:

Variables: a) the residence environment:

a1) urban

a2) rural

b) victim of an aggressive behavior

b1) yes

b2) no

Table 11. Association table for "*victim of aggressive behavior*"

Variable	Urban	Rural
Yes	20	24
No	22	32

$\chi^2 theoretical(\alpha=0.05$ and $df=1) =3.84;$ $\chi^2 calculated =0.21$

Because $\chi^2 calculated < \chi^2 theoretical$ for the risk factor 0.05, we accept *the null hypothesis, H_0,* according to which the variables *a* and *b* do not associate, which means that between *"The resident environment"* and *"Being the victim of an aggressive behavior"* there is no connection in the sense that aggressive behavior can occur any time and anywhere, regardless of age, sex, the environment you come from or where you live.

Conclusions

In this paper we intended sau aimed to establish that in our teaching work, along with modern and traditional educational approaches, it is necessary and useful to take time to communicate more with the students.

Forms of efficient communication are the questionnaires with the help of which we can find that children usually hide.

In terms of choice of learning paths, students in both environments have in view Chemistry.

About violence, we discovered that the most common forms at secondary school level are injuries, swearing and noise.

Therefore we learned that at secondary school level Chemistry awakens children's interest particularly if real experiments are performed. Teacher explanations are received with interest by students in both urban and rural areas.

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