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ORIGINAL ARTICLE

Quality of the results and methodological design of the Internal Medicine examination, academic year 2024-2025

Calidad de los resultados y diseño metodológico del examen de Medicina Interna, curso 2024-2025

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ABSTRACT

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Background: medical education in Cuba demands a constant evaluation of teaching work for its improvement, which is why assessing the design and quality of evaluative instruments takes on special significance.

Objective: to evaluate the quality of the results and the methodological design of the written evaluative instruments in the ordinary examination period of the Internal Medicine subject.

Methods: a descriptive study with a mixed approach was conducted at the No. 2 Faculty of Medicine of the University of Medical Sciences of Santiago de Cuba, which consisted of reviewing 247 written Internal Medicine exams, 3rd year, ordinary examination period of the 2024–2025 academic year. Theoretical and empirical methods were used to support the research and enable data collection.

Results: there was a predominance of students with grades 4 and 5 in both exam sets; the question on the hemolymphopoietic system contributed the highest number of students with errors, and the passed questions ranged between 70 % and 94 %. The prevailing level of assimilation was creation, with over 40 % on the exam. Most questions had a correct design in their statement and items, although errors were found.

Conclusions: the effectiveness of the teaching-learning process in the final written exam of the Internal Medicine subject was assessed, where quality grades were obtained; difficulties were found in some items and in the design of some questions, which demands the involvement of teachers for their improvement through methodological activity.

MeSH: educational measurement; evaluation studies as topic; faculty; students; education, medical

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RESUMEN

Fundamento: la educación médica en Cuba demanda una valoración constante del quehacer docente para su perfeccionamiento por lo que valorar el diseño y calidad de los instrumentos evaluativos adquiere un significado especial.

Objetivo: evaluar la calidad de los resultados y el diseño metodológico de los instrumentos evaluativos escritos en la convocatoria ordinaria de la asignatura de Medicina Interna.

Métodos: se realizó un estudio descriptivo con enfoque cuanticualitativo, en la Facultad de Medicina No. 2 de la Universidad de Ciencias Médicas de Santiago de Cuba, que consistió en

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la revisión de 247 exámenes escritos de Medicina Interna, 3er año, convocatoria ordinaria del curso 2024–2025. Se utilizaron métodos teóricos y empíricos que fundamentaron la investigación y permitieron la recogida de información.

Resultados: hubo predominio de estudiantes con calificación 4 y 5 en ambas baterías; la pregunta del sistema hemolinfopoyético aportó la mayor cantidad de estudiantes con errores, y las preguntas aprobadas rondaron entre el 70 % y 94 %. El nivel de asimilación que prevaleció fue el de creación con más del 40 % en el examen. La mayoría de las preguntas tenía un correcto diseño en su enunciado e ítems, a pesar que se hallaron errores.

Conclusiones: se valoró la efectividad del proceso enseñanza aprendizaje en el examen final escrito de la asignatura Medicina Interna donde se obtuvieron notas de calidad; se constataron dificultades en algunos ítems y en los diseños de algunas preguntas, lo cual demanda la implicación de los docentes para su perfeccionamiento desde la actividad metodológica.

DeCS: evaluación educacional; estudios de evaluación como asunto; docentes; estudiantes; educación médica

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INTRODUCTION

Medical education in Cuba currently implements Curriculum E, which includes the Internal Medicine subject in the second period of the third year of the Medicine degree; it considers developing the teaching-learning process with the active participation of the student and training a broad-profile professional model.[1]

Its syllabus is extensive: it breaks down its time allocation of basic content into different topics and is one of the subjects with the highest teaching load, considering that it studies a

significant number of clinical diseases in the adult individual, which have high morbidity and mortality in this population group.[1]

Its teaching-learning process introduces the student to the clinical area and is basically developed through education in the workplace as the main form of teaching organization; it links study with work and allows the student to acquire essential skills and knowledge based on tutorial teaching, responding to the objectives of the subject, the academic year, and the curriculum.[2]

Its planning contemplates a continuous process from its organization to the final evaluation, the latter being an essential component because it allows certifying the degree of learning achieved and verifying the quality of the process by identifying deficiencies specific to the students, the teacher, and/or the teaching-learning process; and through feedback, achieving regulation and improvement.[3]

Evaluative practice comprises different forms; its main methods are theoretical, practical, and a combination of both. Internal Medicine includes a practical exam that evaluates skills and performance modes, and authorizes the student to take the theoretical exam. For this, it is necessary to develop evaluative instruments in correspondence with the general objectives of the subject and the time allocated for teaching.

Curriculum E and the subject syllabus establish that Internal Medicine is evaluated with a final written theoretical exam of mixed type, which includes the use of free-response (open-ended) or essay questions, and structured-response (closed-ended) or objective test questions, which allow a broad approach to learning.[4]

These aspects motivated the authors to conduct a study aimed at evaluating the quality of the results and the methodological design of the questions in the written evaluative instruments used in the ordinary examination period of the Internal Medicine subject.

METHODS

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A descriptive study with a mixed approach was conducted, consisting of a review of the written exams of the 3rd year of the Medicine degree in the Internal Medicine subject, ordinary examination period, held during the 2024–2025 academic year, at the No. 2 Faculty of Medicine of the University of Medical Sciences of Santiago de Cuba. The universe consisted of 247 exams in which specific variables were studied.

Theoretical methods were used: analysis-synthesis and induction, for obtaining, processing, and analyzing information on the variables used, interpreting the results obtained, drafting the report, and drawing conclusions of the study; in all cases moving from the abstract to the concrete.

Empirical method: documentary analysis based on the variables: student sex, exam set, final grade, topic (according to the subject syllabus), number of students with errors in the questions, final result, question type, level of assimilation, question number, question design, and error in question design. Two evaluative instruments (exam sets) were studied, designated with letters to identify them: A and B, which had a similar structure in relation to question type and topic.

Descriptive statistics were used for the analysis of results; percentages were used as a summary measure for qualitative variables, and variance and standard deviation were applied for quantitative variables. The association between variables was determined using the Chi-square statistic with a statistical significance of $p < 0.05$.

It is necessary to note that the University of Medical Sciences of Santiago de Cuba, in order to unify criteria regarding evaluative instruments, determined, based on the programs and disciplines, that written exams consist of seven questions, taking into account the grading scales established by the Ministry of Higher Education (MHE) and the types of questions to be used.

RESULTS AND DISCUSSION

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The majority of students with grades of 4 and 5 were observed in both exam sets, with a predominance of females (statistical significance $X^2 = 2.37$); however, the statistical analysis showed no significant differences in relation to the exam set evaluated ($p < 0.05$). The mean grade was 3.9; the variance was 0.78 and the standard deviation was 0.88; data shown in Table 1.

Table 1. Final written exam of the Internal Medicine subject according to exam set, student sex, and final grade. Faculty of Medicine No. 2. Santiago de Cuba. 2024-2025 Academic Year

Final written exam	Final grade															
	5				4				3				2			
	Female		Male		Female		Male		Female		Male		Female		Male	
	No.	%*	No.	%*	No.	%*	No.	%*	No.	%*	No.	%*	No.	%*	No.	%*
Exam Set A	21	31.4	12	17.9	40	36.3	13	11.8	20	39.2	11	21.5	6	31.6	2	10.5
Exam Set Bat. B	23	34.3	11	16.4	42	38.2	15	13.7	14	27.5	6	11.8	8	42.1	3	15.8
Total	67(27.1 %)				110 (44.5 %)				51 (20.7 %)				19 (7.7 %)			
Grand total	125 (56.6 %)				122 (49.4 %)				247 (100)				-			

Percentage based on the total of each grade:

Female 174 (70.4) Male 73 (29.6)

Source: database

There was a superiority of students with errors in responses on the digestive system (72.8 %) in Set A, followed by errors in the hemolymphopoietic system; while in Set B, the highest number was in responses on the hemolymphopoietic system (74.6 %). No statistical significance was evidenced ($X^2 = 0.019$). These figures are observed in Table 2.

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Table 2. Final written exam of the Internal Medicine subject according to topic, exam set, and number of students with errors in responses. No. 2 Faculty of Medicine. Santiago de Cuba. 2024-2025 Academic Year

Topics	Number of students with errors in responses				Total	%
	Exam Set A		Exam Set B			
	No.	%	No.	%		
Infectious and parasitic diseases	42	33.6	41	33.6	83	33.6
Respiratory system diseases	26	20.8	21	17.2	47	19.0
Cardiovascular diseases	9	7.2	55	45.1	64	25.9
Nervous system diseases	69	55.2	72	59.0	141	57.1
Hemolymphopoietic system diseases	79	63.2	91	74.6	170	68.8
Endocrine, metabolic and nutritional diseases	60	48.0	79	64.7	139	56.3
Digestive system diseases	91	72.8	69	56.5	160	64.7

Source: database

As shown in Table 3, the final result showed that the questions with the highest number of passing grades were questions 1 and 3 (94.7 % each), related to the topics Infectious and Parasitic Diseases, and Cardiovascular Diseases; while the question with the highest number of failing grades was question 5 (71 students; 28.7%), related to Hemolymphopoietic System Diseases. ($X^2 = 0.037$).

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Table 3. Final result of the final written exam of the Internal Medicine subject according to questions. No. 2 Faculty of Medicine. Santiago de Cuba. 2024-2025 Academic Year

Questions	Passed	%	Failed	%
P 1	234	94.7	13	5.3
P 2	228	92.3	19	7.7
P 3	234	94.7	13	5.3
P 4	210	85.1	37	14.9
P 5	176	71.3	71	28.7
P 6	207	83.8	40	16.2
P 7	205	82.9	42	17.1

Source: database

Figure 1 illustrates that the level of assimilation most used to achieve the objectives in the subject was creation (43 %). The statistical analysis showed no significant differences in relation to the levels used ($p < 0.05$). ($X^2 = 0.022$).

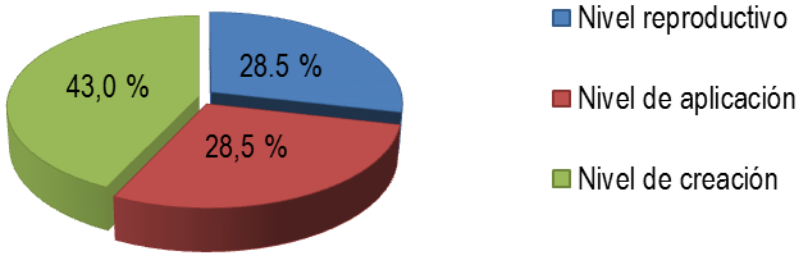

Fig. 1. Final written exam of the Internal Medicine subject according to level of assimilation. No. 2 Faculty of Medicine. Santiago de Cuba. 2024-2025 Academic Year
Source: database

In the reviewed instruments, a preponderance of correct question design was observed; however, it is significant to note that an error was found in the design of the stem of the multiple-choice question, as it was presented directly without previously introducing the subject or content. Regarding errors in the design of the items, the heterogeneity of the

compared elements, the varying length among options, the use of only three response options, and the mixing of items were noted, as shown in Table 4.

Table 4. Final written exam of the Internal Medicine subject according to question type, number of items, and error in question design. No. 2 Faculty of Medicine. Santiago de Cuba. 2024-2025 Academic Year

Question	Question Type	No. of Items	Error in Question Design	
			Statement	Ítems
P1	Alternative response	7	Correct	Correct
P2	Association	6	Correct	Heterogeneity of the compared elements
P3	Multiple choice	7	Correct	Varying length among options
P4	Multiple choice	7	The task is stated directly, without previously introducing the subject or content.	Only three response options
P5	Short answer essay	7	Correct	Correct
P6	Modified essay	7	Correct	Mixing of items
P7	Modified essay	7	Correct	Correct

Source: database

The evaluation of learning is inherent to the educational teaching process. Its purpose is to corroborate the level of fulfillment of the objectives declared in the curricula and study programs by assessing the knowledge and skills that students acquire; it allows identifying

difficulties in the teaching-learning process, recognizing the content that presents the greatest difficulty as well as the strengths and weaknesses in the development of skills and knowledge to outline teaching strategies that provide improvement or enhancement to raise its quality. It fulfills the functions of feedback, instruction, verification and control, and education. It is a complex process and allows the student to develop study techniques that favor their learning.[5]

Several authors[6,7] agree that an important indicator in the educational teaching process is academic performance, which allows assessing the level of learning that students can achieve and on which multiple factors act.

The study shows that the majority obtained grades between 4 and 5 –with a predominance of female students– which expresses a high quality index; data that aligns with Arteaga Navas *et al*.[8] It is important to highlight that there are few studies that evaluate the grade per se of the Internal Medicine subject; however, the results differ from those conducted by Corona Martínez et al.[9] in which the Regular (3) grade prevailed.

It is accurate to state that this research only analyzed the instruments applied in the ordinary examination period, so it is assumed that the quality index could increase with the remaining examination periods.

The authors consider that these results are a consequence of the teaching quality of a faculty with high professional experience as an institutional determinant of academic performance, even though the influence of personal determinants: motivation, cognitive competencies, class attendance, among other factors, is not dismissed.[10]

The study showed a greater number of incorrect answers related to digestive system diseases in Set A; and secondly, in responses to the question related to the hemolymphopoietic system. In Set B, the highest number of errors occurred in responses on the hemolymphopoietic system, followed in order of frequency by responses on endocrine, metabolic and nutritional diseases.

It is noteworthy that in both exam sets, the responses on the hemolymphopoietic system presented difficulties; it was verified that regarding these, they showed errors that led to a significant number of students failing; it is possible that the cause is related to the complexity of these topics, and there is also a lower incidence of these diseases in Internal Medicine services because specialized services are available for the care of patients with these pathologies; without disregarding that there may have been insufficient student preparation in these contents. These results differ from those obtained by Flores Prieto *et al*. referenced by Moreno Montañez *et al*.[11] in which questions on this topic are considered moderately easy.

The level of assimilation is considered an important aspect in the teaching-learning process; it constitutes a guide for the planning of the educational process in order to achieve the objectives declared in the programs. Four levels of content assimilation are described that allow, progressively, the development of essential capacities in the student and skills specific to the degree for solving health problems with a high level of independence, so it is necessary to create questions that express different cognitive levels.[12]

The creation level predominated in the study, and the authors considered its use because it corresponds to learning achievements from a metacognitive perspective: it allows training the student, developing learning strategies, applying different acquired knowledge, reasoning, synthesizing and solving a specific problem with a high degree of autonomy.[13]

Minte Münzenmayer *et al*.[14] address the structure of both open-ended and closed-ended questions, and the importance and utility of mixed instruments, because they measure topics and the particularities of their design in a balanced and complete manner.

The evaluative instruments reviewed demonstrate that there was adequate design in most of the questions, as evidence of the methodological work carried out by the subject teaching collective. Nevertheless, it is necessary to explain the detected errors. The stem in multiple-choice questions must be precise and present the central problem. Errors were also detected in the design of the items of association, multiple-choice, and modified essay questions; the group of authors considers that the use of three response options and the varying length

among options can facilitate student responses by deciding randomly without having real knowledge, which affects the grade, the final result, and the perception of cognitive achievements.

Scientific contribution

An analysis of the final evaluation of a subject from a mixed-methods perspective and the composition of questions where some errors were specified is provided; this demands greater involvement of teachers in the correct design of evaluative instruments from a methodological basis for greater integration and deepening of the topics.

CONCLUSIONS

The effectiveness of the teaching-learning process in the final written exam of the Internal Medicine subject was evaluated, where quality grades were obtained; the greatest difficulties were verified by evaluative exam sets in some topics, and errors in the design of some questions, which demands the involvement of teachers for their improvement through methodological activity.

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Conflict of interest statement

The authors declare no conflict of interest.

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