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COORDINATION LEVEL AMONG THE CHEMISTRY TEACHING CURRICULUM OF PEDAGOGICAL UNIVERSITY AND SECONDARY EDUCATION IN MOZAMBIQUE

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ABSTRACT: The curriculum as an organized model of the educational program of the school and describing the matter, the method and teaching steps - what, how and when to teach, "is the assessment and analysis in the study: Coordination level among the Chemistry Teaching Curriculum of Pedagogical University and General Secondary Education in Mozambique. The initiated study serves as one of the main ways to curriculum reform and also predominant in the diagnosis of the level of learning and therefore the level of contents of program areas and class approval. It was established as a comparative study because Pedagogical University is the largest higher education institution in the country with the main mission to train education professionals. The main objective of the study is to know the levels of articulation between the teacher training curriculum from UP and General Secondary Education programs in chemistry subject. It focused on analysis of chemistry teaching curriculum of UP and chemistry teaching programs of the 8th to 12th of the national education system, and examination of the 12th from 2000 to 2010. The results prove the existence of gaps in the coordination of programs and major strategic gap between teaching and examination (time and given weight for each content). About research concluded that: 1- there is a lack of coordination between the ESG curricula and training of teachers (UP), thus creating a disparity in treatment considerations and content mode; 2- the introduction of new content or curriculum changes has not strictly followed the steps of the curriculum reform and not proceeded by training of teachers which hinders its implementation, treatment of certain content, providing poor learning, poor dispensing of the contents to examine, consequently the high level of failures. The survey results lead to suggestions for greater coordination in the preparation of curricula, defining priorities and above all avoid discrepancy in dosage of teaching time content with the weight of the exams.

Keywords: Curricula, coordination, training, teaching and learning, exams.

INTRODUCTION

The curriculum as a guiding document of the teaching and learning process has been the subject of several studies and changes. Many studies as Dewey(1904), Bobit (1918), Tyler (1949), Habermas (1971), Schön (1983);Skilbeck (1984), Shulman (1987), etc., and curriculum changes have had a common goal, that's improving the teaching and learning process quality.

This study is explorative and reflexive-philosophical character. Exploratory research is defined as an integral part of the main research as the preliminary study in order to better adapt the measuring instrument to the reality that if you want to know (PIOVESAN & TEMPORINI, 1995, p. 321).

Study on curricula can be the start of many other studies depending on the results, and because according to Santos (2010?):

"Exploratory research is "Used to conduct a preliminary study of the main objective of the research that will be conducted, that is, become familiar with the phenomenon being investigated, so that the subsequent search can be designed with a greater understanding and accuracy"

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The research was based on the study of curriculum and fit us in various curriculum theories, teaching and learning and curriculum reform, education policy and its different facets, among others aimed at the study of the teaching-learning process and the different variables influence their quality.

It's under these circumstances of teaching and learning process and other factors, the researcher would like to discuss the coordination of Chemistry Teaching Curriculum at Pedagogical University and High School Education in Mozambique. Therefore, the university must have a good management capacity to accomplish their values and objectives in teaching and learning process. The main purpose of this project is to focus on the current levels of coordination, its consequences, the relationship between different syllables aspects and the results of the teaching- learning process.

In order to carry out the study, it was necessary to concentrate on data gathering procedures or techniques, in this case the researcher used Bibliographical technique and reviewed some current curriculum theories and also analysed the Curriculum Plan and education programs of the High School Education and the Pedagogical University, in terms of its contents.

The work follows the philosophical essay structure proposed by Polonius where we highlight the problem as the starting point for further points and sub-points as well as a logical sequence to achieve the predefined objectives

Questioning

In Mozambique the curricular changes in secondary education has happened relatively often, due to various factors, according to the makers of curricula, among them economic policy ("*PARPA*" for, Five Year Plan and population density) and social aspects (the educational needs of society, etc.). The curricular changes in view of the dynamism that characterizes the teaching-learning process, it is welcome, but this must be accompanied by some changes from teacher training and conditions of its operation.

In the past ten years in Mozambique the secondary school curriculum has gone several changes. The main reasons evocated for these changes is to meet internal (socio-economic and political changes) and external demands (SADC integration and Millennium Development goals for education). On one side, we would like to question the process of curriculum change done by the Ministry of Education: it is happening in relatively short period of time (less than 5 years of implementation of the previous one) and not involving the teacher training institutions that train teachers for secondary school. On the other side the Pedagogical University, guided by the same reasons (internal and external) has undergo several curriculum change that do not meet the demands of secondary school curriculum – where the teachers are trained to work.

In a study is the Curriculum Plan of the Secondary Education in 2007 which came into force in 2008, without however be no change in the teachers training curricula of the Pedagogical University particularly and other institutions such as the Eduardo Mondlane University and Catholic University of Mozambique, Since these are institutions that form the professionals to the secondary education, and according to *PCESG*, "the success of the plan depends on the agents of which the teacher," however, is needed to ask the following question:

Question

What are the levels of articulation between the teacher training curriculum of Pedagogical University and programs of secondary education in the chemistry subject?

Objectives

General Objective

Knowing the levels of articulation between the teacher training curriculum of Pedagogical University and Secondary Education Programs in Chemistry subject

Specific Objectives

- Identify the possible convergences and divergences between the two curriculum and its implications;
- To describe the approach of content levels, in teacher education curriculum and secondary education;
- To evaluate the educational achievement level taking as the basis the level of assimilation and the teaching of content;
- Analyze the strengths and weights of the contents in curricula and tests applied;
- Proposing organizations and model of curriculum reforms.

Topic Relevance

It is common today, many questions about the quality of education in Mozambique. By contrast it has been noted contained in the Secondary Education curriculum change without however be a monitoring of curriculum changes in teacher training to deal with the proposed innovations.
According to PCESG-2007 the curriculum influences the quality of education. The curriculum being a "structured plan of teaching and learning, including learning objectives or results to be achieved, materials or content to teach, processes or learning experiences to promote"; (RIBEIRO-1989 *in* LOPES 2009), we need first to graduate teachers in the context of curriculum change and then introduce the new curriculum.

Changing the contents of the workload, the evaluation methods of students among other changes, should be in line with the changes in teacher training, fit these with reality and even identification with the changes by the teachers, at risk to compromise the objectives of education in general.

The curriculum design should obey some subsystems as:
- Political administrative;
- Participation and control;
- Ordination of the education system;
- Production of learning through
- Scope of cultural creations, scientific, etc;
- Technical teaching: trainers, experts and researchers in education;
- Experts and Innovation;
- Practical-pedagogical. (GIMENO-2000, p. 23)

Failure to follow one of the above steps, the probability of producing a resume disabled, which causes some negative consequences in education.

THEORETICAL FRAMEWORKS

The learning process is a natural human phenomenon which involves a number of factors as: cognitive, emotional, organics, psychosocial and cultural (WORLD EDUCATION). The process Also depend on Several other factors such as educational policies, society, teachers, students, parents and / or guardians, school supplies, school environment, etc.
For the learning process Shulman drew a string of Categories of the Knowledge Base, which are:
- Content knowledge;
- General pedagogical knowledge, with special reference to those broad principles and strategies of classroom management and organization that appear to transcend subject matter;
- Curriculum knowledge, with particular grasp of the materials and programs that serve as “tools of the trade” for teachers;
- Pedagogical content knowledge, that special amalgam of content and pedagogy that is uniquely the province of teachers, their own special form of professional understanding
- Knowledge of learners and their characteristics;
- Knowledge of educational contexts, ranging from workings of the group or classroom, the governance and financing of school districts, to the character of communities and cultures;
- Knowledge of educational ends, purposes, and values, and their philosophical and historical grounds; (SHULMAN, 1987, p. 8)

We recognize that there are various factors and categories that influence in different ways the quality of education and are capable of studies. Based on the combination of all these factors and categories, the study devoted to the analysis of the curriculum document handlebar teaching-learning process based on two categories, namely: Content knowledge e pedagogical content knowledge.
The curriculum presents aspects as:
- Who will teach? (teacher's background)
- What will teach? (objectives / fields of learning);
- How to teach? (strategies);
- Who should be taught? (the target audience).

Among curricular aspects of the more prominent of the process is "who teaches", hence the concern about the level of training, curriculum, skills and particular aspects such as:
- Teacher’s background

- Solid and deep scientific knowledge
- Pedagogical knowledge of the field of education.

Teacher's Background

The solid scientific knowledge is essential for anyone who teaches, for such there is need to be some alignment between the training school curriculum (learned) and broadcast (workplace). According to Novoa (1997, p.33) cited Gaia (2007)

(...) There are no two identical teachers and (...) the identity that each of us constructs as an educator is based on a unique balance between personal characteristics and professional paths. And the conclusion that it is possible to unravel the universe of the person through the analysis of their pedagogical action: tell me how to teach, I will tell you who you are.

For the acquisition of solid content, the teacher's character helps a lot. Linked to individual aspects as a determining factor in the learning process are the 3 principles of Piaget's learning theories advocating:

- Learning by discovery
- Readiness for learning
- Individual difference

Piaget believed that children learned only through its effect on the environment while Vygotsky argues among several implications:

- Active participation of the subject and acceptance of individual differences
- Power Discovery vs. independent discovery (Piaget)

The teacher's background are determinant in both process, we mean, on traditional and constructivism leaning process, although as lower incidence or relatively less decisive on constructivism.

In the teaching-learning process, the teacher should list their individual skills with different facets of the process, such as the use of technology, science, his experience of the day-by-day, and several other aspects that will provide you a good learning and later transmission or mediation.

Content Knowledge

For the process of teaching and learning it is very important that the teacher has solid and deep knowledge of the subject to transmit or facilitate depending on the applied teaching model, traditional or constructivist respectively.

While teacher content knowledge is crucially important to the improvement of teaching and learning, attention to its development and study has been uneven. Historically, researchers have focused on many aspects of teaching, but more often than not scant attention has been given to how teachers need to understand the subjects they teach. Further, when researchers, educators and policy makers have turned attention to teacher subject matter knowledge the assumption has often been that advanced study in the subject is what matters. Debates have focused on how much preparation teachers need in the content strands rather than on what type of content they need to learn. (BALL, THAMES, and PHELS, p. 1)

Content knowledge of an knowledge that aims to train skills, i.e. transformation of the individual progressive form of the categories of knowledge according to the BLOOM taxonomy's, based on the knowledge (cognitive) to know how to be, and be (emotional) to the know-how (psychomotor) must be contextualized and systematic modes that is easy, acquisition and testing of ways to transform the teacher's knowledge accumulated and lived by it.
The adoption of contextual learning experiences and use by teachers as the basis for improvement of teaching points fall on current study Lee S. SHULMAN (1987, p. 1) comes to teaching reform

[...] teaching reform on an idea of teaching that emphasizes comprehension and reasoning, transformation and reflection. ...He justified it "by the resoluteness with which research and policy have so blatantly ignored those aspects of teaching in the past." To articulate and justify this conception, Shulman respond to four questions: What are the sources of the knowledge base for teaching? In what terms can these sources be conceptualized? What are the processes of pedagogical reasoning and action? And what are the implications for teaching policy and educational reform?

In the traditional model of education the teacher must first be accumulated scientific knowledge holder during the period of training for onward transmission to the students and the constructivist model where "the principle

goal of education in the schools shouldn't be creating men and women who are capable of doing new things, not simply repeating what other generations have done." (PIAGET), the constructivist model gets added to the teacher's responsibilities as a guiding agent or facilitator rather than mere transmitter of knowledge acquired in the training period.

According to the characteristics of teaching models both traditional and constructivist is evident the importance of knowledge of the contents by the teacher. When knowledge of the contents are solid and deep, this makes the teacher to apply the most appropriate methodology and according to real and concrete conditions in order to ensure meaningful learning, effective, affective and lasting

Pedagogical Content Knowledge

The pedagogical content knowledge is the step that links the knowledge of the content, the ability to acquire the same by the students and the methodology to be applied in order to reach the teaching-learning process objectives.

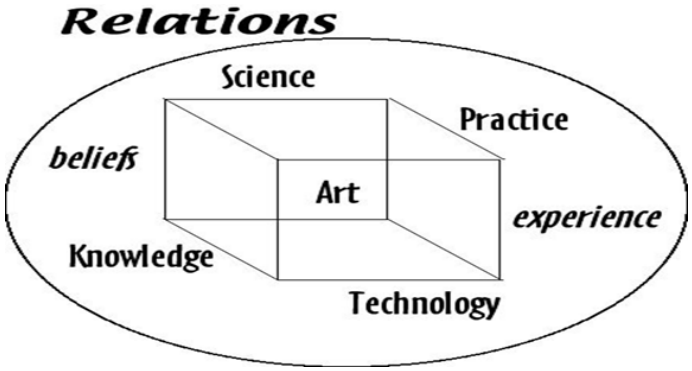
"Those who can, do. Those who understand, teach" (SHULMAN, 1986, p. 14), Teaching is a process of transmission and or mediation of knowledge, so it is necessary to adjust for each content, learning and pedagogical aspects.

Pedagogical Content Knowledge is a type of knowledge that is unique to teachers, and is based on the manner in which teachers relate their pedagogical knowledge (what they know about teaching) to their subject matter knowledge (what they know about what they teach). (COCHRAN, 1997, p. 2)

When teachers got Content Knowledge Their next step is to research the best way to transmit them using various means according to their ability and creativity. These details vary from teacher to teacher, because not everyone can have the same creativity and not the same possibilities.

For Shulman (1986) apud Cochran (19997, p. 2) pedagogical content knowledge […] embodies the aspect as contents most germane to its teach ability. Within the category of pedagogical content knowledge I include, for the most regularly taught topic in one's subject area, the most useful forms of representation of those ideas, the most powerful analogies, illustrations, examples, explanations, and demonstrations – in a word, the way of representing and formulating the subject that make it comprehensible to others.

Pedagogical content knowledge is a knowledge that gives us ability and different ways to teach. According to Shulman (1986, p. 9) "it also include an understanding of what makes the learning of specific concepts easy or difficult; the conception or preconception that student of different ages and background bring with them to learn". So the pedagogical content knowledge becomes an art of teach with the main objective of facilitating the process of teaching and learning.



Curriculum Theories

The curriculum theories from Silva and Pacheco suggest that content must arise from the need for learning society to the government and not imposed by the government to society. Following the correct Society-Government knowledge it can be contextualized the serving of key assumptions for effective learning.
Silva (2003) in their teaching classes, in the academic perspective, "the teacher is trained as a specialist in one or more areas or disciplines, with the main objective to master the content to teach." Based on the proposal of the direction of emergence of the contents to be taught, and the main purpose of teacher education there is need to harmonize the curriculum of teacher training schools and secondary schools in ways to avoid discrepancy between the curriculum.

Theses

Main Thesis

Lack of efficiency in the transmission of content (weak learning and high level of failures)

Secondary Theses

- Introduction of contents that are not taught in teacher training;
- Relativity in their priorities, importance and weight in the dosage and treatment of content *vs* evaluated contents and their weights;
- Teachers who do not identify with the curriculum (lack of motivation).

Reasons for Theses

Lack of efficiency in the transmission of content (weak learning and high level of failures)

The chemical as a curricular discipline, studies the matter and its transformations. In cycles of learning, regardless of system or subsystem, the study of chemistry is guided by so-called general contents. The general contents, by logic should be treated with balanced or approximate consideration (importance and weight) both at the Pedagogical University (teacher training) as in secondary schools. Since the Pedagogical University trains professionals to teaching mainly in secondary education, the levels of content approach levels should be higher, i.e. the contents in the universities should be treated with greater complexity or depth but the following table shows some differences:

Table: General Contents

General contents	Hours scheduled for treatment at the Pedagogical University			Hours scheduled for treatment at Secondary School	
	Basic Chemistry	**General chemistry**	**Other subjects**	**1st Cycle Grade (8-10)**	**2nd Cycle Grade (11-12)**
1. Atomic Structure and Matter,	28	9		22	18
2. Periodic Table of elements				**5**	**9**
3. Chemical bonding		**9**		**7**	**12**
4. Class of Inorganic compounds			IQ – 80	15	20
5. Class of organic compounds	22		OQ – 80	72	*40*
6. Thermochemistry					
7. Chemical Kinetics		**12**	**FQ – 15**		***9***
8. Chemical Equilibrium,					**32**
9. Redox reactions		16	FQ – 20	6	22
10. Electrochemistry					
11. Stoichiometry and solutions	15	18		10	6
12. Reactions and hit equations.	15				
Total	**80**	**64**	**195**	**137**	**168**

Looking at the table above it appears that no content as 2, 3, 6, 8, 10, i.e., half the contents are treated in Pedagogical Universities less thorough manner due to the time available for your study in relation to secondary schools. The findings above are plausible data for the lack of efficiency in the transmission and reception of facts, as they are intricately treated in secondary education (workplace) and not in Pedagogical Universities (training institution).

Content Introduction Not Taught In Teacher Training

The training of professionals of any desktop is the moment when we adopt the tools individuals (scientific knowledge and methodologies) required for its activities as a professional. The introduction of both technologies content as "unknown", the decrease in workload but without altering the contents, the lack of educational facilities, among others, to create so-called teacher feeling “burnout" which according to (CODO, 2002, pg. 374) means "the pain of professional pinned down between what we do and what we can actually do, between heaven and hell possibilities structural limits, between success and frustration". The transformation of professionals in "burnout", induce the commission of several errors in the education sector such as: Teachers trained in a certain area but obliged to teach the other as an alternative to the lack of qualified professionals;

- Teachers teaching content which in turn do not dominate;
- Teachers committed to the completion of the programs and not to the quality of the content learning;
- A Ministry "pusher", concerned with positive results to serve as justifications bases of curriculum changes or other measures taken.

The above points are also born a few antitheses raised about the subject being studied, which in turn has been largely used to pass to the teachers the responsibility of the failures of political and educational process in general and the quality of education in particularly.
Among various antitheses on the subject, the following stand out:

- The teacher should be a simply facilitator and not the knowledge transmitter;
- Training of teachers for the new approach to content or new content approach;
- View and considering the country's financial conditions, it is not imperative to change the curriculum of Pedagogical University but of Secondary Education because of the quality of graduates.

Antitheses

The teacher should be a simply facilitator and not the knowledge transmitter

The intention of changing the model of teacher centered in teaching methods (traditional theory) to the model of student-centered (critical theory), supports the antithesis and also give rise to not conceive the teacher as a holder of knowledge but with the requirement to transmit the methodologies and indicate the sources for the purchase or production of knowledge.
The above arguments clearly admit that touts teachers with methodologies domain and not precisely scientific knowledge, because it is regarded as moderator. The Mozambican reality indicates the reverse, by reason of the lack of educational facilities such as libraries, books, laboratories, flood in classrooms etc. in most schools, mean that the teacher is the only source of transmission of knowledge. Being the teacher the only source of transmission of knowledge is imperative to be equipped with scientific knowledge on the content to be taught.

Training of Teachers for the New Approach to Content or New Content Approach

The training of teachers has been notorious in the schools, but the level and modalities of its implementation leaves much to be desired, and as a result do not guarantee a solid learning, let alone solving the educational problems.

Some comments from citizens lead us to understand that they are apologist for the unilateral change, but the practice goes against this thinking, because even though theoretically emancipated centralization of education in student practice teaching still centered on teacher, due to various factors. However these assumptions require a teacher to be deeply knowledgeable of the contents to be taught. So if the education secondary education results are not satisfactory, and the results indicated the change of the curriculum, will be very important to articulate or even unify the changes between the curricula of teacher training and secondary education.

[i] *Where the teacher should be an expert in one or more subject areas, with the main objective of training the content area teaching.*

[ii] *The student is an active participant of learning, the teacher is the mediator between knowledge and the student.*

View and considering the country's financial conditions, it is not imperative to change the curriculum of Pedagogical University but to secondary education because of the quality of graduates.

Reflection Points

There is a growing level of failures result of lack of coordination?

The study based on analysis of content and its dosage in examinations (2000-2010), clearly proves that the contents with higher weight (both in question amounts as values), are linked to chemical equilibrium peaking in exams 2005 in the first and second time values 9.8 and 10.9 respectively the following organic chemistry. Chemical balance is one of the contents studied at the Pedagogical University according to the tabulated data extracted from the program, and one of the most if not the most complex chemistry teaching because it involves deep mathematical calculations, domain other content such as chemical reactions, hit equations , stoichiometric calculations, among others.

In this respect the following contents are automatically bonded "an antagonistic model by Descartes' which instead of breaking to facilitate understanding of the contents, they are bonded. The poor knowledge of the matter by the teacher, consequently no understanding of them by students and overweight exams "paradoxical phenomenon " contributes good percentage in group aspects that increase the level of disapproval.

Were the universities contributed to the development of this curriculum (Secondary Education 2007)?

By differences in priority and treatment of various contents, and partial lack of identification of the universities with the secondary curriculum and a clear distancing regarding the supposed lack of quality of secondary education appears the lack of involvement of universities or a joint review in curriculum revision. Nevertheless there are several countries in which universities participate actively in the development of curricula for upper secondary education, with the bases the assumptions and curriculum models adopted by the government as a result of various curricular researches.

Is not the curriculum design model the main cause of problems in the education sector?

The curriculum development model has been one of the least recommended, as many actors as V. Landsheere & G. De Landsheere (1983: 49) in Pacheco (2001: 52) suggest that "the primacy in education target of choice must go to the analysis of the needs of society ", but in Mozambique the contents rather than comes from the community's educational needs to the government, it comes from the government to the community. Curricular reforms that follow the government to society model is not stanch the problems of basis, this makes the school community (teachers, students, etc.) and society does not identify with the curriculum, creating motivation, lack of interest, not contextualized and consequently weak learning.

CONCLUSION

About examined topic conclude the following:

- There was lack of coordination of the curriculum of secondary education and teacher training (Pedagogical University), thus creating a disparity in treatment considerations and content mode.
- The introduction of new content or curriculum changes has not strictly followed the steps of the curriculum reform and not proceeded by training or training of teachers which hinders its implementation.
- The lack of coordination between the curricula of the Pedagogical University and Secondary Education carries gaps as: the difficulty in treating certain content, poor learning, poor dispensing of the contents to examine hence the pronounced level of failures.
- At the macro level, the lack of coordination between the curricula of the Pedagogical University and Secondary Education is reflected in the poor quality of education.

PROPOSAL

To ensure greater involvement and more effectively the reforms and their implementation, it is proposed that:

- Curricular reforms should take place in cascade and follow direction, Universities-Secondary Schools and not Secondary Schools-Universities, thus ensuring, first to train teachers able to deal with required reforms and policies and then work with these.
- Prioritize joint research with universities (forming education professionals) and other research institution on teaching and learning, curriculum, contents adjusted to the reality of the country, region and world before any reform modes to provide a meaningful learning, lasting and applicable.

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APPENDIX

1. Table of search on weight content in general examination from 2000-2010
2. Lifting table of the number of questions in the 2000-2010 exams

Table Of Search On Weıght Content In General Examınatıon From 2000-2010

General contents	2000 1ª / 2ª Season		2001 1ª / 2ª Season		2001 2ª Season	2002 1ª / 2ª Season		2003 1ª / 2ª Season		2004 1ª / 2ª Season	2005 1ª / 2ª Season		2006 1ª / 2ª Season		2007 1ª / 2ª Season	2008 Extra	2009 1ª Season	2010 1ª / 2ª Season		2010 Extra
1. Atomic Structure and Matter,	0,8	0,7	0,5	0,5	0,5	0,8	0	0,5	0,5		2	2,2	1,5	3	0,9	1	1	0,5	1	1
2. Periodic Table of elements					0,5			1	0				1,5	1	1		0,5	1	0,5	0,5
3. Chemical bonding	1	0	0,5	0,5	0,5	0	2,8	0,5	1				0,8	0	0,9	1,5	1,5	1,5	1,5	1
4. Class of Inorganic compounds	1	1,6	0,5	1	0,5	3,2	0	0	0,5				0,6	1,8		1,5	0,5	1,5	1	1,5
5. Class of organic compounds	2,6	4,1	3	3,5	3,5	1,6	5,8	2,5	2,5		3,8	3,1	3	3,2	3,8	**4**	**4,5**	**4,5**	**4,5**	**4,5**
6. Thermochemistry	1,2	2						1,9	0,5								0,5	0,5	0,5	0,5
7. Chemical Kinetics	3,2	3,4	3	3	3,1	2,4	1,4	3	3		2	2,5	3,7	3,7	3,5	1,5	2	2	2	2
8. Chemical Equilibrium,	**3,8**	**2,8**	**5,8**	**7,3**	**6,7**	**5,9**	**4**	**6,1**	**5,5**		**9,8**	**10,9**	**5,6**	**4,3**	**6,1**	**7**	**5,5**	**5,5**	**5,5**	**5,5**
9. redox reactions					2,5	2,4	1						3,3	0		0,5	1,5	0,5	1	1
10. Electrochemistry	4,4	3,6	5,7	0	1,7	3,7	3	4,5	4,5		2,4	1,3	0	3	3,7	1	0,5	1	1	1
11. Stoichiometry and solutions	0	1,8	0,5	1,5	0,5											1	2	1,5	1,5	1,5
12. Reactions and hit equations.	2	0	0,5	2,7		0	2	0	2							1				

Lıftıng Table Of The Number Of Questıons In The 2000-2010 Exams

António C. P. Madeira & Djabrú. J. Manuel

General contents	2000 1ª / 2ª Season		2001 1ª / 2ª Season		2001 2ª Season	2002 1ª / 2ª Season		2003 1ª / 2ª Season		2004	2005 1ª / 2ª Season		2006 1ª / 2ª Season		2007 1ª / 2ª Season	2008 Extra	2009 1ª Season	2010 1ª / 2ª Season		2010 Extra	Avar/ %
1. Atomic Structure and Matter,	1	1	1	1	1	1	0	1	1		4	3	1	3	1	2	2	1	2	2	1,5
2. Periodic Table of elements					1			2	0				1	1	1		1	2	1	1	0,6
3. Chemical bonding	1	0	1	1	1	0	3	1	2				2	0	1	3	3	3	3	2	1,4
4. Class of Inorganic compounds	1	1	1	2	1	1	0	0	1				1	3		3	1	3	2	3	1,3
5. Class of organic compounds	2	4	4	4	4	2	4	5	5		4	3	2	2	4	8	9	9	9	9	4,9
6. Thermochemistry	1	1						2	1									1	1	1	0,47
7. Chemical Kinetics	2	2	3	2	2	1	2	3	3		2	3	3	3	5	3	4	4	4	4	2,84
8. Chemical Equilibrium,	**3**	**2**	**4**	**5**	**5**	**2**	**2**	**5**	**4**		**5**	**5**	**6**	**4**	**5**	**14**	**11**	**11**	**11**	**11**	**6,05**
9. redox reactions					2	2	1						4	0		1	3	1	2	1	0,89
10. Electrochemistry	3	3	3	0	1	2	2	3	3		3	1	0	1	2	2	1	2	2	3	1,9
11. Stoichiometry and solutions	0	2	1	2	1											2	4	3	3	3	1,1
12. Reactions and hit equations.	1	0	1	3		0	2	0	1							2					0,5
Total of questions	**15**	**16**	**19**	**20**	**19**	**11**	**16**	**22**	**21**		**18**	**15**	**20**	**17**	**19**	**40**	**40**	**40**	**40**	**40**	**20V**