

Research Article

Developing Investigative Skills in Health Rehabilitation Students in Cuba: A Methodological Approach

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Abstract

University education has the challenge of undertaking a profound transformation to respond to the imperatives of society. The objective of this study is to propose a methodology to contribute to the development of investigative skills in students pursuing a bachelor's degree in health rehabilitation. The methodology used in this research is a predominantly quantitative research strategy followed, at an explanatory level, by applying different methods at the theoretical and empirical levels. As a result, the actions established in each of the stages of the methodology stand out as an element of change within the scientific result. The study concluded that the validity of the methodology was corroborated by the criteria of experts, who stated that it was very appropriate, and the development of a pre-experiment with the students of Sancti Spiritus Medical Sciences University, where it was demonstrated that the development of investigative skills towards health rehabilitation careers was achieved.

Keywords: Cuba higher education; investigative skills; health rehabilitation

INTRODUCTION

Professionals are required to not only perform effectively but also offer solutions to the challenges of the intricate reality in which they are situated, as well as the social context and the community as a whole. In that regard, the advancement of science and technology, particularly, is the determining factor between nations [1].

Society is characterized by a perpetual state of flux and an expedited process of scientific, technological, social, and cultural transformation. Cuban higher education is a reflection of the transformation processes that have occurred in society. For instance, the transition from the D to E curriculum is a recent example. In this curriculum, endogenous and sustainable development is essential, as it is based on the satisfaction of the needs posed by the social, technical, and economic development of a country.

As stated by Casanova et al. (2020) [2], in professional training, the research aspect becomes a first-order element, as well as the specialty aspect that must be carried out in higher-level institutions. Therefore, the formation of skills, both specialty and disciplinary and investigative, must be taken into consideration as part of the comprehensive development of the student from the first cycles of university life. The issue of student training constitutes a challenge in the face of constant transformations, mainly social and undoubtedly educational, at an international and national level.

However, the social development achieved in relation to health in terms of decreased mortality and increased life expectancy invokes a new paradigm for this challenge. The development of biomedical technologies is evident around the world; however, Cuba did not have high-tech equipment or trained personnel to operate them.

It is necessary to highlight that the discussion of the correspondence between teaching and research and the relationship between training for research and the research mission of higher education depends on the precision of formative research and scientific research in the strict sense. The first is more linked to the undergraduate degree and specialization, and the second is most used in fourth-level training (master's and doctorate) and the materialization of the teleological vision of the university [3].

The training and development of research skills in undergraduate degrees is a topic addressed in various educational research projects in the international context. One of the fundamental trends of these studies has been the correlation between the training of research skills or the development of investigative skills and the term research training.

In the review of the previous works of the authors, as mentioned by Morales et al. (2022) [4], they talk about the importance of the development of these competencies in higher education as well as the leading role that these institutions have in the processes of change, construction, and production of knowledge in society. These studies have allowed us to determine that even when the topic of investigative skills has been addressed in the field of educational research, the studies that provide a theoretical modeling of it are insufficient, taking into consideration that most of the theoretical results and empirical ones focus, specifically, on training towards a profession. The careers most reflected in the subject are medicine and a degree in education, and in this last case, the object of study that is most reiterated is initial research or undergraduate training, as it is also known.

The theoretical assessments carried out up to this point and the preliminary results of an exploratory nature made it possible to determine the contradictions, in their external form, between the social mandate of the university and the level of development of research skills. Hence, the objective declared is to propose a methodology that contributes to the development of investigative skills in students of the health rehabilitation career.

When investigating the process of training investigative skills in the students of the health rehabilitation career, and from our experience as teachers and researchers, it was

possible to see that the relationship between what is proposed in the professional model and the modes of action that they manifest in the students does not correspond. Therefore, it is essential to determine the theoretical assumptions related to the topic being investigated.

The formation of skills lies in the phases of said acquisition: the first, in which the skill is formed and the second, in which it is developed. Skills can only be formed and developed based on the subject's experience, knowledge, and habits that he already possesses.

The philosopher and researcher Bunge, quoted by Sánchez Díaz et al. (2022) [5], generates a clear concept of investigative skills and human behavior by generating new scientific knowledge through the process of thought and objective, verifiable, useful, communicable, methodical, explanatory, and predictive discovery in accordance with the classification of formal or factual science.

It is precisely in the activity where skills are formed and developed, which are defined by Petrovski Csyky, quoted by Badillo Pérez et al. (2023) [6] as "the mastery of a system of psychic and practical actions, necessary for a rational regulation of activity, with the help of the knowledge and habits that the person possesses" (p. 117).

In this sense, student activity must be intentionally planned. To do this, it is necessary to take into account the characteristics of the educational process, the particularities and objectives of the subject, the dosage of the contents carried out by the teacher and, of course, the potential of other subjects to adequately establish the interdisciplinary relationships that contribute to the training and skill development.

Hence, Cruz points out that "the investigative skill with the highest level of integration is the solution of professional problems, considered the mastery of practice to solve problems in the technical-professional context, using the methodological resources of science" (as cited in Rueda Milachay et al., 2022, p. 67 [7]).

The authors Sierra Figueredo quoted by García Méndez and Carballosa González (2023) [8] refer to investigative skills as:

"...the mastery of the action that was deployed to solve investigative tasks in the teaching, work, and investigative fields with the resources of the methodology of science. Note that this concept is the one that has the greatest relationship with the undergraduate training process by revealing investigative skills as a transversal axis within the substantive processes of the university."

It is important to keep in mind that the formation of the skill is achieved when the student consciously appropriates the operations, for which he or she needs adequate guidance on how to proceed under the timely direction of the teacher to guarantee correctness. In execution, as well as the proper order of those operations. This stage includes the conscious acquisition of ways of acting and is essential to guaranteeing the correct acquisition of the skill. Guaranteeing adequate and conscious training of a skill

before beginning to practice it avoids the assimilation of incorrect or unnecessary elements or aspects that are later very difficult to eradicate. For many authors, the development of a collaborative research culture in the university context is of vital importance and they refer to it as a key to success for the efficient development of research skills [9].

The researcher López Hurtado defines that:

... the development of the skill is achieved through the repetition of the modes of operation, which means that once the skill is formed, it is necessary to begin to exercise it, to use it as many times as necessary with a good frequency and periodicity. Only in this way can errors be eliminated, making it increasingly easier to carry out operations until some operational components are perfected. (As cited in García Méndez and Carballosa González, 2023, [8] p. 244)

The scholar Martínez Rodríguez, quoted by Quintana Santiago et al. (2022) [10], considered that investigative skills are the domain of the content of research training (system of knowledge, skills, and values), thus allowing the conscious assimilation of the scientific method and the gradual development of modes of action in the solution of theoretical problems. -practical from the academic, work, and research fields themselves. (p. 15)

For the development of the research, the ideas of Angulo quoted by Badillo Pérez et al., (2023) [6] when referring that:

Linking teaching with research as a tool to teach educational university students in training to assume its practice as an activity, which must be scientific and reflected in an ethical attitude towards teaching, is an unavoidable issue.

METHODOLOGY

The research employed the materialist dialectic as a comprehensive methodological framework, ensuring a predominantly quantitative investigative approach at an explanatory level. This approach was augmented by the application of various methods across theoretical, empirical, mathematical, and statistical domains. Specifically, methods such as analysis and synthesis, induction and deduction, historical and logical analysis, transition from the abstract to the concrete, scientific observation, surveys, interviews, experiments, expert judgment, and descriptive statistics were utilized.

Through the implementation of these diverse research methods and instruments, it became evident that students at Sancti Spiritus Medical Sciences University possess a strong grasp of the general aspects of their career fields. Furthermore, the participation of students in university-level events within these areas of knowledge demonstrated significant results, highlighting a key strength in the institution's research development. This mastery and active engagement in academic events underscore the robust research capabilities fostered within the university.

The proposed methodology is structured in four stages, which are as follows:

Stage I: Diagnosis and identification of the needs for the development of the investigative skills of the students in the health rehabilitation career.

- Analysis of the regulatory and methodological documents of the health rehabilitation career.
- Selection and application of diagnostic methods, means and instruments.
- Interpretation of the results obtained.

Stage II: Projection and organization of the process of developing research skills.

- Assessment of the curricular sequence of the academic activity based on academic-work and research tasks.
- Organization of academic, work and research tasks.
- Determination of the research skills to systematized in the contexts of action.

Stage III. Execution to contribute to the improvement of the process of developing research skills.

- Precision of the organizational and curricular conditions for the development of research skills.
- Adequacy and adjustment of the actions conceived in the planning and organization stage based on the development of research skills.
- Guidance for the performance of academic, work and research tasks.

Stage IV: Evaluation of the evidence of the process of development of investigative skills.

- Assessment of the criteria of evidence of the development of research skills.
- Systematic, partial and final assessment of the fulfilment of the activity (achievements and difficulties)

A model of the methodology is presented in Figure 1, which can be found below:

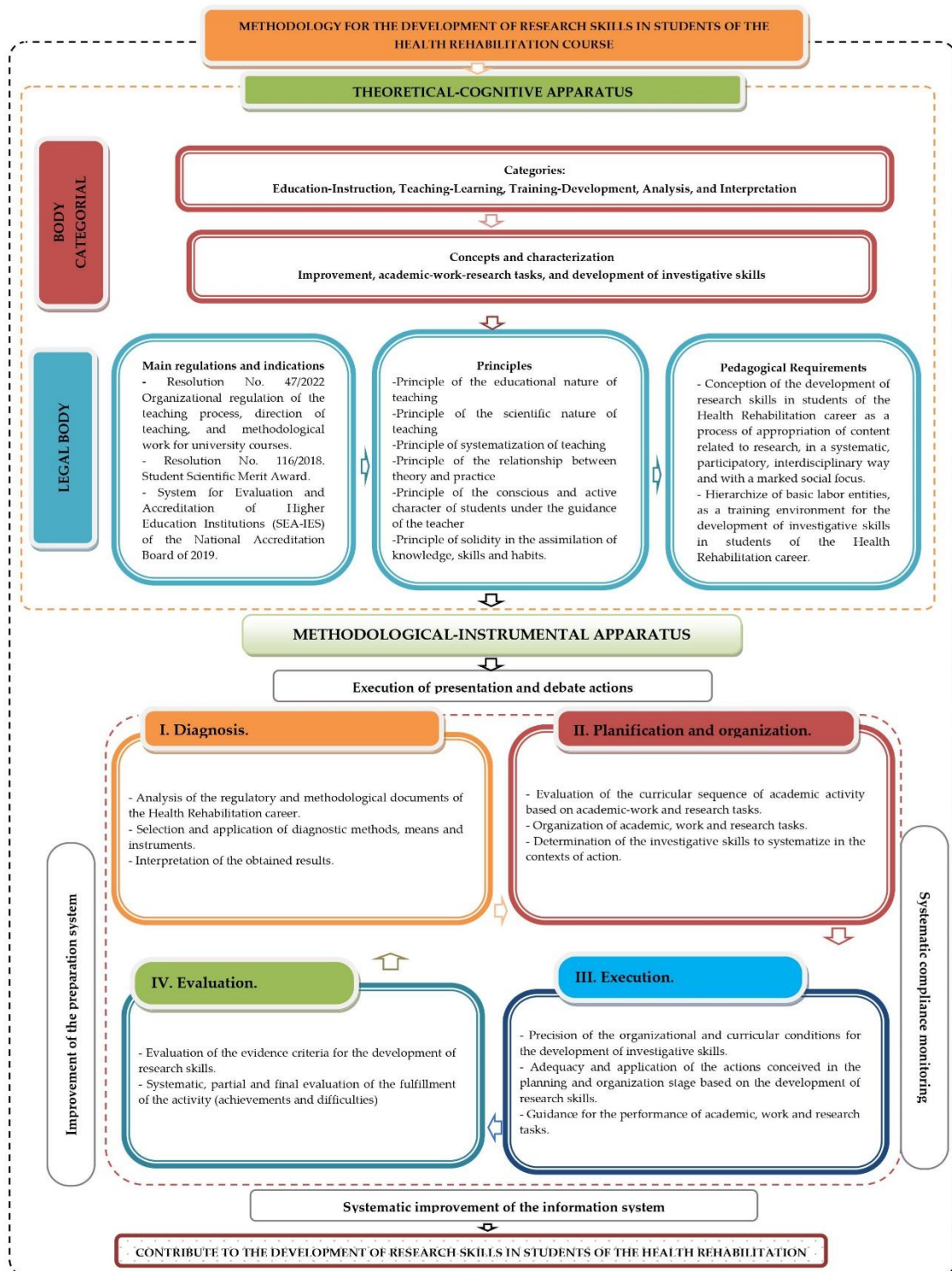


Figure 1. Methodology model

Proposal and Results

In order to implement the methodology in pedagogical practice, the following requirements are proposed:

Systematic control of compliance with each of the stages of the methodology:

- The compliance rate for each stage of the methodology was found to be 95%.
- The control system demonstrated an 85% effectiveness in its preventive function.
- An accuracy rate of 90% was achieved in the process control, underscoring the importance of distinguishing the control of the research skills development process from meta-evaluation, which constitutes an evaluative judgment on the progress and results of the process. This control was exercised systematically at each stage.

Systematic improvement of the information system that supports the process of developing the research skills of the students of the Health Rehabilitation career:

- There was an 80% improvement in the validity of the information accessed.
- The reliability of the information was measured at 75%.
- The accessibility of the information was enhanced to 85%. For the effective development of research skills, access to valid and reliable information about student training and their results, whether primary or secondary, is crucial. Primary data include information from teaching reports or records generated by the year group, work practice teacher, or main integrating discipline subject teacher. Secondary data from primary sources are included and related to the expected indicators.

Execution of preparatory actions and collective debate among the members of the pedagogical group to reach consensus on the development of research skills and leveraging the potential offered by the training process:

- The participation rate among pedagogical group members was 70%.
- A 65% consensus was reached on the development of research skills.
- The potential offered by the training process was utilized to an extent of 80%. Preparatory actions and collective debates were conducted to ensure consensus on how to develop research skills and make the most of the training process's potential.

A result of the implemented methodology is presented in Figure 2.

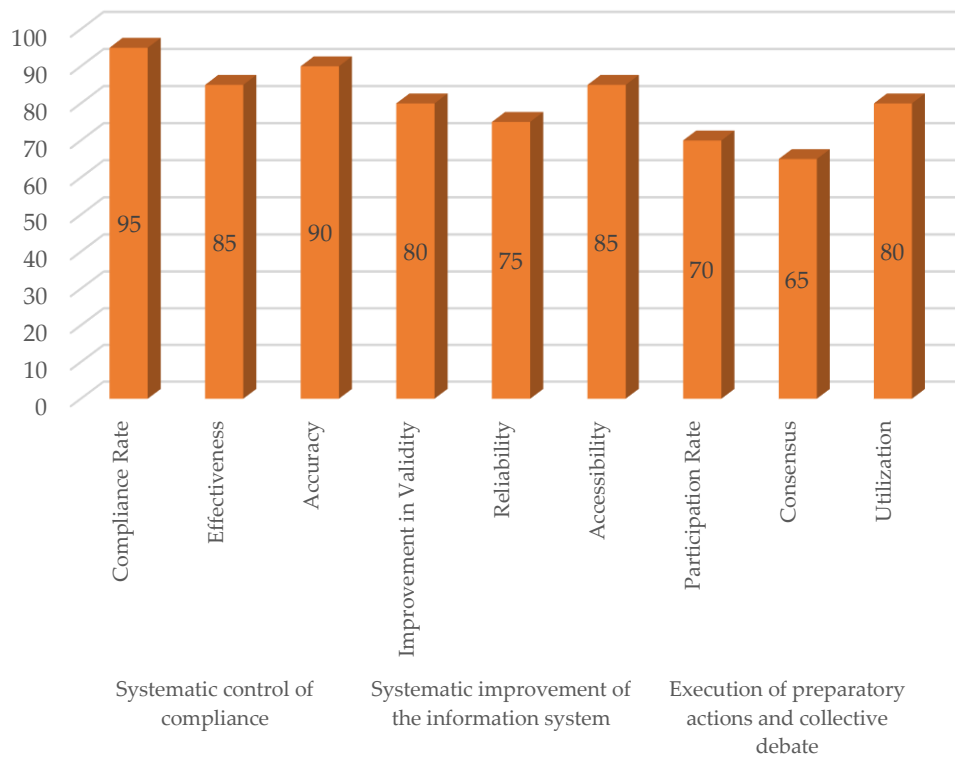


Figure 2. The results of the proposed methodology model

The pedagogical group must be adequately prepared to effectively execute this process and fulfill its educational function, all while fostering student acceptance. The exchange spaces facilitate the learning of teachers regarding the duty of the process, their responsibility to direct and perfect it, and the possibilities offered by the training process. Choosing what to evaluate, for what, when, and with what tools and techniques are all part of this process.

CONCLUSION

The contemporary necessity for the development of investigative abilities to respond quickly to the current demands is a challenge for higher education. Specifically for professional training, as society wants professionals who are capable of successfully executing their vocation. One of the current issues that necessitates attention in the preparation of students is the necessity to ensure the training process of these skills. Students must have all the theoretical and methodological foundations necessary to develop investigative skills in the Health Rehabilitation career through their work. In this research, the validity of the pedagogical pre-experiment was demonstrated through the use of research methods, procedures, and instruments. The implementation of the experiment resulted in the development of investigative abilities in students pursuing a profession in health rehabilitation.

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CONFLICT OF INTERESTS

There is no conflict of interests associated with this publication.

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