

Didactic strategy for the preparation of students concurring talents of chemistry in the basic secondary

Ginle Alonso-Hernández^{1*} <https://orcid.org/0000-0002-6479-3906>

Mercedes Caridad García-González² <https://orcid.org/0000-0003-4785-8605>

Nisdalys Figueredo-Trimino² <https://orcid.org/0000-0003-2929-8450>

¹ Secundaria básica Capitana Rosa la Bayamesa, Camagüey, Cuba.

² Universidad Ignacio Agramonte Loynaz, Camagüey, Cuba.

*Autor para la correspondencia: ginlealonso@profesores.cm.rimed.cu

ABSTRACT

The objective of the research was to develop a didactic strategy for the preparation of chemistry contestants in basic secondary education. Of the empirical methods, document analysis, interview and survey, and consensus method by nominal group were used. It is concluded that there was a lack of attention to the individual and collective needs and potential of the talented students, as well as the lack of a didactic strategy for their preparation and the validation of the feasibility of the strategy and the teaching material were evaluated among the Very suitable and adequate categories.

Keywords: Chemistry, Basic Secondary, Preparation of Contestants, Chemistry Teaching.

Introduction

The principal objective of education the Cuban is to propitiate the maximum development of the potential of all of the citizens, when forming positive attributes of her personality and the complete individual satisfaction of her projects of life and social

commitments in order that they apply his intelligence's resources. In this sense, it are promoted events that the possibility to demonstrate the capability and command of the contentses of the different subjects of study, these events yield music the The Olympics and the contests of knowledge and abilities, which come true in different educational levels (Brito, 2008).

So then, the student to deposit the secondary basic education faces new challenges, within them the incorporation to the academic curriculum of subjects of study that until then they were been ignorant of for him. Precisely the Chemical subject of study, from the eighth grade captive and catch many pupils ' attention. Several reasons reaffirm the previous proposal, in addition to the amazing experiments that characterize her, the principal of these refers to their multiple applications, because the Chemical science is present at the quotidian life and it is a fundamental pillar in the pupils' academic formation (Alonso, 2019).

Therefore, the process of teaching of Chemistry, it must be conceived to meet requirements and all of the students' potentialities. In order to achieve an adequate treatment to the diversity in the educational process, the students with educational especial needs must be had in account, between the ones that the talented students that take part in contests of knowledge locate themselves. These students motivated in the study of the subject of study must receive a treatment individualized within the schools Cubans, for part of everybody entrusted with to interact with them, in each one of the moments of his development (Alonso, 2019).

According to Vázquez (2010), the competitor's preparation, a mandate is for making good use of its potentialities; Stimulated and canalized toward more significant spheres of the scientific social development, as well as the benefits that they yield of teaching learning to the process, because when saying of Zalamea and Vega (p.4) (the minds arranged for of his students are a nation's fundamental riches (2005).

The attention of these minds that comes true in the developed countries, is characterized fundamentally for his character totally elitist and it takes effect for educational private institutions. Besides, his realization limits itself to previous and short intensive periods for the The International Olympics of Sciences.

On the contrary, in Cuba it is proposed guaranteeing the attention of these students from youths and in all the educational levels; Although the educational praxis has proven that the teachers' priority finds in the preparation of the students with low academic performance. The above justifies itself because the educational especial needs

have been object of investigation in the area of the especial teaching, prioritizing those that appear associated to events and conditions than discapacitan (Borges, Orozco and Fabá, 2007).

However, the educational reality demonstrates than the students' present-day preparation talents Química's competitors, still is far away from being that challenging surroundings and developer, characteristic environment for these pupils's attention and schoolgirls (Abascal, López and Zepeda, 2013).

For the sake of knowing about the students' preparation talents Química's competitors in the secondary basic education, an empiric investigation that consisted came true in: A study of the documents of the ministry of education (MINED) related with the aforementioned preparation, the income analysis in the municipal, provincial contests and nationals of Química applied in the eighth and ninth grade, and the revision of thesis of masteries and doctorates related with competitors' preparation (Vázquez, 2010; Almeida and Almeida, 2016; Ministry of Education, 2018a, 2018b).

They were applicable, you poll provincial executives in Camagüey and of the municipality Mines, linked to the secondary basic education, to the ESBUs professors of Química and to students Red Captain's Wife the Bayamesa of the same municipality, the same way that you interview the staff of the school library. In that connection, the attained results reveal the following insufficiencies (Alonso, 2019):

Deficient attention to the needs and the students' individual and collective potentialities interested talents in taking part in Química's contests.

The curriculums of the Chemical subject of study in the secondary basic education offer scarce potentialities to attain the attention that the competitors in this matter require .

Lack of a didactic strategy for part of municipal and provincial metodólogos once competitors' preparation in Química was entailed on.

The profesores/entrenadores's insufficient preparation.

Scarcity of a teaching material for competitors' preparation that you allow to in Química in the secondary basic education raising the results in the different editions.

In the same way potentialities stand out, job than, interest for preparation belongs significant to emphasize that students feel motivation to take part in contests of knowledge in Química and the teachers competitors.

The above allowed identifying like scientific problem: Insufficiencies in the conception of the preparation of the students talents for the contests of knowledge in Química of the basic secondary school, the fact that they limit his performance in the same.

For the educational secondary level, the teaching of Chemistry focuses on the properties fundamentally and it looks for transformations of the substances with it, developing in the students the capability to explain some chemical processes that happen at his surroundings, as from the performance of the internal structure of substances. At the same time as they give the contentses of Química's program in the secondary basic education, the preparation of the students that take part in the contests comes true (Alonso, 2019).

In this way, the students' preparation talents you require Química's competitors of the presence of the teacher that has command of the activities that come true in the eighth and ninth grade. This plays coordinator's role to initiate the development of the workouts, to guarantee the organization and functioning in all the activities and to propitiate the link of all of the students of the center, professors, trainers, family and the community, in terms of the specific preparation and the integral formation out of every one of his members (Alonso, 2019).

Of there than, the objective of investigation is: Contributing with the process of teaching of Chemistry; By means of a didactic strategy for students' preparation talents that take part in the contests of knowledge at the basic secondary school.

Development

The red Capitana accomplished an educational, descriptive investigation and side road at the basic secondary school herself You Mine the municipality's Bayamesa, Camagüey's province during the period understood of September 2017 to February 2018. Instruments were designed according to the characteristics of the fact-finding variables, they became elaborate as from the diligent for Vázquez (2010) in his investigation and contextualizadas for the authors to the secondary basic education, being submitted to consultation and revision for specialists, linked to the activity of contest, the ones that were not a part of the studied universe.

The municipality's Bayamesa takes like population to the 134 students that conform the license plate in the eighth position and ninth gado of the basic secondary school Rose-Colored Flagship for the realization of investigation You Mine in the school year 2017-

2018. The sign got shaped by 48 students (24 in the eighth position and 24 of ninth grade) gotten interested in to receive the workout.

The application of the instruments contributed essential elements, which expose themselves from now on (Alonso, 2019):

The fact that he lacks ground ruleses for part of the MINED that competitors' preparation in the secondary basic education, because preparation comes true by means of Química's programs that are given in octavo and ninth grade legislate verified itself with the *documentary analysis*, allowed compiling the exercises that were a part of the agendas applied in prior years, that favored the selection of the same with an eye to the elaboration of a teaching material for the workouts, as well as synthesizing the information on the results obtained at Camagüey's province in the national contests.

The *observation* accomplished during the sessions of preparation evidenced that the independent job of the students of individual form predominates, also it became verified than during preparation the competitive environment that queen is good and than the activities guided by the professor the debtor whose property is attacheds during the workout and in extra-teaching schedules are exercise machine.

In the opinion poll *applied to the provincial and municipal executives* linked to the Chemical subject of study in the secondary basic education it was checked than one (14.29 %) takes care of the Chemical subject of study exclusively of the seven very respondents and, that the 57.14 % possesses an exiguous knowledge relating to the activities of contests of knowledge.

In as much as, at the disposal of counselling materials for the preparation of the students and professors 42.85 % of the respondents present that it is told exercises in digital support that they are employed to this end but that they are not sufficient and the 100 % in the need to elaborate a teaching material for the competitors' workout coincides.

In the opinion poll *to Química's professors of the municipality Mines*, it was verified than of the four professors of the municipality, the 100 % works with the eighth and ninth grade, of them the 75 % has over 10 years of experience like teacher giving the Chemistry, without very embargo one (25 %) likes him like professor of the subject of study training the students for contests having experience like professor trainer, in this opinion poll 100 % of the teachers coincide in that the subject of study's programs (program in the eighth position and ninth grade) are not enough adequate for students' preparationTalents and the 75 % does not have a material for the workout of the same.

The utilized opinion poll to know the assessments of the students of the basic secondary school Red Capitana You Mine the municipality's Bayamesa, on the regularities of the preparation in Química's contests; Show than of the 48 respondents (24 students of eighth grade and 24 in the ninth position), the 50 % (24) feels little motivated for the preparation of contests, and the 62.5 %, he decided to get ready in the contests for personal initiative.

(24) the interest to take part in the competitions and to reaffirm what learned at the classroom, coinciding to have like needs when you get ready in the contests to know more and loving challenges, the 48 respondents present within the aspirations that they cut in on contests, the 50 % for 30 have taken part in contests of another subjects of study of them, (62.5 %) they appraise like to regulate the preparation that they receive and the work accomplished by the professor exercise machine.

The obtained regularities of the interviews *accomplished* to four librarians were the following:

The students' visitors are insufficient talents that take part in the contests and of the profesores/entrenadores to the libraries, since there is scarcities of updated and specific bibliography for the work in the students' preparation talents that take part in the contests of knowledge.

Consequently, the results obtained of the diagnosis based on facts allowed to talents to elaborate a *didactic strategy* for students' preparation Química's competitors in the secondary basic education (Alonso, 2019).

The didactic strategies call for a planning and previous organization, and you are necessary for his implementation than:

- The objectives to get be specific.
- The teacher possess the necessary knowledge to broadcast the information.
- Preparing the necessary materials.
- Emphasizing in the important aspects of the information that it is wanted to broadcast.
- Fomenting the student's autonomy to the hour to generate own strategies of learning.
- Accomplishing periodic evaluations to verify the students' progress.

One of the objectives of the contests is the stimulation to learning. The encouragement must be based on control, with a harmonious and well-balanced relation of both

processes the progress is taken care of. It is indisputable that it breaks of an initial diagnosis, but to diagnose is to continue checking real statuses to establish changes that they propitiate the advance, of there than the checking of how have influence the system of acquisition of knowledge allows verifying the revelation of experiences in the students, creating conditions to solve learning problems, to find roads and more efficient methods and cashes (Gamboa, García and Beltrán, 2013).

The *stages* of the didactic strategy constitute the organizational components that Química's competitors in the secondary basic education assume for students' preparation talents themselves. They delimit four stages in the didactic strategy:

The competitors' stage of selection.

This stage aims at selecting the students that will receive the preparation to take part in the contests to different levels.

The actions to accomplish in this stage music:

Elaboration and application of the level contest of base.

Competitors' selection.

2. Stage of diagnosis and preparation.

The objective of this stage is to get criteria about the diagnosis from the basic needs of preparation that they present students Química's competitors in the secondary basic education. The stage is intended to guarantee the conditions required for the process of preparation, it understands the quest of information on the level of knowledge that talents possess the students Química's competitors.

They plan the following actions for this stage:

- Diagnosis of the basic needs of preparation that they present students talents Química's competitors.
- Evaluation of the level of academic knowledge that talents possess students Química's competitors.
- The professors' selection trainers.
- The professors' capacitation trainers.
- Realization of workshops for professors trainers on the contentses and aspects to evaluate in contests different levels.
- Precision of the material necessary conditions.

Stage of planning.

The objective of this stage is to project the preparation. For it, breaks of the diagnosis of the basic needs of preparation of the students talents Química's competitors.

In this way, the actions of this stage are:

- Determination of the objectives of the preparation of the students talents.
- Selection of the organizational forms of preparation.
- Selection of the roads for the evaluation of preparation.

One must have in account the requirements of the model of basic secondary school relating to competitors' preparation for the selection of the organizational forms of preparation. The selected candidate was like organizational form of preparation: The classroom out of the teaching schedule. The schedule of workout will be established according to the conditions of the school center, the teaching educational process must not affect itself, this you must be in extra-teaching schedule. If students belong in addition to a group, the trainer can attend them of form separated. (they can vary in numbers) it will be worked up with the teaching material for competitors' preparation in Química in the elaborate secondary education in the weekly encounters for (Alonso, García and Figueredo, 2017a, 2017b), which is designed of the following way:

Split I Activities.

They are organized for the contentses that appear in Química's program of the basic secondary school. This is classified into the activities of eighth grade and the activities of ninth grade, present general considerations as to the contentses themselves I am opposed to evaluate pertenecientes to the units in contests to different levels. Each block of activities presents an information, the title and the objectives of the activities.

Activities of eighth grade.

Substance mixtures

They go aboard contentses related with substances, his classification, physical properties, formation of mixtures, operations to separate the components from these in this section and be more than enough what selected candidates, as well as the description and performance as from the flow chart of the process of separation of his components were base, clauses linked to the performance and classification according to the energy appear besides implicated in the process of the chemical reactions and calculation applying the law of conservation of mass. They set themselves a total of 10 activities.

Examples.

Title: Substance mixtures. Separation of his components.

Objectives

Classifying signs of substances in pure, mixtures or dissolutions.

Describing the operations of separation of the components in a mixture relating them to his physical properties and school implements of laboratory.

Identifying school implements of laboratory to accomplish the operations of decanting, leak, vaporization and distillation, taking into account the properties of the substances that they tap in the process.

Representing diagrams of flow related with the operations of separation of the components in a mixture.

Representing with words the funny remark of chemical reactions.

Classifying chemical reactions according to the energy in the process implicated.

Chemical reactions and calculations

They will go aboard contentses related with the chemical reactions, his performance as from the scheme with words and classification according to the energy in this section implicated in the process, in addition to the calculation of mass relative formula and mass of a sign of substance applying the law of conservation of mass. They set themselves a total of 14 activities.

Title: Performance of chemical reactions. Calculation of mass.

Objectives

Representing chemical reactions as from the scheme with words.

Classifying reactions according to the energy in the process implicated.

Calculating the mass formulates relative.

Calculating the mass of a sign of substance that intervenes in the chemical reaction applying the law of conservation of mass.

Chemical elements

They will go aboard contentses once the chemical elements were related to, his structure, electronic distribution, position in the periodic table that they form, the simple substances and the classification of these, as well as the electronegatividad of the atom in this section. They set themselves a total of 6 activities.

Title: Chemical elements. Structure and position in the Periodic Table.

Objectives

Interpreting electronic distribution of an atom.

Naming and representing chemistry symbol, atomic number and nuclear load of a chemical element.

Justifying the moral values of fusion temperature and boiling in atomic and molecular substances.

Activities of ninth grade.

Nomenclature and chemical notation

The nomenclature and chemical notation of compounds studied until now, as well as the classification of substances according to the given criteria (composition, properties, type of particles and chemical link), the physical properties and chemistries of these, the acid host character that they present and the means for his identification, the moral values of fusion temperature and boiling relating to his molecular or ionic structure, and the electric conductivity of these, in addition to the quantitative information in relation to the quantity of substance and the number of particles that offers a chemical formula will be gone aboard in this section. They set themselves a total of 10 activities.

Title: You leave and hydroxides. Nomenclature, chemical notation and classification.

Objectives

Naming and formulating salts and hydroxides.

Classifying according to his composition, properties, type of particles and chemical link to salts and hydroxides.

Explaining the electric conductivity in dissolutions of ionic compounds.

Justifying appraise it of the fusion temperatures and boiling in ionic and molecular compounds.

Interpreting the qualitative and quantitative information that offers a chemical formula in relation to the number of particles and quantity of substance.

Chemical properties

You will discuss the performance of chemical equations through the completamiento of schemata of transformation of substances in this section, himself predecirá the funny remark or not give reactions, the classification of these according to the energy in the process implicated and the variation or not give numbers of oxidation, in addition to the applications of the substances based in your properties. They set themselves a total of 10 activities.

Title: Chemical reactions.

Objectives

Representing the chemical equations through the completion of schemata of transformation of substances.

Classifying chemical reactions according to the energy in the process implicated and the variation or not give numbers of oxidation.

Exemplifying the applications of the substances based in his properties.

Calculations

The calculus of concentration will tackle molar and molar mass itself in this section.

They set themselves a total of 10 activities.

Title: Concentration molar and molar mass. Calculations.

Objective

Calculating the concentration molar and the molar mass.

Miscellanies

They will discuss several themes in this section:

The relation structures properties applications in substances will be present at the activities that relate to each other, many of these present format to complete sentences, to fill blank spaces and to relate columns. They set themselves a total of 10 activities.

Title: Miscellanies. Varied activities.

Objective

Establishing relations structures properties applications in substances.

Reports, curiosities and data of self-interests of the area of the natural sciences appear besides in this part of the material.

II Respuestas departs.

Appear the solutions of the exercises proposed, for the sake of avoiding that the novel professors commit the error to accept an incorrect answer presented by the students, besides serve as car preparation of the same when the trainer not be present .

III Glosario departs.

They include specific concepts of the subject of study that make it easy to consolidate gone aboard contentses and the justification of some activities in addition to have attachments in the ones that find tie and schemata of valuable interest in the resolution of the activities.

Bibliography.

The materials that were consulted relate to each other.

The evaluation has a procedural character and it must be assumed by the trainers, like means to check the evolution of the process of preparation. When designing the

evaluations destined to measure the quality of learning, they must consider some elements: His character of system, his sistematicidad, the levels of assimilation, the educational potentialities of the contents and, most of all, the auto-evaluation must be stimulated, like road for the collective assessment.

Stage of execution.

The objective of the stage is to orchestrate the actions of preparation for the obtaining of criteria on effectiveness and the pertinence of strategy in practice. This stage admits the adjusting and I redesign of the actions accomplished until now, which is possible for the flexible character of strategy. The results depend on the realized preparation of the quality of this stage.

Stage of evaluation.

The objective of this stage is to evaluate the actions foreseen in strategy, that they were executed for the students' preparation talents competitors. Evaluativas that understand the auto-evaluation, the coevaluation and the heteroevaluation foresaw actions themselves in order to give fulfillment to this objective.

Exploratory proofs, the ones they were in selected activities evaluated in previous courses were applicable. In order to strengthen the value of honesty in the students talents the competitors, these exámenes can be branded personally in an encounter once the revision was destined of the same, there in addition to clarify existent doubts, the or will be identified the more elements affected, in the ones that one will center the attention in at a later time.

Validation of the feasibility of the didactic strategy and the teaching material for students' preparation talents Química's competitors in the secondary basic education.

The validation of the proposals utilizing the method of consent for nominal group to 10 professionals with recognized prestige for his experience like teachers giving the subject of study of Química was requested, the ones that fulfilled the following criteria:

Teaching category (Assistant Professor and Assistant Professor).

Years of professional and investigating experience in the Pedagogic Sciences (enter 10 and over 20 years).

Sampling was aleatory simple, not probabilistic conformed for three doctors in Ciencias Pedagogic and seven masters, three in educational Ciencias and four in Enseñanza of Chemistry, the ones that labor at Camagüey Ignacio Agramonte Loynaz's University.

The consulted professors possess a vast experience, because with over 20 years there are seven specialists, wholes recognized like professional and very competent excellent

grades in the provincial space. To the in respect of his teaching categories, they all have teaching principal category. This element and the right now made a comment beforehand convert themselves in extremely reliable specialists to the hour to emit the necessary criteria for the validation of the feasibility of the proposals.

The specialists encountered an opinion poll that included the following aspects.

Were asked to appraise the general objective, stages that they set themselves, foundation of the stages, actions foreseen for each stage and the precisions for the didactic strategy metodológicas.

were asked to appraise the structure of the material, the mail with the objectives of the programs in the eighth position for the teaching material and ninth grade, the logic of the exercises proposed with the contentses that are given in Química's programs in the eighth position and ninth grade, the mail of the exercises proposed with the objectives of contest, the need and utility of the teaching material, if you contribute to reflecting the reality that presents the Chemical science with the preparation for the life from the system of chemical knowledge and the guiding show of the answers and the glossary of proposed terms.

The following scale became established in order to process the opinion poll: C1. Very adequate, C2. Adequate, C3. Adequate little and C4. Inadequate.

You considered with validity of contents if over the specialists' 70 % of the considerations found within the categories of very adequate and adequate.

The general objective and stages were evaluated of the aspects appraised in the didactic strategy of very adequate and the foundation of the stages, his actions and precisions metodológicas of adequate.

The realized recommendations were centered on the stage of planning, because according to the specialist professors the referred should have yielded more explanation on the actions projected of punctual way itself to the elaboration of the teaching material.

They were evaluated of the aspects appraised about the teaching material of very adequate the need and utility of the material, if you contribute to reflecting the reality that presents the Chemical science with the preparation for the life from the system of chemical knowledge and the guiding show of the answers and the glossary of proposed terms. The evaluated aspects of the structure of the teaching material, the mail with the objectives of the programs of eighth and ninth grade, the logic of the exercises proposed with the contentses that are given in Química's programs in the eighth position and

ninth grade and the mail of the exercises proposed with the objectives of contest were adequate.

The signalings accomplished by the consulted professors were the following:

- They should have included more activities.
- Including orientations general metodológicas.
- Describing the objectives of contests by degrees so that the mail between activities and objectives be established.
- Elaborating the objectives of form separated, since they include several abilities in a same objective.

The authors selected the aspects that were categorized as a result of this work enter very adequate and adequate, evaluated like feasible and taking the offered recommendations into account, the teaching material was conformed.

Conclusions

Became verified in the realized deficient diagnosis attention to the needs and the students' individual and collective potentialities interested talents in taking part in Química's contests, scarcity of a teaching material to accomplish the preparation and lack of a didactic strategy that guarantee the students' preparation talents and the professors that assume the workout.

The didactic proposed strategy is structured in five stages dedicated to the selection, diagnosis and preparation, planning, execution and finally to the evaluation of students' preparation talents Química's competitors in the secondary basic education.

The validation of the didactic strategy and the teaching material were evaluated between the categories of very adequate and adequate for the specialists, that offers an alternative for the practical implementation and its perfecting.