EDUMECENTRO 2026;18:3434
ISSN 2077-2874
RNPS 2234

Santa Clara Jan-Dec.

ORIGINAL ARTICLE

Didactic integration of active methods to develop initial surgical competencies in Surgery interns

Integración didáctica de métodos activos para formar competencias quirúrgicas iniciales en internos de Cirugía

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ABSTRACT

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EDUMECENTRO 2026;18:3434
ISSN 2077-2874
RNPS 2234

Santa Clara Jan-Dec.

Background: The initial training of surgical competencies during the internship requires a didactic organization that promotes active participation, clinical reasoning, decision-making, and feedback in real workplace education settings.

Objective: To design a didactic-methodological proposal that integrates the SNAPPS method with the task types of the double-chaining Trifecta method for the initial training of surgical competencies.

Methods: A mixed-methods research study with a descriptive predominance was conducted at the Arnaldo Milián Castro Clinical-Surgical University Hospital between October 2025 and July 2026. Theoretical and empirical methods were used: documentary analysis, observation, interview, survey, and expert criteria. The proposal was assessed by 19 experts. Descriptive statistics and Kendall's coefficient of concordance W were used.

Results: The diagnosis showed inadequacies in the orientation of activities, reflective participation, organization of clinical reasoning, argumentation, and feedback. The six SNAPPS steps were particularized in the tasks of preoperative and postoperative evaluation and management, surgical intervention, and Surgery didactics, with guidelines for their flexible application. The assessment reached high concordance ($W=0.87$; $p<0.05$).

Conclusions: The didactic-methodological proposal constitutes a pertinent, coherent, and feasible alternative for organizing workplace education and mediating the Surgery intern's reasoning, according to expert criteria.

MeSH: internship and residency; competency-based education, faculty, education, professional, education, medical

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RESUMEN

Fundamento: la formación inicial de competencias quirúrgicas durante el internado requiere una organización didáctica que favorezca la participación activa, el razonamiento clínico, la toma de decisiones y la retroalimentación en escenarios reales de educación en el trabajo.

Objetivo: diseñar una propuesta didáctico-metodológica que integre el método SNAPPS con los tipos de tareas del método Trifecta de doble encadenamiento para la formación inicial de competencias quirúrgicas.

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EDUMECENTRO 2026;18:3434
ISSN 2077-2874
RNPS 2234

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Métodos: se realizó una investigación con enfoque mixto y predominio descriptivo en el Hospital Universitario Clínico-Quirúrgico Arnaldo Milián Castro, entre octubre 2025-julio 2026. Se emplearon métodos teóricos y empíricos; análisis documental, observación, entrevista, encuesta y criterio de expertos. La propuesta fue valorada por 19 expertos. Se utilizaron la estadística descriptiva y el coeficiente de concordancia W de Kendall.
Resultados: el diagnóstico mostró insuficiencias en la orientación de las actividades, participación reflexiva, organización del razonamiento clínico, argumentación y retroalimentación. Se particularizaron los seis pasos de SNAPPS en las tareas de evaluación y manejo preoperatorio y posoperatorio, intervención quirúrgica y didáctica de la Cirugía, con orientaciones para su aplicación flexible. La valoración de los alcanzó alta concordancia ($W=0,87$; $p<0,05$).
Conclusiones: la propuesta didáctico-metodológica constituye una alternativa pertinente, coherente y factible para organizar la educación en el trabajo y mediar el razonamiento del interno de Cirugía, según criterio de expertos.
DeCS: internado y residencia; educación basada en competencias, docentes, educación profesional, educación médica

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Received: 01/10/2026
Accepted: 11/01/2026

INTRODUCTI0N

Competency-based medical education requires students to integrate knowledge, skills, clinical reasoning, decision-making, and professional values in real patient care situations. In the surgical field, this requirement is particularly important because of the complexity of the actions that the future physician must learn and the need to progress gradually toward greater levels of autonomy under faculty supervision.

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EDUMECENTRO 2026;18:3434
ISSN 2077-2874
RNPS 2234

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The Surgery Internship constitutes an essential stage in this process, as it allows students to participate in authentic care scenarios and to relate the knowledge acquired during their degree program to the assessment and management of the surgical patient. However, exposure to real clinical situations does not by itself guarantee the development of competencies. Learning requires opportunities to participate actively, explain the reasoning followed, justify decisions, and receive feedback linked to the observed performance.[1,2]

Workplace education offers favorable conditions for this purpose by integrating care and teaching activities within the very settings of professional practice. Its formative use depends, nevertheless, on a didactic organization that allows care experience to be transformed into reflective learning. When teaching guidance is insufficient or the student is limited to observing and reproducing behaviors, active participation, clinical reasoning, and progression toward professional independence may be affected.[3]

In this context, active methodologies constitute alternatives for structuring the interaction between teacher and student. Among them, the SNAPPS method—Summarize, Narrow down, Analyze, Probe, Plan, Select—proposes a student-centered sequence through which the student synthesizes clinical information, defines problems, analyzes alternatives, expresses uncertainties, proposes a plan, and selects learning needs. Its main contribution consists of making the student's reasoning explicit and facilitating more focused teaching feedback.[4]

On the other hand, the double-chaining Trifecta method organizes surgical training through three types of tasks related to professional performance: a) assessment and management of the preoperative and postoperative patient, b) surgical intervention, and c) Surgery didactics. These tasks are articulated according to the logic of the surgical disease and patient care, which provides a structure for integrating clinical reasoning, technical performance, and the formative role of the future professional.[5]

Both methods present complementary possibilities. The double-chaining Trifecta organizes the tasks and progression of the formative activity, while SNAPPS provides cognitive mediation to structure the intern's thinking during its execution. Their integration may favor

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more intentional workplace education by encouraging students to organize information, argue their decisions, identify their uncertainties, and participate actively in the construction of their learning.

This need becomes relevant in light of inadequacies observed in the Surgery Internship related to the orientation of activities, the intern's reflective participation, the organization of clinical reasoning, the argumentation of diagnostic and therapeutic criteria, and formative feedback. Such limitations justified the development of a particularization that articulates the SNAPPS steps with the tasks of the double-chaining Trifecta, accompanied by methodological guidelines for its flexible application in the different workplace education scenarios. The thesis precisely supports this relationship between formative structure and cognitive mediation.

The objective of this research is to design a didactic-methodological proposal that integrates the SNAPPS method with the task types of the double-chaining Trifecta method for the initial training of surgical competencies.

METHODS

A mixed-methods research study with a descriptive predominance was conducted at the Arnaldo Milián Castro Clinical-Surgical University Hospital in Santa Clara between October 2025 and July 2026. The study included the diagnosis of the teaching-learning process in the Surgery Internship, the development of the didactic-methodological particularization of the SNAPPS method according to the task types of the double-chaining Trifecta method, and its assessment through expert criteria.

The population consisted of medical interns completing the Surgery rotation and the professors directly involved in their training in the service. The sample was selected intentionally. Eighteen students participated, included because they were active in the rotation and attended the settings where the diagnosis was conducted, along with 11 Surgery professors with experience in leading workplace education activities. Twenty observations were carried out in teaching-care settings of the internship.

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ISSN 2077-2874
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The following theoretical methods were used:

- Analytical-synthetic: to analyze and synthesize the references on competency-based education, surgical education, and SNAPPS.
- Inductive-deductive: to relate the regularities identified in practice with the foundations of the proposal.
- Historical-logical: to examine the evolution of Surgery teaching and its contemporary trends.
- Systemic-structural: to establish the relationships between the task types and the components of the design.
- Modeling: to configure the integration of the SNAPPS steps with the tasks of the double-chaining Trifecta and its methodological guidelines.

Among the empirical methods:

- Documentary analysis: of the Surgery Internship program and normative documents of medical education, with the purpose of assessing the organization of the teaching-learning process and its possibilities for the initial training of surgical competencies.
- Participant scientific observation: made it possible to verify, during workplace education activities, the teaching orientation, the intern's participation, the organization of clinical reasoning, the argumentation of criteria, and feedback.
- Semi-structured interview: with 11 professors to explore their criteria on the organization of the formative process, the main inadequacies of the interns, and the needs for methodological improvement.
- Questionnaire administered to the 18 interns to learn their perception of the guidance received, participation in patient care, clinical reasoning, argumentation, and teaching feedback.

The results of the observation and the questionnaire were processed using absolute frequencies and percentages. The information obtained in the interviews was examined through content analysis, based on recurring ideas, coincidences, and relevant criteria.

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Subsequently, a triangulation of the results from the different instruments was carried out to determine the main regularities of the diagnosis.

Based on the theoretical references and the identified inadequacies, the didactic-methodological particularization of SNAPPS was developed according to the three task types of the double-chaining Trifecta: a) assessment and management of the preoperative and postoperative patient, b) surgical intervention, and c) Surgery didactics. For each task, the actions corresponding to the six SNAPPS steps were adapted: summarize, narrow down, analyze, probe, plan, and select. Methodological guidelines were also developed for their flexible application in workplace education settings.

The proposal was submitted to expert criteria. For their selection, professional, teaching, and research experience; connection with General Surgery or related specialties; participation in the training of students or residents and in workplace education activities; mastery of the teaching-learning process in clinical-surgical settings; and willingness to participate were considered.

The competence of the potential experts was determined using the K coefficient, based on the knowledge coefficient (Kc) and the argumentation coefficient (Ka). The former was obtained through self-assessment of knowledge on a scale from 0 to 10 multiplied by 0.1; the latter considered sources related to teaching, care, and research experience and theoretical, empirical, and bibliographic knowledge on Surgery didactics and workplace education. High competence was considered for K values between 0.80 and 1.00, and only these experts participated in the final assessment.

The panel consisted of 19 experts: 10 with master's degrees in sciences and nine with doctorates in sciences; seven full professors, eight associate professors, and four assistant professors. Regarding professional experience, nine had more than 15 years, six between 10 and 15 years, and four between five and 10 years.

The experts assessed nine aspects: pertinence of the proposal with respect to the diagnosed needs, coherence between SNAPPS and the task types of the double-chaining Trifecta,

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clarity of the particularization, feasibility in the Surgery Internship settings, contribution to clinical-surgical reasoning, usefulness of the methodological guidelines for the professor, role assigned to the intern, possibility of favoring formative feedback, and scientific-methodological value.

A five-category ordinal scale was used: Very adequate, Fairly adequate, Adequate, Slightly adequate, and Not adequate. The instrument included a space for observations and recommendations.

Absolute frequencies and percentages were used to summarize the assessments. The degree of agreement among the experts was determined using Kendall's coefficient of concordance W. The null hypothesis was established as the absence of significant concordance among the experts, and the alternative hypothesis as the existence of concordance, with a significance level of 0.05. The qualitative observations were organized into favorable criteria, suggestions for improvement, and recommendations for application.

The participation of interns, professors, and experts was voluntary. Before applying the instruments, they were informed about the purpose of the research, and anonymity, confidentiality of information, and its use exclusively for research purposes were guaranteed. The results were analyzed collectively, and no individualized assessments of the participants were made.

RESULTS AND DISCUSSION

The diagnosis revealed consistent inadequacies in the organization of workplace education, the intern's reflective participation, the structuring of clinical reasoning, the argumentation of criteria, and teaching feedback. In the observation, the most unfavorable result corresponded to the orientation of the objective and of the actions the intern was to perform, which was not evidenced or was insufficient in 100% of the activities.

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EDUMECENTRO 2026;18:3434
ISSN 2077-2874
RNPS 2234

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Feedback presented the lowest percentage of unfavorable assessments, although these still reached 80%. In the questionnaire, initial orientation was also the most affected aspect: 88.9% of the interns reported that it was never or rarely carried out clearly.

The main results are summarized in Table 1.

Table 1. Main results of the diagnosis of the teaching-learning process in the Surgery Internship. Arnaldo Milián Castro Clinical-Surgical University Hospital. Santa Clara. October 2025–July 2026

Indicators	Observation: not evidenced or insufficient, % (n=20)	Survey: never or rarely, % (n=18)
Orientation of the objective and of the actions	100,0	88,9
Active participation of the intern	70,0	77,8
Identification of the problem and organization of the information	90,0	61,1
Argumentation of criteria	90,0	61,1
Teaching feedback	80,0	44,4

Source: results of the observation guide and the survey of interns.

The interviews conducted with the 11 professors complemented these findings. The teachers recognized as a strength the diversity of care settings and the intern's direct contact with surgical patients; however, they pointed out the absence of a systematic method for conducting the teaching activity, differences in student preparation, the breadth of content, and the high care workload. They also identified difficulties in prioritizing clinical information, presenting cases, arguing decisions, and proposing their own courses of action, as well as needs for pedagogical preparation of the faculty.

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EDUMECENTRO 2026;18:3434
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The coincidence among observation, questionnaire, and interview showed that the student's presence in real settings does not by itself guarantee structured clinical learning. This result is consistent with research that highlights the need for workplace learning to include active participation, explicit reasoning, and opportunities for reflection on the decisions adopted.[1,2] It is also coherent with what has been reported about the limitations generated by teaching practices insufficiently oriented toward critical reasoning.[3] Recent research further supports the use of active and structured strategies to favor reasoning and clinical skills in medical education.[6,7,8]

Based on these needs, a didactic-methodological proposal of SNAPPS according to the task types of the double-chaining Trifecta was designed. Its general objective is to favor the initial training of surgical competencies through an organization of workplace education that articulates the tasks inherent to surgical performance with a sequence of mediation of the intern's reasoning.

The proposal is structured based on the three task types of the double-chaining Trifecta: assessment and management of the preoperative and postoperative patient, surgical intervention, and Surgery didactics. In each one, the six SNAPPS steps are particularized according to their formative purpose: summarize, narrow down, analyze, probe, plan, and select.[5] Table 2 synthesizes the predominant function that this integration acquires in each task.

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Table 2. Propuesta de SNAPPS según los tipos de tareas del Trifecta de doble encadenamiento. Hospital Universitario Clínico-Quirúrgico Arnaldo Milián Castro. Santa Clara. Octubre 2025-julio 2026

Task type Function of the particularization	**Task type Function of the particularization**
Assessment and management of the preoperative and postoperative patient	Organizes clinical information, defines the surgical problem, favors the analysis of alternatives, the reasoned proposal of courses of action, and the identification of learning needs
Surgical intervention	Relates the indication to the foundations of the procedure, its risks, critical moments, decision-making, and patient safety, according to the level of participation permitted to the intern
Didactics of Surgery	Transforms the care experience into an object of explanation, discussion, and shared learning, which favors argumentation, communication, and reflection on what has been learned

Source: elaboration by the authors based on the scientific result.

The proposal does not intend the rigid execution of the six steps in all situations. Its application methodology begins with the identification of the predominant task and a brief specification of the formative purpose. Subsequently, the intern summarizes the relevant information, defines the problem, analyzes alternatives, expresses doubts, proposes a course of action, and selects subsequent study needs. The professor acts as a mediator through guidance, questioning, observation of reasoning, and feedback.

In preoperative and postoperative assessment, the main purpose is to prevent the patient presentation from being reduced to an accumulation of information, and to guide the intern toward prioritizing problems and substantiating decisions.

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In surgical intervention, the application adjusts to the conditions of the operating room and patient safety; it can be carried out before and after the procedure and, during it, only when circumstances permit.

In the didactic task, the clinical experience is used to organize presentations, case discussions, analysis of complications, and explanations of procedures.

This adaptation preserves the student-centered nature that distinguishes SNAPPS. Wolpaw *et al*.[4] conceived the method to make clinical reasoning visible, express uncertainties, and guide self-directed learning. The proposal studied here extends this logic to the surgical context and links it to tasks that reproduce different dimensions of professional performance. In this sense, it is not limited to transferring SNAPPS from the outpatient clinic to another setting, but rather particularizes its actions according to the demands of clinical assessment, intervention, and didactic activity.

The integration also responds to the need to relate performance and progressive autonomy. Ten Cate[9] points out that the acquisition of professional responsibilities should advance gradually in correspondence with demonstrated competence and under adequate supervision. In surgical education, the progression of autonomy is also recognized as a relevant component of supervised professional development.[10]

In the elaborated proposal, the verbalization of reasoning allows the professor to assess not only what the intern does, but also how he or she interprets the situation, justifies decisions, and recognizes limits.

Feedback constitutes another essential component. By making the processes of analysis and decision explicit, the professor has more elements to offer guidance focused on performance and not only on the final answer. This approach coincides with the relevance attributed to specific and contextualized feedback in clinical and surgical training.[11,12]

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EDUMECENTRO 2026;18:3434
ISSN 2077-2874
RNPS 2234

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The assessment of the scientific result showed high concordance among the 19 experts. Kendall's W coefficient was 0.87, with $p < 0.05$, so the hypothesis of absence of concordance was rejected and the agreement reached was considered significant.

The criteria issued were favorable regarding the pertinence of the proposal to respond to the diagnosed needs, its internal coherence, the articulation between SNAPPS and the tasks of the double-chaining Trifecta, its feasibility in teaching-care settings, and its usefulness for organizing reasoning and the interaction between intern and professor. Its potential to increase student participation and favor formative feedback was also recognized.

However, the experts identified conditions that must be considered for its application. They pointed out the need to strengthen the pedagogical preparation of professors, develop support materials, and avoid a rigid use of SNAPPS in settings with high care demand. The main observation was related to the emergency department, where it may be difficult to complete all the steps during the initial care of new patients.

This recommendation led to an improvement of the proposal. For the emergency department, an abbreviated modality was established that prioritizes the synthesis of relevant data, the definition of the urgent surgical problem, the analysis of priority alternatives, and the proposal of a safe initial course of action. The exploration of uncertainties and the selection of content for self-study can be completed later, once the patient is stabilized or during the teaching discussion of the case. In this way, flexibility constitutes a condition of application and not a modification of the foundations of the method.

This result is relevant in a setting characterized by time constraints and simultaneous care responsibilities. Clinical teaching strategies must be integrated into professional activity and adapted to the context, rather than becoming added procedures that interfere with care. The literature on teaching in clinical settings also recognizes that the effectiveness of these strategies depends on their adjustment to real conditions, student participation, and teacher preparation.[13]

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EDUMECENTRO 2026;18:3434
ISSN 2077-2874
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The proposal presents as a novelty the functional integration of two didactic levels: the double-chaining Trifecta determines the tasks in which surgical training is organized, and SNAPPS provides a sequence to activate and make reasoning observable within those tasks. The complementarity between both allows relating patient care, understanding of surgical performance, and the ability to teach what has been learned. This comprehensive conception is coherent with the importance that contemporary surgical education also attributes to the development of non-technical skills.[14]

Its scope should be interpreted in accordance with the research design. The favorable assessment by the experts provides evidence about the pertinence, coherence, feasibility, and scientific-methodological value of the result, but does not by itself demonstrate its effectiveness on the interns' performance. The main limitation is, therefore, the absence of an implementation that allows comparing changes in clinical reasoning, decision-making, argumentation, or autonomy before and after applying the proposal.

Consequently, its immediate applicability lies in the methodological organization of habitual activities of the Surgery internship—ward, ward rounds, outpatient clinic, emergency department, case discussion, and operating room—while its generalization requires teacher preparation and adaptation to the characteristics of each setting. Further research should evaluate its effects during systematic application and determine the extent to which it contributes to the observable development of initial surgical competencies.

Scientific contribution

It lies in the didactic-methodological integration of the SNAPPS method with the three task types of the double-chaining Trifecta method: assessment and management of the preoperative and postoperative patient, surgical intervention, and Surgery didactics. This integration particularizes the six SNAPPS steps according to the nature of each task and articulates the structure of the formative activity with the mediation of the intern's clinical reasoning during workplace education.

CONCLUSIONS

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ISSN 2077-2874
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A didactic-methodological proposal of the SNAPPS method was developed according to the task types of the double-chaining Trifecta method, which articulates the mediation of the intern's reasoning with the assessment and management of the preoperative and postoperative patient, surgical intervention, and Surgery didactics. The assessment carried out by 19 experts showed high concordance and supported its pertinence, internal coherence, feasibility, and scientific-methodological value for the Surgery Internship. The SNAPPS-Trifecta integration offers a flexible way to organize workplace education, favor the intern's reflective participation, and guide teaching feedback, although its effectiveness on the development of surgical competencies must be verified through its systematic implementation in formative practice.

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EDUMECENTRO 2026;18:3434
ISSN 2077-2874
RNPS 2234

Santa Clara Jan-Dec.

Declaration of interests

The authors declare that they have no conflicts of interest.

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