

What makes students drop out of the Chemistry track in Secondary Education in Cyprus

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Context of my research

Education in Cyprus faces major challenges which may hinder its future development. One of the most important problems is a negative attitude towards the subject of Chemistry, which has resulted in a high number of dropout students from the Chemistry track in the second and third (final) year of the Lyceum. It is obvious from the above that this issue is very important to me. As a teacher of Chemistry I would like to see more students being interested in Chemistry, and an increasing number of students choosing Chemistry as a specialization subject.

I am confident that my project will also be very important to my target audience. I believe that my work will meet the needs of my target audience (Ministry of Education, school, colleagues, and students). It is obvious that through both questionnaires and interviews a few negative and positive points will be elicited from my findings. The target audience should take into consideration the above and through modifications, adjustments, instructional changes and redefinitions, the necessary changes should be incorporated into their policies, with a view to addressing the problem of students' dropping out of the Chemistry track.

Aim/Objectives

- o Knowing that what students want is the key factor to change a situation, I decided to explore what students think about.

- o My main aim was to find out what factors foster or hinder students' perspectives of dropping out of Chemical track.

Research Questions

- o *I tried to ascertain If effective teaching methods-effective teacher improve students' attitudes towards Chemistry*
- o *If teaching by computers has a positive impact on students' performance*
- o *If a low performance contributes to a considerable dropping out of the Chemistry track*
- o *If teachers should emphasise individualized learning processes.*
- o *If a teacher should clarify any difficult concept of Chemistry to each pupil separately*
- o *If teachers should give more emphasis on the relationship between Chemistry and real life.*
- o *If the education system in Cyprus is responsible for the above problem*
- o *If a suitable classroom environment enhances students' attitudes towards Chemistry*
- o *If interaction and participation of students is an essential factor for learning process*

Methodology

Research families, Research approaches and Data collection techniques

Having defined the research questions and sub-questions, tried to find out how this investigation should be carried out.

To determine the most appropriate method, the following factors were taken into consideration

- Research questions

- Personal strengths and preferences
- Opportunities available to me

The survey has been used as the main research instrument. As regards data collection, questionnaires were utilised as the main technique. Since my survey is aimed at finding out what makes students drop out of the Chemistry track from the students' perspective, I used questionnaires with as large a sample of students as possible in my investigation.

Being aware of the fact that a quantitative research design with questionnaires focuses on understanding the essential characteristics of an object studied numerically, I made a deliberate decision at the beginning of my research to add interviews to my main research technique as a qualitative research tool in my investigation in order to provide extra depth to my survey and, also, for triangulation reasons, as combined methods offer greater possibilities of validity and reliability. I intend to transcribe interviews personally, due to the fact that not only tone of voice, change of voice and pauses are important but equally good indicator is a body language movement, which, though it cannot be recognised on a tape, could be identified by a researcher should s/he be present at the interview. The greatest degree of accuracy of these transcripts will rely on the researcher transcribing them personally (Ives, 1999). The interviews were transcribed verbatim in an attempt to record every facet of the interview for later analysis.

Research approaches - Research techniques

The Survey has been chosen as the main research method because it offers flexibility and could vary in level of complexity. A survey approach goes beyond mere findings and descriptions and provides the opportunity for some sort of analysis and explanation about why things are as they seem to be. It can be said that the main advantage of the survey approach is the ability to gather data from a wide range of representative respondents. Surveys are usually characterised by the effort to apply findings of a small scale research on a wide scale and generalise them.

In addition, elements of experiment were used within a kind of action research as a supplementary approach, for further triangulation and with a view to improving professional practice in teaching Chemistry.

In my case the following actions were carried out:

- a problem was identified, namely that students do not choose Chemistry as a specialisation subject
- students perceptions were investigated answering questionnaires
- a kind of action research was conducted with elements of an experiment
- an assessment of students' performance had taken place

I used a sort of experiment during the first semester by dividing the students into an experimental group (40 students) and a control group (38 students). I taught the module **Reactivity of metals** to the experimental group using the method of **Learning at stations** via the use of a computer (power point, with video simulations, spreadsheets, working in groups). After the demonstration, the students had the opportunity to cooperate and fill in a spreadsheet. Students were divided into groups (3 student in each group).The control group was taught this module by using a conventional approach.

Project Findings

My fundamental aim, as already mentioned, was to gather data on the topic of why students attending state secondary schools drop out of the Chemistry track, and develop a deeper understanding of the subject, exploring not only what respondents think but why they think so.

My study focused on students aged 15 in the first grade of the Unified Lyceum of Pallouriotissa in Nicosia at the end of first semester when their memories were fresh. My investigation dealt with only students of the first grade, since I teach four classes of this and this fact enabled me to divide students into two groups so that I could compare the results of the experiment.

I investigated the students' views based on to the following key dimensions:

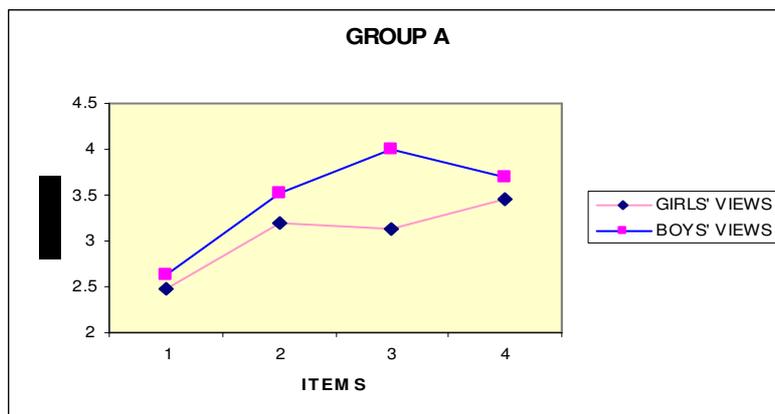
VARIABLES	
Independent variables:	Dependent variables:
<ul style="list-style-type: none"> ■ Gender ■ Chemistry orientation 	<ul style="list-style-type: none"> ■ A.Students' views of the importance of Chemistry ■ B.Aspects of Chemistry students found uninteresting ■ C.Students' views about the curriculum and entrance examination system ■ D.Students' views about the teaching method Learning at station

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In terms of group A, which deals with students' views on the importance of Chemistry, the salient message that is generated from the answers is that boys (*it is a prestigious subject 3.52 - 0,65*) hold Chemistry in a higher esteem than girls (*3.13 - 0.58*). However, although both boys and girls do not consider Chemistry to be necessary for future employment they believe that the subject is a prestigious lesson, which is closely related to contemporary life and contributes toward developing critical thinking in terms of scientific issues. Students' responses were selected from 5 options on a Likert type 5-point scale with the following descriptors: 1 = strongly disagree, 2 = disagree, 3 = No opinion, 4 = I agree, 5 = I strongly agree.

The above can be demonstrated in the following chart.

Chart 1: The importance of Chemistry as perceived by students



GROUP B: Aspects of Chemistry students found uninteresting

In terms of the second group of questions it is obvious that girls consider Biology to be an easier subject than Chemistry while boys consider Physics to be easier. One major feature of this data set is that girls made many more negative comments on physics than boys, who support that school physics still lacks appeal for girls. It is obvious from the findings that there is a general agreement that many aspects of Chemistry are “hard” or “difficult to understand” which in turn makes them uninteresting for some. The surprise that emerges from that data set is that girls focus on their grades in Chemistry and that their low attainment may make girls resign from Chemistry track. An overwhelming majority of girls regard Chemistry as a mathematical subject. Both boys and girls feel that the curriculum is rushed.

GROUP C: Aspects of Chemistry students found interesting

In regard to this group of questions, the most important message which is generated is that girls put emphasis on teachers who devote time to clarify different concepts and also they associate the level of interest with the level of their achievements. Somewhat in contrast, boys emphasise issues which are observable and also draw attention to first hand activities.

Effective teacher

Utilising prompts and probes during interviews, I realised that students consider an effective teacher

- A teacher who is excited about a subject, and works in creative ways to get the students excited too.
- A teacher who is flexible and tries to work with the students instead of rigidly sticking to the rules
- A teacher who encourages rather than lectures when the students are having difficulties
- A teacher who is pleasant and interesting and seems to enjoy the class

Non effective teacher

- A teacher who shows little interest in his/her students
- A teacher who is rigid and inflexible
- A teacher who is boring and non – creative
- A teacher who is disorganised
- A teacher who motivates through shame and criticism rather than praise and encouragement

GROUP D: Students' views on the Chemistry curriculum and the university entrance examination system

As far as students' views in response to questions of group D are concerned, the message that can be elicited is that both boys and girls support that Chemistry is an abstruse subject. Furthermore, boys and girls agree that since Chemistry is not compulsory for someone to be eligible for entrance to the Greek and Cyprus universities, they do not choose it as a specialisation subject.

SUBSET B: Students' views on the Learning at stations method

Concerning students' views on the method of *Learning at stations* the findings that have emerged are that the overwhelming majority of students are satisfied with the new learning environment. They were attracted by movies, animations, sound and colours. On the other hand, both boys and girls support that they do need, at least to some degree, the teacher's explanations.

Furthermore, in comparison with boys, girls were attracted by the topic of "Reactions of metals with acid" while the topic "Reactions of metals with water" attracted the boys' attention. The only slight difference between genders appeared in item 21. More girls than boys prefer to repeat the experiments in the wet laboratory.

Conclusions

- Based on the questions of group A and related interviews it is obvious that boys hold Chemistry in higher esteem than girls and both boys and girls consider Chemistry as a prestigious subject
- Regarding the questionnaire of group B it should be stressed that an overwhelming majority of girls consider Chemistry as a Mathematics subject and also both boys and girls consider Chemistry a highly difficult subject and the curriculum too rush.
- As far as the comments of group C is concerned, the central message which is generated is that teachers who make lessons fun, who create a relaxed environment in the classroom heighten students' interest.
- In terms of group D it is obvious that both boys and girls claim that students do not choose Chemistry as a selective subject since it is not a prerequisite for universities.
- The experimental group had better results.

Recommendations

- MOEC should try to persuade students for the importance of Chemistry via curriculum and to stress that Chemistry helps students to develop critical thinking, a skill which will be useful in their future life.
- Educators might reconsider the curriculum since Chemistry is considered as an incomprehensible subject and too rush.
- The MOEC should pay attention to the in-service training of teachers. Teachers need to be informed about teaching methods, about the characteristics of effective teachers and generally about current issues related to education

- Last but not least the MOEC should both reconsider the system of final qualification for entrance in the universities and the formula of moderation