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ARTÍCULO ORIGINAL

Research in initial professional training: a perspective from quality indicators

La investigación en la formación inicial del profesional: una mirada desde los indicadores de calidad

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ABSTRACT

Background: for universities to meet the quality criteria established by national accreditation agencies in initial professional training, it is essential to delve deeper into the substantive research process.

Objective: To present methodological procedures and their applications based on quality indicators in university programs to improve research in initial professional training.

Methods: a descriptive study was conducted at the José Martí Pérez University of Sancti Spíritus between September and December 2023. Theoretical methods included analytical-synthetic, inductive-deductive, and systems approaches; empirical methods included document analysis, in-depth interviews, participant observation, focus groups, and expert

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evaluation; and mathematical-statistical methods were used to process the quantitative data.

Results: document analysis of self-evaluation reports revealed weaknesses associated with research in professional training. In-depth interviews showed deficiencies in student participation in research projects, and observation revealed more rigorous control over the research tasks carried out by professors. These findings highlighted the need to develop methodological procedures and actions to improve the quality of research in initial professional training.

Conclusions: the methodological procedures, based on the work of the career collective, favor the link between the research developed by the students in the work practice, the projects, the scientific groups and the lines of research; which contribute to improving the quality of research in the initial training of the professional.

MeSH: research; qualitative research; quality control; total quality management; education, medical.

RESUMEN

Fundamento: para que las universidades logren cumplir los criterios de calidad fijados por las agencias de acreditación nacional en la formación inicial del profesional, es esencial profundizar en el proceso sustantivo de investigación.

Objetivo: exponer procederes metodológicos y sus acciones basados en indicadores de calidad en las carreras universitarias para la mejora de la investigación en la formación inicial del profesional.

Métodos: se realizó una investigación descriptiva en la Universidad de Sancti Spíritus “José Martí Pérez” en el período septiembre-diciembre 2023. Se utilizaron métodos teóricos: analítico-sintético, inductivo-deductivo y enfoque de sistema; empíricos: análisis documental, entrevista en profundidad, observación participante, grupos de discusión y valoración por criterio de especialistas; y matemático-estadísticas para procesar los datos cuantitativos.

Resultados: el análisis documental de los informes de autoevaluación reveló la presencia de debilidades asociadas a la investigación en la formación del profesional, la entrevista en profundidad mostró deficiencias en la participación de estudiantes en proyectos de investigación, y la observación evidenció un control más riguroso sobre las tareas de

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investigación ejecutadas por los profesores; todo lo cual llevó a la necesidad de elaborar procederes metodológicos y sus acciones para mejorar la calidad de la investigación en la formación inicial del profesional.

Conclusiones: los procederes metodológicos favorecen, a partir del trabajo del colectivo de carrera, el vínculo entre la investigación desarrollada por los estudiantes en la práctica laboral, los proyectos, los grupos científicos y las líneas de investigación; los que contribuyen a mejorar la calidad de la investigación en la formación inicial del profesional.

DeCS: investigación; investigación cualitativa; control de calidad; gestión de la calidad total; educación médica.

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INTRODUCTION

To ensure inclusive and equitable quality education that promotes lifelong learning opportunities for all, in recent years universities have shown greater concern about the impact of the institution and its undergraduate and graduate programs on society.[1] To achieve these global perspectives, institutions are required to meet the quality indicators established for the substantive processes of training, research, and university extension.

In this regard, González Pérez et al.[2] assume that: "... one of the processes that at the university can provide the greatest solutions to problems in all areas of knowledge is research, since if well managed, with the participation of professors and students, it represents the main human potential to drive the development of science and technology in many countries."

In Cuba, the initial training of professionals conceives as a central idea the integration between the organizational components of the pedagogical process: academic, work-investigative, and extension; the systemic nature between these facilitates the implementation of activities in all years of study, according to the objectives declared in the professional model; it confers the professional approach that distinguishes this training. The importance of appropriating the scientific method as a necessary element for the future professional to transform the existing reality in their context of action is emphasized.

To guarantee the quality of education, the Ministry of Higher Education in 2000 approved the creation of the National Accreditation Board (Junta de Acreditación Nacional - JAN) as the body designated by the State to implement quality evaluation and accreditation policies for undergraduate programs, postgraduate academic training, and institutions. Thus, in the Higher Education Evaluation and Accreditation System (SEAES), the importance of self-evaluation to meet quality standards in professional training is highlighted, as it is conceived as a mandatory and reference process that precedes external evaluation, organized and conducted by its own actors based on the established quality standard and evaluation guide.[3]

The University Program Evaluation and Accreditation Subsystem (SEA-CU) is part of SEAES and has the general objective of ensuring the quality and continuous improvement of its programs, based on the comprehensive development of its substantive processes to achieve comprehensive relevance and academic excellence.[4]

The above indicates the need to deepen the role of research in the initial training of professionals to ensure the development of research skills that will allow their insertion into the labor market. However, Castro Rodríguez *et al*.[5] indicate that the low scientific production of university students highlights the existing limitations in research management in these institutions; which may be caused because their training and linkage with projects remains limited,[6] aspects that demonstrate the need to improve the understanding of the research process and the role of tutors.

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Based on the arguments mentioned and the analysis of the systematic self-evaluation reports of programs with the "Certified" accreditation category, in addition to the experience of the authors of this study, the existence of weaknesses related to the scarce participation of students in research that contributes to solving socioeconomic problems of the territory in the program's area of knowledge was verified; this was evidenced, mainly, in the behavior of the indicators linked to research in the "students" dimension of the SEA-CU. Among the main causes, the lack of articulation between the research developed by them in work practice, projects, scientific groups, and the program's research lines stands out.

For the reasons previously stated, this research seeks to answer the following scientific question: What methodological procedures can improve the quality of research in initial professional training? Likewise, it aims to: present methodological procedures and their actions based on quality indicators in university programs to improve research in initial professional training.

METHODS

A descriptive investigation was carried out in the period September-December 2023 at the "José Martí Pérez" University of Sancti Spíritus. The population included five university programs with the "Certified" accreditation category. From this population, three programs were selected, adhering to the inclusion criterion that they must request external evaluation during the second semester of 2025; participants provided their informed consent to participate in the research.

The theoretical methods were:

- Analytical-synthetic: It provided the study of the most relevant background supporting the topic of research in initial professional training at the international and national levels, as well as the analysis of the indicators established for programs in the SEA-CU.

- Inductive-deductive: It facilitated the interpretation of the theoretical information that bases research in professional training in correspondence with the quality standards of university programs, which allowed identifying the shortcomings and their possible causes, as well as characterizing the methodological procedures.
- Systems approach: It helped to establish the relationships between the methodological procedures to improve research in professional training, as well as to organize them and create synergies between them.

Empirical methods:

- Document analysis: it facilitated the conceptual understanding of the indicator standard, linked to student participation in research in the governing documents of the MES and the verification of its behavior in the selected programs. The documents reviewed were the SEA-CU and the systematic self-evaluation reports of the selected programs.
- In-depth interview: it allowed obtaining information about the students' opinions regarding participation in projects or scientific groups linked to research lines, the research topic they develop in their work practice and its impact on solving socioeconomic problems of the territory, the dissemination of their scientific results, and participation in academic networks.
- Participant observation: it made it possible to record information about the leading role of students in the activities organized in the projects, the observed aspects included: the composition of the participants, the presentation of research results, the control over the status of course and diploma work developed in work practice, and its impact on solving socioeconomic problems of the territory.
- Focus group: it promoted the exchange of opinions among professionals about the characteristics of research in professional training based on the quality indicators established for the program subsystem, as well as the methodological procedures that can contribute to its improvement. Two groups were held with key informants: the first consisted of eight professionals, four of whom were project leaders and the other four were specialists from the quality group; the second group consisted of seven professionals, including five program coordinators and two specialists from the

quality group. During the exchange sessions in the focus group, the moderator used an interview guide with open questions that favored the collection of qualitative data from the explanations of the members of each group.

- Evaluation by expert criteria: to guarantee the scientific rigor of the research, the methodological procedures were evaluated by specialists. For this, 20 specialists in the topic were selected, including three members of the program's technical committee, four department heads, four research project leaders, five program coordinators, and four year-group leaders. Among the participants, with more than ten years of professional experience, there were 16 doctors in different specialties and full professors (80%), while the others were associate professors.

The specialists evaluated the methodological procedures taking into account the following indicators: relevance, structure, usefulness, and feasibility of execution. They assigned each indicator a value on a measurement scale composed of the numbers 5, 4, 3, 2, and 1, with five being the highest rating.

Mathematical-statistical methods served as a basis for comparing the quantitative results obtained by the programs in this indicator with the quality standards set by the SEA-CU. Furthermore, they were used for the elaboration of figures that facilitated the processing of information.

RESULTS AND DISCUSSION

The analysis of the SEA-CU verified that the continuous improvement of the program is assumed as the progressive and systematic development of the substantive processes, materialized in systematic self-evaluation and the control of development plans, oriented towards achieving qualitative and integrative educational outcomes that denote academic excellence, comprehensive relevance, and a quality management culture.[4]

Thus, the present study focuses on the "Students" indicator, established by the Ministry of Higher Education in the Regulations of the Higher Education Evaluation and Accreditation

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System (SEAES). Resolution 160/2023.[3] Therefore, all research activities developed in professional training must take as their starting point the assessment of compliance with the indicator, expressed in the following quantitative data in Table 1.

Table 1. Dimension 3. Students, according to Resolution 160/2023. SEA-CU. Regulations of the Higher Education Evaluation and Accreditation System (SEAES). Havana.

Indicator: Incorporation of students in research projects	**Assessment of compliance**
The percentage of students linked to research lines or projects for solving socioeconomic problems, and integration into the scientific pyramid, together with their professors.	Students of the program are incorporated into research projects for solving socioeconomic problems, in strategic sectors of local, community, educational, and cultural development and integrate the scientific pyramid: Qualified: 35 % of students from the last two years together with their professors are incorporated into research. Certified: at least 40 % of students from the last two years together with their professors are incorporated into research lines and projects and integrate the scientific pyramid. Excellence: at least 45 % of students from the last two years are incorporated together with their professors into research lines and projects and integrate the scientific pyramid.
Percentage of students linked through work practices in teaching units and base labor entities to research with course and diploma works for socioeconomic, local, social, cultural development of the	Qualified: 15 % of students in work practices and diplomas are linked to local, social, and cultural development. Certified: 20 % of students in work practices and diplomas are linked to local, social, and cultural development or strategic sectors.

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territory and to strategic sectors	Excellence: 25 % of students in work practices and diplomas are linked to local, social, and cultural development.

Source: Resolution 160/2023. SEA-CU.[3]

After examining the information from the SEA-CU, the behavior of the indicated indicator in the self-evaluation reports of the selected programs was analyzed. Its evaluation showed weaknesses linked to the scarce participation of students in research projects and scientific groups that contribute to solving socioeconomic problems of the territory. This observation is supported by a quantitative analysis of students, organized by academic years, who participated in research projects, as shown in Figure 1, where the highest percentage corresponds to students from the higher years.

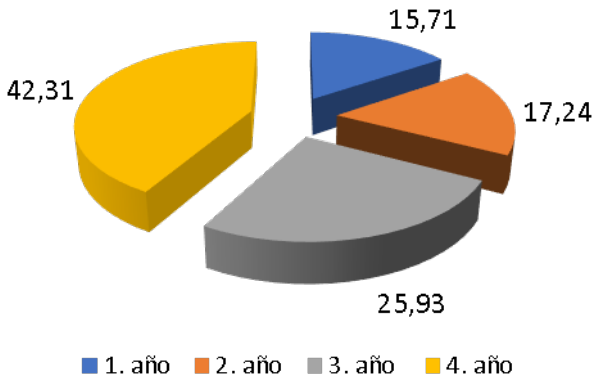

Fig. 1. Percentage of students in the sample, by academic years, in research projects. "José Martí Pérez" University of Sancti Spíritus

Source: Self- elaboration

From the data analysis, it is deduced that of the total third and fourth-year students, 40% are participating in research projects; a percentage that aligns with what is indicated in Table 1 for the certified category. However, these results still do not meet the 45% specified in the SEA-CU for the excellence category.

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During the interview it was notable that all students gave a positive assessment of the possibilities offered by work practice for developing their research and of the accompaniment by tutors both from the university and in the base labor entities. Third and fourth-year students explained the importance of the research topic they develop; however, they found it difficult to establish its relationship with the program's lines and projects, as well as to comment on its contribution to the development of the territory's strategic sectors. Regarding first and second-year students, a small percentage stated that they participated in research projects. Likewise, all students expressed that they found it difficult to publish their scientific results in journals, as well as to participate in academic networks; on these latter topics, they offered few arguments.

Observation allowed the researchers to participate in activities organized by the research projects. As a result, scarce presence of first-year students in these activities was noted, in addition to the existence of similar research topics that are not linked to projects. Greater control over the research carried out by the program's faculty was also noted, focused on compliance with project tasks, scientific production, and the impact of its results at the university and in the territory.

In the focus groups, the exchange of opinions among professionals focused on:

- Analyzing the categories to be characterized: research in professional training and quality indicators.
- Determining the essence of the selected categories.
- Comparing with other components of professional training (training and extension).
- Selecting the elements that distinguish the methodological procedures to improve the quality of research in professional training.

Among the participants' criteria, the following stand out:

"... we consider it necessary to deepen the topic of research in professional training and the quality indicators of university programs established by the JAN, as well as the

characterization of methodological procedures that guide the work of the program's faculty..."
"...it would be important for the program's faculty to ensure the projection of actions related to research in work practice..."
"...what is stated is transcendental, because the program's faculty has among its functions the analysis of self-evaluation results and the elaboration of the continuous quality improvement plan..."
"I suggest that one of the procedures should be the specification of the research lines that these programs can develop in their area of knowledge..."
"...also, it is required to identify the projects and scientific groups of the program, in which students, professors, and professionals from the territory participate..."
"I think that organizing research, following methodological procedures, will favor the integration of the topics of course and diploma works developed by students in work practice with the projects and research lines of the program; which will contribute to achieving tangible results in solving the territory's socioeconomic problems..."
"...the possibility of including procedures related to expanding the program's collaborative relationships that support the research process is suggested..."
"...it is necessary to strengthen the publication of articles by students; as well as their participation in academic networks..."

The qualitative analysis of the information sources allowed identifying the existence of potentialities and limitations:

Potentialities:

- High recognition of the program's faculty in the design, implementation, and evaluation of research actions
- Effective assessment by students of the potential of work practice for developing their research
- Notable professional development of the participants in the exchanges held in the focus groups

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Limitations:

- The research topics developed by students in work practice are not properly linked to the program's lines and projects, which is why the totality of scientific results fails to impact the solution of socioeconomic problems of the territory
- Student participation in projects and scientific groups is limited, which hinders the dissemination of their scientific results
- The methodological procedures to improve research in professional training, based on the quality indicators established for this subsystem, are not sufficiently characterized and articulated with each other, from the program's faculty

The comprehensive analysis of the opinions shared by the participants in the focus groups helped to understand the diversity of elements that need to be considered to improve the quality of research in initial professional training. However, most current studies address these aspects independently and do not always delve into the quality indicators established for the university program subsystem.

The authors of this research consider that, in correspondence with the weaknesses identified in the selected programs, the methodological procedures have the general objective of favoring the link between the research carried out by students, projects, scientific groups, and the program's research lines. Below are the procedures and their corresponding actions; in addition to the evaluation by specialists considering the set indicators, as well as the theoretical elements to be taken into account for their implementation.

I. Determination of the research lines that the program can develop and that require:

- Identify the priority scientific problems that the program should contribute to solving in the territory and the institution
- Review the starting point of the research lines, based on the existence of projects in related topics, presence of professor-student-researchers studying a topic, specific objectives to investigate in diverse topics, or common scientific results derived from postgraduate studies, among others

- Identify the scientific leaders who encourage students to participate in research
- Justify the program's research lines

II. Organization of student participation in projects or scientific groups, according to the program's research lines, based on:

- Determine the research tasks linked to the students' course and diploma work
- Identify the contributions of student research in a determined area of knowledge
- Verify the results of article publication in scientific journals and participation in national and international events
- Check the percentage of students in the program who are conducting research

III. Projection of the program's inter-institutional relations to promote research advancement, based on:

- Implement actions of academic, scientific, and technological cooperation with national and foreign institutions in the program's area of knowledge
- Integrate into academic networks, derived from existing agreements to generate scientific exchange and academic mobility for students

IV. Dissemination of results derived from research in professional training, based on:

- Participate in student scientific days, workshops, multidisciplinary discussion forums, and national and international events, among others
- Publish scientific articles in journals or books

V. Evaluation of the research results of the program's students, based on the analysis and interpretation of quantitative and qualitative data obtained from the application of instruments, which requires:

- Identify the impact of projects and scientific groups on solving socioeconomic problems and the strategic sectors of the territory

- Determine the percentage of works presented at national and international scientific events
- Determine the percentage of articles published in impact journals by students in cooperation with their professors
- Identify the number of national and international awards received by students for the quality of the research they conduct
- Design actions for the continuous improvement of research in the initial training of professional programs

In the evaluation of the procedures, the specialists assigned values between five and four to the set indicators, the highest on the measurement scale. It is noteworthy that 100% rated their relevance as five, which evidenced that the procedures were aligned with the need to improve research in professional training. Furthermore, 90 % rated their structure as five, helping to confirm the coherence between the procedures and each of the actions, which include the indicators linked to research in the six dimensions of the SEA-CU.

Likewise, 100 % rated their usefulness with the maximum score, recognizing that they contribute to improving the link between the research carried out by students, projects, scientific groups, and the program's research lines. On the other hand, 95 % gave a five to their feasibility of execution by the faculty in designing the actions of the educational strategy in the program and the years.

Consequently, it is essential for the program's faculty to focus on the determination and specification of research lines, considering that the most relevant in their construction process is the collaborative, interactive, and transformative work among researchers, who contribute to its strengthening from interdisciplinary or transdisciplinary projects articulated with each other.[7] This idea demonstrates the need to deepen their link with research projects; therefore, it is assumed that programs and projects constitute the fundamental organizational form that allows regulating the process of organization, planning, elaboration, approval, financing, execution, evaluation, and control of science, technology, and innovation activities.[8] Hence, the importance of achieving articulation between lines and projects in planning research actions in professional training, from the program's faculty.

Also, it is essential to create student scientific groups, since these groupings allow students to foster collaborative work and acquire research skills through practical experiences related to research.[9] These groups should be led by leaders of recognized prestige in the academic field to favor the acquisition of methods and procedures of science.[10] In this way, it will contribute to establishing strategies that guarantee greater scientific production, manifested in the publication of articles as an indicator to measure the impact of research results.[11]

Currently, the organization of networks, alliances, and environments that focus their action on identifying, cultivating, and promoting connections and collaborative relationships inside and outside the faculty are of great importance, which will benefit professors, students, together with their community.[12] In this context, the use of information and communication technologies offers benefits for the development of proposals that promote collaborative work.[13] Thus, the program should project this type of cooperation with both national and international institutions, to strengthen academic, scientific, and technological exchange in its area of knowledge.

The evaluation of research results must be integrated into the program's systematic self-evaluation, as a basic procedure for managing continuous quality improvement.[3] It is essential to base it on the evaluation criteria and indicators established in the SEA-CU to guide the comprehensive growth of the program and the accreditation of its quality, based on the application of methods that help identify strengths and weaknesses. Based on these analyses, an improvement plan including sustenance, development, and contingency actions should be elaborated.

Scientific contribution

The methodological procedures and their actions to improve the quality of research in initial professional training are presented, which provide relevant information for conducting the program's self-evaluation, since they consider the indicators established in the SEA-CU. Their implementation by the program's faculty should favor the planning, execution, and control of the actions of the educational strategy of the program and the years, linked to

student research; furthermore, it provides data that reflect the strengths and weaknesses derived from the program's self-evaluation.

CONCLUSIONS

The methodological procedures and their actions facilitate the collection of information linked to student participation in projects and scientific groups, the use of academic networks, the status of the dissemination of research results, as well as their impact on solving socioeconomic problems of the territory; which ensures the elaboration of an improvement plan with sustenance, development, and contingency actions.

BIBLIOGRAPHICAL REFERENCES

1. United Nations. The 2030 Agenda and the Sustainable Development Goals: an opportunity for Latin America and the Caribbean. Santiago: ECLAC; 2018. LC/G.2681-P/Rev.3. Available from: https://www.cedhnl.org.mx/bs/vih/secciones/planes-y-programas/Agenda-2030-y-los-ODS.pdf

2. González Pérez MM, Núñez González S. Conceptualization and definition of priority research lines at the university level. Univ Soc [Internet]. 2020 [cited 02/16/2025];12(4):[approx. 9 p.]. Available from: http://scielo.sld.cu/scielo.php?script=sci_arttext&pid=S2218-36202020000400341

3. Cuba. Ministry of Higher Education. Regulations of the Higher Education Evaluation and Accreditation System (SEAES). Res. 160/2023. Havana: MES; 2023.

4. Cuba. Ministry of Higher Education. University Program Evaluation and Accreditation Subsystem (SEA-CU). Res. 36/2024. Havana: MES; 2024.

5. Castro Rodríguez Y. Strategies to increase scientific production from the undergraduate level. 16 de Abril Journal [Internet]. 2018 [cited 11/13/2024];57(269):[approx. 3 p.]. Available from: https://www.medigraphic.com/pdfs/abril/abr-2018/abr18269a.pdf

6. Rodríguez Batista A, Núñez Jover R. The Science, Technology and Innovation System and the updating of Cuba's economic development model. Univ Soc [Internet].2021 [cited

11/26/2024];13(4):[approx. 12 p.]. Available from: https://www.researchgate.net/publication/355928412

7. Da-Silva JL. Identification and management of research lines. Development of an institutional experience. Andrés Bello Catholic University case. Uni-Pluri/Versity [Internet]. 2015 [cited 02/18/2025];15(2):[approx. 10 p.]. Available from: https://revistas.udea.edu.co/index.php/unip/article/view/26821/20780192

8. Cuba. Law 7/2020 of the science, technology and innovation system. Havana: Official Gazette of Cuba; 2021. Available from: https://instituciones.sld.cu/fcme/files/2024/08/goc-2021-o93.pdf

9. Pancorbo Sandoval J, Sánchez Suárez Y, Fernández Ochoa Y, Vega López MB. Student scientific groups as a strategy for the development of research projects. Scientific Journal Mundo Recursivo [Internet]. 2024 [cited 03/21/2025];7(1):[approx. 15 p.]. 163-178. Available from: https://www.atlantic.edu.ec/ojs/index.php/mundor/article/view/228/307

10. Espinoza Freire EE, León González J L, Hernandez HS, Guamán Gómez VJ. Pedagogical scientific preparation in students of the Computer Science Teaching program, at the Huila Education Institute. Univ Soc [Internet]. 2021 [cited 04/17/2024];13(2):[approx. 9 p.]. Available from: https://rus.ucf.edu.cu/index.php/rus/article/view/1980?articlesBySameAuthorPage=3

11. Romero Fernández AJ, Alfonso González I, LatorreTapia LF. Management indicators to measure the performance of the research process in Ecuadorian universities. Conrado [Internet]. 2020 [cited 04/25/2025];16(75):[approx. 7 p.]. Available from: https://www.researchgate.net/publication/348406270_

12. Civís Zaragoza M, Flores Muxí C, Geis Balagué A. Weaving alliances in and from the university. The case of the Blanquerna Faculty of Education. Distance Education Journal [Internet]. 2023 [cited 08/21/2024];23(74):[approx. 17 p.]. Available from: https://www.researchgate.net/publication/369462247

13. Rodríguez Revelo E, Velasteguí López LE, Rodríguez González R, Rodríguez López WA, La O Mendoza Y. Didactic potential of social networks in university training: student perceptions. Univ Soc [Internet]. 2021 [cited 09/25/2024];13(5):[approx. 10 p.]. Available from: https://rus.ucf.edu.cu/index.php/rus/article/view/2221

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Declaration of interests

The authors declare no conflict of interest

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