

***Un acercamiento al proceso de exámenes de premio en la
disciplina Biología Molecular y Celular***
***An approach to the award examination process in the discipline of
Molecular and Cellular Biology***

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Resumen

El objetivo del presente artículo es proponer procedimientos metodológicos para el perfeccionamiento del proceso de exámenes de premio en la disciplina Biología Molecular y Celular de la carrera Licenciatura en Educación Biología en la Universidad de Guantánamo. Se utilizaron métodos teóricos y empíricos, los cuales permitieron identificar como principales dificultades, la falta de motivación de los estudiantes ante la realización de exámenes de premio, en tanto desconocían su importancia educativa y profesional, el proceder para el desarrollo de los mismos, así como la inclusión de los resultados de estos en la evaluación integral. Posterior a la implementación de los procedimientos metodológicos, los resultados alcanzados estuvieron centrados en el incremento del número de estudiantes presentados a examen de premio, con resultados evaluados de satisfactorios en las esferas cognitiva, procedimental y motivacional. Al respecto, se destacó el vínculo entre el contenido de la asignatura con los problemas profesionales del docente de Biología.

Palabras clave: Exámenes de premio; Procedimientos metodológicos; Disciplina Biología Molecular y Celular; Formación profesional.

Abstract

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El objetivo del presente artículo es proponer procedimientos metodológicos para el perfeccionamiento del proceso de exámenes de premio en la disciplina Biología Molecular y Celular de la carrera Licenciatura en Educación Biología en la Universidad de Guantánamo. Se utilizaron métodos teóricos y empíricos, los cuales permitieron identificar como principales dificultades, la falta de motivación de los estudiantes ante la realización de exámenes de premio, en tanto desconocían su importancia educativa y profesional, el proceder para el desarrollo de los mismos, así como la inclusión de los resultados de estos en la evaluación integral. Posterior a la implementación de los procedimientos metodológicos, los resultados alcanzados estuvieron centrados en el incremento del número de estudiantes presentados a examen de premio, con resultados evaluados de satisfactorios en las esferas cognitiva, procedimental y motivacional. Al respecto, se destacó el vínculo entre el contenido de la asignatura con los problemas profesionales del docente de Biología.

Palabras clave: Exámenes de premio; Procedimientos metodológicos; Disciplina Biología Molecular y Celular; Formación profesional.

Introduction

According to Ministerial Resolution No. 47/2022 of the Ministry of Higher Education (MES) of the Republic of Cuba:

The training of higher level professionals is the process that, consciously and on scientific bases, is developed in the institutions of Higher Education to guarantee the integral preparation of university students, which takes the form of a solid scientific-technical, humanistic training and high ideological, political, ethical and aesthetic values, in order to, achieve competent, independent and creative professionals, so that they can perform successfully in the various sectors of the economy and society in general. (pp. 2-3)

On the other hand, this same resolution states that:

The educational work in Higher Education institutions constitutes the main priority in the training process and is developed using an integral approach, involving the entire university community. For the development of the educational work, the curricular and extracurricular pathways must be used and structured at the different organizational levels in which the training process takes place. (p. 4).

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Hence, in the group of extracurricular activities, the prize exams are placed as a way to evaluate the integral teaching results. The award exams, as expressed in Article 368.1 of Resolution 47/2022 of the Ministry of Higher Education of the Republic of Cuba: "They constitute a way to raise the quality of the graduates of higher education, and their objective is that students deepen the study of the subjects and disciplines that make up their study plan" (p. 93).

In the context of the Bachelor's degree in Biology Education, these are, in turn, a way to achieve and evaluate quality and excellence in the initial training of Biology teachers. According to Cortés and Antúnez, (2015), cited in Martínez, Reyes and Rodríguez, (2022), their realization guarantees the most updated knowledge, with the scientific dimension demanded by the institutions of Higher Education and go in the direction of forming a better prepared professional as a result of an efficient teaching-learning process.

The student of the Bachelor's degree in Biology Education must master the knowledge provided by the disciplines of the training curriculum, specifically the discipline of Molecular and Cellular Biology, whose interdisciplinary nature allows consolidating and deepening the approach of the basic contents of the discipline of Biology in the grades of the basic and upper middle levels, as well as including an important number of the main impacts and biotechnological applications of the biological sciences of the late twentieth century and early twenty-first century. This discipline thus acquires a greater social significance, considering the role of its teaching-learning process in the consolidation of the formation of the scientific conception of the world, the valuation of the socioeconomic development of the country.

In this sense, the interaction of the professional in training with the educational processes that are developed in the work entities is required; hence, linking them with the object of their profession, from the early years, constitutes a fundamental element that serves as motivation and develops in them responsibility and love for the profession (Batista, et al., 2018).

In the last courses, in the discipline Molecular and Cellular Biology of the Bachelor's Degree in Biology Education, there has been a decrease in the participation of students in the prize exams, independently that, it could be related to the non-bonus of the results to the academic index, although, it is maintained as a requirement that students who obtain the first three places in the prize exams, are granted recognitions that correspond to what is established in the Ministerial Resolution of Higher Education of the Republic of Cuba 102/24.

This resolution regulates the "Student Scientific Merit Award", which is of interest to the authors, so research is conducted on its behavior to act on its improvement, as inadequacies have been identified in this process that show as problematic the need to ask about how to improve the process of award exams in the discipline of Molecular and Cellular Biology of the Bachelor's Degree in Biology Education of the Faculty of Education Sciences of the University of Guantanamo?

This article aims to provide methodological procedures supported by the use of WhatsApp for the improvement of the process of award exams in the discipline Molecular and Cellular Biology of the Bachelor's Degree in Biology Education of the Faculty of Education Sciences of the University of Guantánamo.

Development

In Cuban Higher Education, the participation of students in activities linked to scientific research is recognized throughout their professional training stage, which significantly affects their comprehensive training and prepares them for greater interaction with society from the management of science, scientific research and production (Pérez, 2018).

The student, in order to record and record in his academic record the results achieved in scientific activities, must present certificates, diplomas or other documents that certify his participation in events, publications in journals and the results achieved in the award exams (Jacomino and Rodríguez, 2022).

For Cortés, Tejera and Hernández (2015), the completion of the award exams guarantees the most updated knowledge and goes in the direction of forming a better prepared professional as a result of an efficient teaching-learning process.

According to Rodríguez and Argüelles (2020), the prize exams constitute an instrument to motivate students of Cuban Higher Education to deepen the knowledge addressed in a subject studied in a competitive way; since the professor must select a first, a second and a third place among the works evaluated as excellent.

According to Font, et al., (2019), cited in Martínez, Reyes and Rodríguez, (2022), the process of award exams has an important educational component, but requires a management of the teachers' collective and the university community as a whole, since, regardless of the fact that they do not

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always bring a prize, they do contribute to personal improvement, and require a sustained effort, an individual projection of each student and the group, reflected in the brigade's educational project.

The content of the award exams will be determined in the teaching department, with the participation of the subject or discipline group (MES, 2022), with the intention that students assume a leading role and develop skills in information management, through teacher/student exchange.

In this regard, Font, et al., (2019) are of the opinion that the methodological work carried out at different organizational levels is essential to achieve coherence and quality in the formative processes. The educational component focused on the career and year collective and in particular, on the discipline and subject collective that has among its functions to carry out the systematic analysis of the teaching results derived from the learning process is highlighted.

The student's interest in participating in the award examinations should be stimulated from the beginning of the course, the year, the semester and, in particular, the discipline and subject, until it is translated into results at the end of each period. We agree with Rodríguez and Argüelles (2022) that students should set learning objectives for themselves. According to Estrada, Fuentes and Blanco, (2018) "planned and conscious self-learning contributes to the academic training of university students, allowing the consolidation of the contents and objectives of a professional career" (p. 98).

The discipline Molecular and Cellular Biology is taught in the second semester of the first year and first semester of the second year of the Bachelor's degree in Biology Education on the basis of the articulation with the preceding preparation that students possess; the satisfaction of the requirements of the professional's fields of action, as well as those of the main integrating discipline, and the necessary internal logic of the discipline itself.

The object of study of the discipline is the molecular and cellular levels. The objective and contents of the discipline are related to subjects of the disciplines that are part of the curriculum of the career, which integrally prepare the student so that, as a professional, he/she can solve problems that arise in the teaching-learning process of Biology at the basic and upper secondary levels, so that, according to the authors, it has potentialities for the development of prize exams, where the critical thinking and creativity of the students are stimulated.

The deepening in the subject of prize exams favored the development of a research-action in the discipline Molecular and Cellular Biology of the Bachelor's degree in Biology Education of the Faculty of Education Sciences of the University of Guantánamo in the 2024 course. We worked with a

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population of 65 first and second year students of the day course. Theoretical methods such as the analytic-synthetic, inductive-deductive, documentary analysis, as well as empirical methods and techniques were used with a questionnaire to students and observation guide of results records.

Three indicators were established for the analysis, whose elaboration took into consideration those proposed by Martínez, Reyes and Rodríguez, (2022), but contextualized, according to the objectives of this research:

1. Participation in the award exams in the discipline of Molecular and Cellular Biology in the 2022-2024 academic years.
2. Results obtained in the award exams.

Two response options were considered: with results and without results. For the calculation of both, the total enrollment of students enrolled in these years in the aforementioned courses was taken as a reference.

3. Promotion, planning, organization and execution of the award examinations in the teaching-learning process of the discipline Molecular and Cellular Biology.

Consequently, guidelines were established for the promotion, planning, organization and execution of the award exams by the professors, with the following options:

- Guidance on the award examinations at the beginning of the study of each of the subjects of the discipline.
- Information on the award examination topics at the beginning of the study of each of the subjects of the discipline.
- Disclosure of award examination topics.
- Inclusion of the realization in the educational project of the brigades of the first and second years of the Bachelor's degree in Biology Education.
- Inclusion of the results of the Molecular and Cellular Biology discipline award exams in the comprehensive evaluation of students at the end of the semester and school year.
- Differentiated attention by the professors of the Molecular and Cellular Biology discipline during the development of the research activity prior to the presentation of the results of the award exams (this can be face-to-face or virtual).
- Dissemination of the results of the award exams developed.

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- Three response options were considered: always, sometimes and never.
- Contribution of the award exams to your training as a future professional.

Likewise, an initial characterization was carried out and the most coincident responses in the sample studied were taken for qualitative analysis. Subsequently, procedures were designed with their corresponding actions, oriented to the different levels of methodological work. To this end, the provisions of the normative documents, the nature of the system, its feasibility and the possibility of monitoring the results and its implementation were taken into account.

All this allowed proposing methodological procedures for the improvement of the award examination process in the discipline of Molecular and Cellular Biology.

In this perspective, they agree with Peña, et al. (2018) when they refer that methodological procedures constitute:

Complements of teaching methods, they constitute tools that allow the teacher to instrument the achievement of objectives, through the creation of activities, from the characteristics of the content, to guide actions aimed at achieving a goal (p. 14).

In the elaboration of the procedures, the authors of this research took into account the proposal made by Martínez, Reyes and Rodríguez, (2022), although contextualized, according to the objectives of this article.

The proposed methodological procedures and their corresponding actions are described below:

Procedure 1: Planning, elaborating, organizing and execute the process of award examinations in the discipline Molecular and Cellular Biology:

Actions at the discipline level 1.1.

- To evaluate in depth the topics of their subjects (Molecular and Cellular Biology I and Molecular and Cellular Biology II), with respect to the objectives of each one and of the discipline.
- To analyze the interdisciplinary relationships of the content of the subjects of the discipline with the main integrating discipline in terms of the link with the professional problems to be solved in it.
- To deepen in the analysis of the semester reports by subject and discipline the situation of the award exams and the actions for their follow-up.

1.2. Actions at subject level

- To rigorously analyze with the group of teachers of each subject of the discipline Molecular and Cellular Biology the topics to be selected for award exams that respond to the objective of the same and that contribute to the professional problems of the academic year.
- To orient the first day of classes of each of the subjects, the information related to the prize exams, prior consensus in the teaching group of each subject.
- To commit 100% of the students who meet the requirements of the Ministerial Resolution of the Republic of Cuba 47/2022 to take the award exam.
- To identify, by the teaching staff, students with potential for this type of exam, based on their performance in class, their academic performance, as well as the performance of teaching and research tasks, without having to wait to complete the study of the subject.
- To include in the preparation of each subject of the discipline, activities that guarantee a differentiated attention to the students, previously analyzed by the teaching staff of each subject.
- To analyze the semester report of the situation of the award exams and the actions for their follow-up in each of the subjects of the discipline Molecular and Cellular Biology.
- To deliver the final record of the evaluative results of the award exams to the faculty secretary's office.
- To socialize the results of the award exams among the students and teachers of the academic year.

Procedure 2: Analyze the topics of the award exam, where the contents of the molecular and cellular levels are linked to the professional problems of the Professional Model of the Bachelor's Degree in Biology Education. The following topics are presented to the students:

Subject: Molecular and Cellular Biology I.

- The biomolecules and their effects on human health.

Objective: to explain the effects of **biomolecules** on human health from the analysis of their structure-property-importance relationship.

- The role of secondary metabolites in agricultural ecosystems.

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Objective: to explain the effects of secondary metabolites on the agricultural ecosystem by analyzing their structure-property-importance relationship.

- Photosynthetic efficiency of different agricultural crops.

Objective: to explain the photosynthetic efficiency of different agricultural crops, taking into account the photosynthetic structures of C3, C4 and CAM plants, as well as the main characteristics of the enzyme that captures atmospheric CO₂.

Subject: Molecular and Cellular Biology II

- Applications of the DNA molecule.

Objective: to explain the applications of the DNA molecule based on the analysis of its structure-property-importance relationship.

- Development of genetic engineering and biotechnology in Cuba and the world.

Objective: to explain the advances and applications of genetic engineering and biotechnology in Cuba and the world.

- Nanotechnology. Characteristics. Applications in different sectors. Bioethical considerations.

Objective: to explain the advances and applications of nanotechnology.

Epigenetics. Characteristics. Applications in different sectors. Bioethical considerations

Objective: to explain the advances and applications of epigenetics.

After socializing all the topics, each student will select the one that is most motivating and where he/she would like to go deeper by means of the bibliographic review through the elaboration of a paper.

Procedure 3 Analyze the requirements for the elaboration of the paper for the award exam:

For writing:

- Accuracy of scientific language without ambiguity in the use of terms.
- Logic in its presentation: use the content of the paper with a coherent logic, taking into account the relationship structure, properties and applications.
- Creativity: the student determines the form in which the final document will be presented.

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- Correct use of the native language: correct writing, spelling and use of punctuation marks, coherence and cohesion must be taken into account.

Requirements for the structure of the paper:

Regarding the structure of the paper, it must have an initial or presentation page, a digital table of contents, introduction, development, conclusions, bibliographical references and annexes (optional).

The precisions for the writing are: maximum number of pages from the introduction to the conclusions: 10; font: Arial or Times New Roman; font size: 12; letter size paper; line spacing: 1.5; single spacing between paragraphs; APA 7th edition standard for bibliographical references; top, bottom, right and left margins: 2.5.

The introduction should refer to the need, importance and timeliness of the selected topic, concluding with the proposed objective. The paper should go from the general to the particular.

The development should cover the main theoretical aspects consulted. It can be divided into headings. The citations and criticisms made by the researcher should be specified.

The bibliography used must be updated (basically, from the last five years) and have the correct references as to author(s), publisher, year and place of edition, as established by the APA 7th edition standard. The same should include consultation of materials on the Internet, digital support, as well as international, national and local research. It is necessary to check that all references made in the text are supported by a bibliographic entry, which will be organized according to the type of research and the methods used.

The annexes must have titles and be numbered and independent, in the order in which they are presented in the development of the research, they corroborate the information to the reader of the necessary data for the comprehension and evaluation of the work.

Presentation of the results:

The main results of the theoretical study carried out should be presented, according to the selected topic. Finally, the conclusions are presented. The presentation time should be around 15 minutes.

Evaluation

The evaluation is comprehensive. In the first moment, it will be evaluated on the basis of five points taking into account the first two requirements for the elaboration of the paper. Students who obtain five points will be entitled to the second part of the exercise, the presentation and oral discussion of

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the results. At this first stage, the members of the panel must be able to qualitatively assess the quality of the written paper, as well as the level of creativity and independent work of the student.

In a second moment, the presentation of the results will be evaluated through the use of ICT (power point, videos, multimedia, and websites, among others). Here, oral presentation, correspondence between the presentation and the content of the paper, clarity of ideas, creativity and quality of the answers to the questions asked by the members of the tribunal will be evaluated. Finally, taking into account the results achieved both in the written paper and in the discussion of the same, first, second and third place will be awarded.

Main results of the implementation of the methodological procedures:

The data obtained were processed with determination of percentages with mixed analysis (quantitative-qualitative), which allowed the discussion of the results and to arrive at final considerations. The records of the award exams of the two subjects of Molecular and Cellular Biology in the Bachelor's Degree in Biology Education were reviewed, and the limited number of award exams was observed.

This denotes that the educational work carried out in terms of student participation in the prize exams has been limited, if we take into account that it is established that universities must annually create their own system of stimulation to encourage students who achieve important results in the prize exams, as well as in the scientific activity.

In addition, it should be noted that these results are part of the student's file as "index of events and award exams" and will be taken into account in the integral evaluation processes of the student carried out by the institution, the University Student Federation (FEU) and the one attached to the job placement.

It is important to note the results of how students perceive the promotion, planning, organization and execution of the award exams in the discipline of Molecular and Cellular Biology:

- 83% of the students interviewed consider that the orientation on the prize exams by the teachers was good, since they explained to them that it was going to constitute a challenge for their training, they were going to consult bibliographies related not only to molecular and cellular biology, but its link with the problems of their future profession to guarantee their self-preparation; 10% considered that it was regular and only 7% that it was bad.

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- In general, more than 78% considered that the information, dissemination and differentiated attention by the professors, both via WhatsApp and in person was good, motivating them towards the execution of a research work with creativity.
- The most affected indicators, according to the students, were the inclusion in the brigade educational project, its analysis in the groups, as well as the comprehensive evaluation.

In the behavior of participation in the prize exams in general, it was possible to observe the willingness, interest and motivation of the students to obtain a grade of 5 points in each of the subjects of the discipline Molecular and Cellular Biology, as well as to participate in the prize exams. They acknowledged that since they were few, the differentiated attention was acceptable. Although this activity is no longer rewarded, we worked on the motivation of the students, showing them the importance in their integral formation.

As part of the motivation achieved by the students, together with the teachers, they created a WhatsApp group for virtual tutoring. It focused on guidance, control, systematization, evaluation and feedback with the students, on the topics and work in general.

Virtual tutoring is a factor that can determine the academic success of students. For them, constant exchange is necessary, characterized by an affective climate. In tune with the development of information and communication technologies, with emphasis on the incorporation of artificial intelligence, it is suggestive to incorporate applications of this type to the teaching-learning process given that they could be attractive, motivating and practical for students (Cueva, Molerio and Ramírez, 2019; Castro and Antúnez, 2021; González and Guerrero, 2022).

In general, the students considered that the award exams in the discipline of Molecular and Cellular Biology were a challenge as well as a stimulus, since they had to plan more time to do research in networks, journals and the university library. It was an opportunity to deepen on the importance of the contents of this discipline with the professional problems of the career, a starting point in the realization of other research work and participation in scientific events at different levels.

They recognized the motivation towards the activity and this made possible the development of their creativity both in the realization of the paper and in the power point presentation. In general, the five students participating in the prize exams highlighted the impact that this type of exam had on the development of their cognitive independence.

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As can be seen, the contribution of the prize exams to the training of the Biology teacher was not only limited to the deepening of the contents of the discipline Molecular and Cellular Biology, but also to the strengthening of the link with professional problems, the development of creativity and motivation for the career.

On the other hand, it was identified as negative, the lack of award exams in other subjects, which the authors consider unfavorable, if it is taken into consideration that, although they are subjects of the basic cycle, they contribute decisively to the integral formation. We agree with Font, et al., (2019), when considering that the realization of award exams has an important educational component, but it requires a projection of the teachers' collective and the university community as a whole, where student organizations and advanced movements, also prioritize and promote it.

Conclusions

The application of prize exams in the discipline Molecular and Cellular Biology of the Bachelor's degree in Biology Education at the University of Guantánamo, is characterized by the lack of motivation of students to take prize exams, first, because of the complexity of the contents involved and second, because of the lack of knowledge of their educational and professional importance. The results achieved in the process of award exams, supported by the use of Whatsapp, indicate that the proposal of methodological procedures is feasible, since it propitiated a greater teacher-student interaction face-to-face and virtual, managing to transform the students' mode of action. It was also highlighted the link between the content of the subjects of the discipline with the professional problems presented in the teaching-learning process of Biology.

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