



ORIGINAL ARTICLE

Integration of biomedical sciences into student research and education. Benguela. Angola, 2020

Integración de las ciencias biomédicas a la investigación y educación del estudiante. Benguela. Angola, 2020

Iliana Otero-Rodríguez¹  , **Lien Gómez-Estacio²** 

¹University of Medical Sciences of Pinar del Río. Pinar del Río, Cuba

²University of Medical Sciences of Villa Clara. Villa Clara, Cuba

Received: July 27, 2022

Accepted: January 15, 2023

Published: March 31, 2023

Citar como: Otero-Rodríguez I, Gómez-Estacio L. Integración de las ciencias biomédicas a la investigación y educación del estudiante. Benguela. Angola, 2020.. Rev Ciencias Médicas [Internet]. 2023 [citado: fecha de acceso]; 27(2023): e5731. Disponible en: <http://revcmpinar.sld.cu/index.php/publicaciones/article/view/5731>

ABSTRACT

Introduction: the teaching process of biomedical sciences demands changes with innovative qualities where the teacher's role is to create strategies that achieve the integration of basic research with practice, allowing students to establish new points of reference for research and education.

Objective: to expose teaching actions to integrate the subjects Embryology II and Anatomy II to the development of research and educational work of the medical student of the University Katyavala Bwila of Benguela in Angola.

Methods: descriptive, observational study using theoretical methods at the Faculty of Medicine of the University Katyavala Bwila in Benguela Angola in the school year 2020-2021. Teaching actions were designed to strengthen the development of research and the student's educational work in the subjects Embryology II and Anatomy II.

Results: the actions allowed centralizing the teaching process in the search for information, stimulated research skills, linked learning with environmental problems and encouraged the acquisition of moral and civic values in students according to the professional model according to the social task.

Conclusions: the search for information allowed the gain of competences and skills in the scientific creation of the medical student and the acquisition of values proper to the profession, facilitating the integration of basic biomedical sciences to the development of research and education of the student.

Keywords: Biomedical Sciences; Teaching Actions; Research; Education.

RESUMEN

Introducción: el proceso docente de las ciencias biomédicas demanda de cambios con cualidades innovadoras donde la función del profesor sea crear estrategias que logren la integración de la investigación básica con la práctica, que les permita a los estudiantes establecer nuevos puntos de referencia para la investigación y la educación.

Objetivo: exponer acciones docentes para integrar las asignaturas Embriología II y Anatomía II al desarrollo de la investigación y la labor educativa del estudiante de medicina de la Universidad Katyavala Bwila de Benguela en Angola.

Métodos: estudio descriptivo, observacional utilizando métodos teóricos en la Facultad de Medicina de la Universidad Katyavala Bwila en Benguela Angola en el curso escolar 2020-2021. Confeccionadas acciones docentes para fortalecer el desarrollo de la investigación y la labor educativa del estudiante en las asignaturas Embriología II y Anatomía II.

Resultados: las acciones permitieron centralizar el proceso docente en la búsqueda de información, estimularon las habilidades investigadoras, vincularon el aprendizaje con problemas del entorno e incentivaron la adquisición de valores morales y cívicos en los estudiantes acorde al modelo profesional según el encargo social.

Conclusiones: la búsqueda de información permitió la ganancia de competencias y habilidades en la creación científica del estudiante de medicina y la adquisición de valores propios de la profesión, facilitando la integración de las ciencias básicas biomédicas al desarrollo de la investigación y la educación del estudiante.

Palabras clave: Ciencias Biomédicas; Acciones Docentes; Investigación; Educación.

INTRODUCTION

Today's Angolan society is noted for wide access to education at all levels. The Faculty of Medicine of the Katyavala Bwila University of Benguela fulfills the mandate to train medical graduates with a humanistic approach. The curriculum for training graduates does not establish curricular strategies to be implemented in each of the disciplines of the basic biomedical sciences.⁽¹⁾

Science education in the new millennium requires profound transformations from elementary education to university education. A scientific culture should be fostered that guarantees the development of information-seeking skills, the use of new technologies and information technology, learning how to identify and solve problems and adapt to the rapid changes in science, culture and society.⁽²⁾

The discoveries in the biomedical sciences over the last 200 years, and especially their practical application, have brought about radical changes in the life of mankind. The challenge, of the present and the future, is to achieve the integration of basic sciences with clinical areas. The integration of basic research with practice from an interdisciplinary perspective will make it possible to establish new benchmarks for multidisciplinary and interdisciplinary research since disciplinary knowledge alone is no longer sufficient for problem solving.^(3,4)

It is necessary to replace the predominance of symbolic teaching and to acclaim a more direct teaching, to introduce in initial training a methodology that is presided by action-research as an important learning process of educational reflection that constantly links theory and practice.⁽¹⁾

The teaching process of biomedical sciences demands changes with innovative qualities, where the teacher stops being a transmitter of knowledge and becomes aware that his role is to create strategies and possible learning methods so that the student investigates, feels the satisfaction of elaborating his instructions from problematic situations of his social environment and is motivated by the search for more knowledge that prepares him for life.

In medical science careers, it is of vital importance that teaching activities are designed in terms of teaching tasks whose solution contributes to the assimilation of knowledge. Elaborate teaching tasks allow the development of research skills and the consolidation of knowledge on scientific research in students.^(5,6)

Technological tools through the creation of virtual environments represent a pedagogical strategy that facilitates interaction, since it promotes simultaneous and cooperative learning, where the student learns more than he would learn on his own, as a result of the interaction of the members of a team, who know how to differentiate and contrast their points of view, in such a way that they generate a process of knowledge construction.^(7,8)

The promises and aspirations of the medical humanities are considerable. Can we be confident that their teaching ~ will contribute to producing more humane, compassionate and responsible professionals? The truth is that we do not yet know exactly how or to what extent they will be able to achieve this. What we do know is that we cannot stop trying.⁽⁹⁾

The information of the results of oriented teaching actions is significant, since communication is an effective tool to generate positive changes in students, and through research it is possible to achieve a greater awareness of the need to take part in the solution of environmental problems until they become protagonists of the transformation.⁽¹⁰⁾

The need to sustain the harmonious development of education in the basic sciences is evident, with a view to preserving its theoretical heritage, academic and scientific advances, as well as its impact on the solution of society's health problems from flexible and innovative perspectives.⁽¹⁾

Considering that the contents of biomedical sciences generally have a high degree of complexity and extension, requiring for their learning a high level of abstraction and reflection until their total understanding and application, it is the purpose of this work to expose teaching actions to integrate the subjects Embryology II and Anatomy II to the development of research and the educational work of the medical student of the University Katyavala Bwila of Benguela in Angola.

METHODS

The research shows a descriptive, observational study using theoretical methods among which are: historical-logical, analytical-synthetic, inductive-deductive. The controls carried out to the educational teaching process of biomedical sciences in the Faculty of Medicine of the University Katyavala Bwila of Benguela, Angola in the school year 2020-2021, revealed difficulties in the orientation of teaching towards primary health care with a high scientific, humanistic, responsible and ethical training.

Teaching actions were designed to strengthen the development of research and the student's educational work in the teaching process of the subjects Embryology II and Anatomy II.

RESULTS

The following suggestions were taken into account in the elaboration of the actions:

- ✓ Start classes with the approach of problematic situations, preferably open, elaborated from the family and social environment in which the student develops.
- ✓ The teaching actions should constitute a system and be in correspondence with the objectives set by the teacher. They should be sufficient, varied and differentiated.
- ✓ The system of teaching actions should contain at least three types of tasks: a) tasks aimed at the identification and formulation of new teaching problems; b) tasks aimed at the search for new knowledge and/or solution procedures, and c) tasks aimed at the creative application of the new knowledge and skills acquired.
- ✓ Design and propose open-ended and open-ended actions, which favors the development of creativity.
- ✓ Actions should reflect, whenever possible, the wide possibilities of application of science in life, increasingly complex and interdisciplinary in nature.
- ✓ Develop forms of collective activity and communication that favor the interaction of the individual with the collective in the learning process in the classroom and outside the classroom, in groups, in teams (four or five students), in pairs and individually.
- ✓ Link the learning content with social practice and stimulate the student's appreciation of the educational level.

Teaching tasks were oriented to students throughout the teaching-learning process.

Some of the teaching actions used are shown below

Subject: Embryology II

Lecture. Title: Development of the central nervous system (CNS).

Teaching actions developed by the students outside the classroom in teams, in pairs and individually and taking into account the type of task were answered during the course of the lecture.

1. To investigate three actions for the evaluation of the neurological maturity of the newborn and postnatal growth of the CNS.
2. To inquire at the health center about the methods used and the importance of prenatal diagnosis in the detection of congenital CNS defects.
3. Mention actions to prevent congenital CNS malformations.
4. Select one developmental alteration of the most cephalic part of the neural tube (Cranial congenital malformations) and another of the most caudal part (Congenital malformations of the spinal cord) and describe each malformation taking into account the following:
 - Scientific name.
 - Description (form of presentation of the malformation).
 - Etiopathogenesis (causal mechanism of the defect that must be related to failures of the basic morphogenetic mechanisms).
 - Means for diagnosis.
 - Actions for its prevention.

Subject: Embryology II

Seminar. Title: Normal and pathological embryo-fetal development; its evaluation.

Teaching actions oriented by teams and individually for the development of the seminar.

1. Argue for or against the following statement: **Assessment of amniotic fluid volume and composition is useful in the evaluation of fetal development.**
2. A 40-year-old woman suffering from Diabetes Mellitus after three miscarriages achieves a 20-week pregnancy from a relationship with a 45-year-old man. There is no family history of congenital malformations. It is detected that there is an increase in amniotic fluid volume. The pregnant woman is considered high risk. Referring to the case say:
 - a) Name the period of development in which the fetus of this pregnant woman is. Justify your answer.
 - b) The conditions presented by this woman that justify considering her a high-risk pregnant woman.
 - c) The diagnostic methods you would use to evaluate the growth and maturation of the fetus of a high-risk pregnant woman.
3. Investigate factors that determine the quality of fetal growth and development on which you could influence to avoid low birth weight, explain the answer with examples.
4. Investigate a pregnant woman in the community and identify risk factors that could cause low birth weight in her fetus.
5. Find out the diagnostic means available in the environment for the detection of congenital malformations.
6. Present the actions that could be taken in the community to prevent low birth weight births and congenital malformations.

Subject: Anatomy II

Seminar. Title: Cranial nerves.

Team-oriented and individual teaching actions for the development of the seminar.

1. After a surgical resection of cervical lymph nodes, due to a larynx tumor, a patient lost sensitivity of the neck skin. Argue the possible cause of this situation.
2. Investigate how to localize a lesion caused by involvement of the functions of cranial nerves III, IV and VI.
3. Given a patient with dysfunction of the maxillary and mandibular branches of the V cranial nerve, investigate in which body area the signs and symptoms would be looked for and what skin reflexes might be absent.
4. Investigate why, after parotid excision, the patient is often left with paralysis of some mimic muscles, if this gland is innervated by the glossopharyngeal and not the facial.
5. In the presence of a patient with deviation of the labial commissure to the right and inability to close the left eye, explain with arguments the nerve that is injured.
6. Inquire in the community about a patient with neurological signs suggestive of cranial nerve involvement. Attribute these signs to the possible damaged structures.

Subject: Anatomy II

Practical class. Title: Telencephalon and lateral ventricles.

Teaching actions to be performed in the independent work of each student for the development of the class.

1. Using the atlas and the image gallery of the discipline:
 - a. Reproduce each of the faces of the cerebral hemispheres by means of diagrams.
 - b. Describe the structures that are part of the internal morphology of the cerebral hemispheres.
 - c. Identify a figure showing the faces of the cerebral hemispheres.
 - d. Procure an image representing a horizontal slice of the brain and state the anatomical relationship between gray matter and white matter structures.
2. Patient with loss of motility of the left hemibody. Impossibility to hold objects with the right hand, tremor in both hands and incoherent language. After physical examination, a CT scan is performed and an image suggestive of cerebral infarction is observed. Answer
 - a. Anatomical site or sites of localization of the lesion.
 - b. Will the gray matter, white matter, or both be affected.
 - c. If both substances are affected, which nuclei and fibers are damaged.

The educational tasks indicated allowed centralizing the teaching process of the subjects Embryology II and Anatomy II in the search for information rather than in teaching, stimulated the acquisition of habits, qualities and research skills, linked the learning content with the problems of the environment and encouraged the acquisition of moral and civic values in the students according to the model of the professional to be trained according to the social task.

As the teaching-educational process progressed, the satisfactory results in the control of learning became more evident, as the high and medium performance students were linked to the support and development of the low performance students.

The tasks developed, increased the motivation of the student to appropriate the techniques and/or methods of the scientific and investigative activity that their profession demands, stimulated the collaboration of the students in the search for solutions to the health problems of their neighborhood, the participation in the student scientific day and also increased the incorporation to the group of monitors of the biomedical sciences of the faculty of medicine.

DISCUSSION

Various researches describe medicine as a profession committed to the health of individuals and the community, which cannot cease to be social because when solidarity fades away, the population is left behind in prevention and treatment. The medical humanities are in charge of promoting humanly meaningful skills and attitudes and attitudes of union, responsibility, solidarity, gratitude, respect and acceptance of people.^(1,9)

Evolving teaching methods and ways of self-preparation of medical students from their first years of study oriented to link basic biomedical sciences with the reality of their environment is conducive to the acquisition of committed and responsible behaviors with community medicine.

For the effectiveness of the formative work in the universities of medical sciences, it is a fundamental condition not to lose sight of the systemic interrelation between education-teaching-learning-instruction; this will allow to solve correctly the planning, organization, direction and control of the teaching process considering the health problems that the future professionals must solve.

The researchers agree with Núñez and cols,⁽⁶⁾ in that the teaching tasks contribute to the development of research skills in students for the solution of problems that arise during their professional performance in the provision of health services.

Regardless of the information search method used in each class, the teacher should guide the integration of theoretical knowledge with practice and promote student participation in scientific groups and events.

Student scientific activity in the context of higher medical education is a necessity, since research is one of the substantive processes of the university, it represents a specific function of professional work, which is also linked to a way of thinking and acting that prepares the graduate to successfully face the demands of contemporary scientific-technical development.⁽¹¹⁾

The authors of this work consider that the learning of biomedical disciplines based fundamentally on the search for information allows students to improve their oral and written expression skills, promote the skills required for reasoning, debating or solving a problem and those related to teamwork. Regardless of the information search method used in each class, the teacher should guide the integration of theoretical knowledge with practice and promote student participation in scientific groups and events.

Researchers agree that some of the main impediments to carrying out research projects are the high costs involved, as well as the lack of time, the lack of technical knowledge to carry out research projects and the lack of support from the authorities and/or teachers of the institution, which leads to a reduction in the quantity and quality of research and to discouragement to do research.^(12,13)

The physician's mission has changed as they have developed in correspondence with the transformations of people's state of health and, consequently, the way in which their actions are expressed must also change in order to achieve teaching-health care-research integration. It is a matter of promoting, from the curricular point of view, that the physician in training acquires the basic tools for professional scientific thought and action.⁽¹⁴⁾

It is important to point out that the training of the future professional should be focused on his or her ability to learn, adapt to social transformations, detect important problems and practical ways to solve them. Achieving such qualities demands that the student's teaching-learning process be increasingly focused on the independent search for knowledge, guided by the teacher, so that he/she acquires habits in research and enhances his/her scientific creation, where discipline, formal education, human sensitivity, responsibility and interest in research are fostered within the framework of teamwork.

It is concluded that the teaching actions oriented in the teaching-learning process of the subjects of Embryology II and Anatomy II in the faculty of medicine of Katyavala Bwila University, allowed the gain of competences and skills in the scientific creation of the medical student and the acquisition of values proper of the profession, facilitating the integration of the basic biomedical sciences to the development of the student's research and education.

Conflict of Interest

The authors declare that there is no conflict of interest.

Funding

No funding was received for this study.

Contribution of the Authors

IOR: conceptualization, formal analysis, research, project management, supervision, resources, critical review, approval of the final version.

LGE: conceptualization, data curation, formal analysis, research, methodology, data presentation, approval of the final version.

BIBLIOGRAPHIC REFERENCES

1. Otero Rodríguez I, Liy Isada MV, Velázquez García L. El trabajo independiente en las ciencias básicas biomédicas en la Facultad de Medicina de Benguela. Rev Ciencias Médicas [Internet]. 2019 Abr [citado 20/07/2022]; 23(2): 341-50. Disponible en: http://scielo.sld.cu/scielo.php?script=sci_arttext&pid=S1561-31942019000200341&lng=es
2. Muguercia Fornaris A, Rizo Vázquez X. Guía metodológica para la ejecución de un seminario panel en los contenidos embriológicos. Artemisa: I Jornada Científica de Farmacología y Salud [Internet]. Fármaco Salud Artemisa; 2021. [citado 20/07/2022]: [aprox. 16 p.]. Disponible en: <https://farmasalud2021.sld.cu/index.php/farmasalud/2021/paper/viewFile/134/51>
3. Chaple Gil AM, Corrales Reyes IE, Quintana Muñoz L, Fernández E. Indicadores bibliométricos sobre evaluación de programas de estudio de ciencias médicas en revistas biomédicas cubanas. Revhabancienméd. [Internet]. 2020 Feb [citado 20/07/2022]; 19(1): 154-66. Disponible en: http://scielo.sld.cu/scielo.php?script=sci_arttext&pid=S1729-519X2020000100154&lng=es
4. Sentí M, Presas A, Baños JE. La enseñanza de la relación mutua entre ciencias biomédicas y sociedad. La experiencia de biomedicina, sociedad y cultura. Edumed [Internet]. 2019 [citado 20/07/2022]; 20(6): 347-52. Disponible en: <https://www.sciencedirect.com/science/article/pii/S1575181318301724>
5. Lavandero Espina A, Rodríguez Oropesa K, Delfín Soto O, Gutiérrez M, Buenaventura A. La asignatura Regulación Hormonal del Metabolismo y Reproducción: una necesidad en la carrera de Estomatología. EDUMECENTRO [Internet]. 2019 Jun [citado 20/07/2022]; 11(2): 19-31. Disponible en: http://scielo.sld.cu/scielo.php?script=sci_arttext&pid=S2077-28742019000200019&lng=es
6. Núñez EE, Blanco BN, Jiménez JE. Tareas docentes para el desarrollo de habilidades investigativas desde la educación en el trabajo. EduMeCentro [Internet]. 2020 [citado 20/07/2022]; 12(2): 146-60. Disponible en: <https://www.medigraphic.com/pdfs/edumecentro/ed-2020/ed202k.pdf>
7. Ortiz Aguilar W, Santos Díaz L, Rodríguez Revelo E. Estrategias didácticas en entornos virtuales de enseñanza-aprendizaje universitarios. Opuntia Brava [Internet]. 2020 [citado 20/07/2022]; 12(4): 68-3. Disponible en: <https://opuntiabrava.ult.edu.cu/index.php/opuntiabrava/article/view/1105>
8. Revelo Sánchez CA, Collazos Ordoñez J, Jiménez Toledo A. El trabajo colaborativo como estrategia didáctica para la enseñanza/aprendizaje de la programación: una revisión sistemática de literatura. Tecnológicas [Internet]. 2018 jun [citado 20/07/2022]; 21(41): 115-34. Disponible en: <http://www.scielo.org.co/pdf/teclo/v21n41/v21n41a08.pdf>

9. Rodríguez Zamora R, Espinoza Núñez LA. Trabajo colaborativo y estrategias de aprendizaje en entornos virtuales en jóvenes universitarios. RIDE. Rev. Iberoam. Investig. Desarro. Educ [Internet]. 2017 Jun [citado 20/07/2022]; 7(14): 86-109. Disponible en: http://www.scielo.org.mx/scielo.php?script=sci_arttext&pid=S2007-74672017000100086&lng=es
10. Sánchez González MÁ. El humanismo y la enseñanza de las humanidades médicas. Edumed [Internet]. 2017 [citado 20/07/2022]; 18(3): 212-8. Disponible en: <https://www.sciencedirect.com/science/article/pii/S1575181317300463?via%3Dihub>
11. Leiva Suero LE, Hernández Navarro EV. Novedades metodológicas para la enseñanza de las Ciencias Biomédicas. Enfermería Investiga [Internet]. 2019 [citado 20/07/2022]; 4(1): 1. Disponible en: <https://revistas.uta.edu.ec/erevista/index.php/enfi/article/view/486>
12. Segredo Pérez AM, Reyes Miranda D, Quintana Galende ML, Díaz Lemus M, García Hernández I, Díaz Hernández L. Desarrollo de habilidades investigativas en el campo de la Salud Pública. Educ Med Super [Internet]. 2017 Mar [citado 20/07/2022]; 31(1): [aprox. 22 p.]. Disponible en: http://scielo.sld.cu/scielo.php?script=sci_arttext&pid=S0864-21412017000100005&lng=es
13. Piloto Porras DC, González Miló A, González González M, Ortiz Castillo LE, González Rodríguez R. Interdisciplinariedad desde la disciplina Medicina General Integral hacia las Ciencias Básicas Biomédicas. Revista Universidad Médica Pinareña [Internet]. 2018 [citado 20/07/2022]; 14(3): 257-66. Disponible en: <http://galeno.pri.sld.cu/index.php/galeno/article/view/526>
14. Ríos González CM. Obstáculos para la investigación científica en estudiantes de Medicina del Paraguay. Edumed [Internet]. 2017 [citado 20/07/2022]; 18(1): 78-9. Disponible en: <https://doi.org/10.1016/j.edumed.2016.07.009>