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## Impact evaluation of the teaching and research process of the General Teaching Hospital of Calderón Quito-Ecuador

*Evaluación de impacto del proceso de docencia e investigación en el Hospital General Docente de Calderón Quito-Ecuador*

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## Abstract

The Impact Evaluation Study of the teaching and research process of the Calderón General Teaching Hospital-HGDC in the city of Quito-Ecuador in the period 2016-2022, aims to measure the impact of the Teaching and Research process with respect to: (1) academic process and resources, (2) evaluation and research, (3) learning, training and knowledge transfer and (4) clinical-surgical practice and performance; through the design and application of the impact evaluation methodology with a focus on measurable results, Balanced Scorecard-BSC. The target group was identified as undergraduate students, rotating interns, postgraduate students, teachers and health care personnel of the Higher Education Institutions (HEI) that perform their health care and academic activities at the HGDC. It was developed in three phases: the first comprises the period 2016-2020, with a total population of 949 participants and an effective sample of 291 participants, served as a baseline for the construction of the follow-up and monitoring matrix-BSC. The second phase of 2021 has 382 participants and an effective sample of 165. The third phase of 2022 has a total population of 344 and an effective sample of 128 participants. The BSC monitoring matrix resulted that the average Global Effective Impact Evaluation of the HGDC Teaching and Research process in the period 2016-2022 reached 87.39% effectiveness, reflecting that the care and teaching activities are adequately fulfilled. The research provides conclusions and suggestions aimed at improving the care and teaching processes of the hospital, and allows it to be a model replicated for other institutions.

## Keywords

teaching, education, evaluation, impact, indicators, research.

## Resumen

El Estudio de Evaluación de impacto del proceso de docencia e investigación del Hospital General Docente de Calderón-HGDC de la ciudad de Quito-Ecuador en el periodo 2016-2022, tiene como finalidad medir el impacto del proceso de Docencia e Investigación respecto a: (1) proceso académico y recursos, (2) evaluación e investigación, (3) aprendizaje, capacitación y transferencia de conocimientos y (4) la práctica clínico-quirúrgica y desempeño; mediante el diseño y aplicación de la metodología de evaluación de impacto con orientación a resultados medibles, Balanced Scorecard-BSC. Se identificó como grupo objetivo a estudiantes de pregrado, internado rotativo, posgrado, docentes y personal asistencial de las Instituciones de Educación Superior-IES que realizan sus actividades asistenciales y académicas en el HGDC. Se desarrolló en tres fases: la primera comprende el periodo 2016-2020, con una población total de 949 participantes y una muestra efectiva de 291 participantes, sirvió de línea base para la construcción de la matriz de seguimiento y monitoreo-BSC. La segunda fase de 2021 cuenta con 382 participantes y una muestra efectiva de 165. La tercera del periodo 2022, tiene una población total de 344 y una muestra efectiva de 128 participantes. La matriz de monitoreo BSC dio como resultado que la Evaluación de Impacto Efectiva Global promedio del proceso de Docencia e Investigación del HGDC en el periodo 2016-2022 alcanzó 87.39% de efectividad, reflejando que las actividades asistenciales y docentes se cumplen de manera adecuada. La investigación aporta conclusiones y sugerencias orientadas a mejorar los procesos asistenciales y docentes del hospital, y permite ser un modelo replicado para otras instituciones.

## Palabras clave

Docencia, educación, evaluación, impacto, indicadores, investigación.



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## 1. Introduction

In order to improve the quality and effectiveness of management and teaching and healthcare activities, the Teaching and Research Unit of the HGDC promotes strategies to maintain an environment of study and activities in which theory and practice are interrelated in order to guarantee new health professionals with solid knowledge, altruism and solidarity. As a result, and considering that the quality of management must be anchored to continuous improvement, the question arises as to what has been the impact of the Teaching and Research process of the Calderón General Teaching Hospital in these eight years of management and to have a feedback from the perspective of students, teachers and assisting personnel who perform their daily work in this health center.

The impact evaluation study of the Teaching and Research process of the Calderón General Teaching Hospital-HGDC is aimed at evaluating the impact on the training of health professionals, scientific research, training and knowledge transmission, the improvement of clinical-surgical practice and the fulfillment of institutional objectives, through the design and application of a dynamic impact evaluation methodology whose results allow for the continuous improvement of the teaching-care process.

In this sense, a methodology has been proposed that presents a set of key concepts, practical orientations and guidelines for the application of evaluation in the different stages of the teaching-care process. Tools and mechanisms have been developed for the collection, analysis, monitoring and follow-up of the evaluation through previously defined indicators.

The applicability of the methodology involves several actors, on the one hand, the Higher Education Institutions (HEI) as training centers for professionals, on the other hand, the HGDC as the center where the future professional performs his internships and rotations. Finally, the student who is being trained and acquiring knowledge and new competencies to become a professional in the near future at the service of society.

The present study is a guide that has been structured on the basis of seven axes that address the topics that have been considered key in the elaboration process: 1. Generalities of the study, 2. Design of indicators and data collection instruments, 6. Sample and sample design, and 7. BSC monitoring matrix, based on the Organic Statute of Organizational Management by Processes of Hospitals of the Ministry of Public Health 2012, the Internal Regulations for Teaching and Research of the HGDC 2017, and the ILO Methodological Guide for Impact Evaluation 2011.

Given that the Organic Statute of Organizational Management by Processes of the Hospitals of the Ministry of Public Health 2012 and the Functional Organic of the HGDC contemplates that the Teaching and Research Units as a mission should promote and coordinate the integration in health care of the training activities of health professionals and research, as tools for the transmission of knowledge, improvement of clinical-surgical practice and the motivation and involvement of health professionals, through programs, plans and projects aimed at improving the quality of Teaching and Research (MSP, 2012, p. 12).

Considering the above-mentioned background, the General Teaching Hospital of Calderón, through the Teaching and Research Unit, proposed to carry out a cross-sectional descriptive research, of quantitative type, supported by the application of a web-based questionnaire of its own elaboration addressed to teachers, assisting staff and undergraduate, graduate



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and postgraduate students of the different HEIs, whose main objective was to measure the degree of impact of the Teaching and Research process in the period 2016-2022 as a first starting point for taking corrective actions of the teaching-assistance process. The results are translated into strategies to be implemented by the Teaching and Research Unit in order to improve the teaching-teaching training process of the students of the different careers that are trained at HGDC. The information gathering was carried out in three phases, one in 2020, a second in 2021 and a third in 2022.

The article consists of the following parts: an introduction with a brief description of the problem investigated, the justification on which the research is based, a description of the methods and materials used, describing the methodology, the scope, the determination of the sample, the tools for the collection of information and the indicators for the follow-up matrix Balance Score Card - BSC. The results and discussion reflect relevant interpretations of the quantitative cross-sectional descriptive study carried out. Finally, conclusions are presented with a synthesis of the most significant findings of the study.

### 1.1. Justification

The Calderón General Teaching Hospital is a second level and sixth level of complexity health center, one of its components is training and research. During its more than eight years of operation, it has incorporated several promotions of rotating interns in medicine, nursing, obstetrics and nutrition, prior to the draw for the rural health year. Additionally, it has added students from several undergraduate careers to perform their internships in the careers of Statistics, Psychology, Social Work, Pharmaceutical Chemistry, Clinical Chemistry, Clinical Laboratory, Physical Therapy, Environmental Engineering, Psychiatry, Nutrition, and Journalism, among others, with a total of 3,800 undergraduate students who have completed their internships. 800 undergraduate students who have completed their pre-professional practices or internship prior to obtaining their professional degree, and 1,192 fourth-level postgraduates from various universities in the capital, who have completed their graduate rotations at Calderón (UDI-HGDC, 2016-2022).

The Teaching and Research Management of the HGDC is in charge of generating research, studies, projects and the integration of teaching and care activities, which involve a series of processes that have not been previously measured or monitored. In this sense, it has been necessary to have an impact evaluation methodology that allows measuring, through management indicators, how is the process of Teaching and Research Management of the HGDC in the teaching, assistance, academic, research, learning, clinical-surgical practice and human talent training activities. This exercise shows the critical processes of the Teaching and Research Management and those processes that should be strengthened or redesigned in order to guarantee a high-quality teaching-care process, in constant monitoring and continuous improvement.

The impact evaluation methodology is intended to serve as a guide for application in other health units that manage teaching and research processes or are involved in training activities for health professionals.

## 2. Methods and materials

The study is descriptive, cross-sectional, quantitative and based on primary data collected through the application of a web-based questionnaire developed by the authors, which responds to the methodological criteria of the Training Impact Evaluation Guide issued by the International Labor Organization-ILO-CINTERFOR. The different questions developed for each axis are quantitative, and were measured through an ordinal scale and for their



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tabulation they are parameterized through a Likert scale with the following options: 1=Bad, 2=Regular, 3=Good, 4=Very good and 5=Excellent; for their validation and reliability, Cronbach's Alpha was used, which reached a score of 0.926. The questionnaire was addressed to teachers, assisting personnel and undergraduate, rotating internship and postgraduate students of the different HEIs that carried out their academic and assisting activities at the Calderón General Teaching Hospital in the period 2016-2022. To determine the population and details of the sample size calculation, it was considered that the total population of teachers and students for the entire period was 1,675 participants, broken down as follows: in the period 2016-2020 with 949 participants, year 2021 with 382 participants and year 2022 with 344 participants (UDI-HGDC, 2016-2022). The sample calculation was based on the simple random probability sampling method and the finite population sampling formula, with a confidence level of 95% and an error level of 5% (Malhotra, 2004, p. 344-348), which determined an overall effective sample in the reference period of 584 participants, with 291 participants for the 2016-2020 period, 165 for the year 2021 and 128 for the year 2022.

For data collection, two anonymized web survey forms were designed under the methodological criteria of the Training Impact Evaluation Guide issued by the International Labor Organization-ILO-CINTERFOR (one for teachers and assisting staff and the other for students), whose links were sent to the e-mails registered in the databases of teachers and students of the reference period, which is under the custody of the Teaching and Research Unit of the HGDC.

Due to the scope of the study and the database, it was considered that the methodology that best fits the analysis requirements is quantitative, which seeks to establish the degree of causality between the precepts of the management of the Teaching and Research Unit of the HGDC and its impact on the teaching, assistance and research activities carried out by both teachers and students; this methodology has allowed for a more rigorous and accurate statistical analysis. The study inclusion criteria were: teachers, assisting staff and undergraduate, rotating internship and postgraduate students from the different higher education institutions that performed their teaching and assisting activities at HGDC in the reference period 2016-2022. In the exclusion criteria are students who do not have a registered email and who could not be feasibly located.

The data collected have been anonymized and were treated with strict confidentiality and only for research purposes. A presentation of the study was made to teachers, health care personnel and students in order to encourage the participation of all. Similarly, the introductory part of the questionnaire stipulates informed consent; if the participant accepts, the contents of the different sections of the questionnaire are displayed; if he/she does not accept, the questionnaire closes with a thank you. The results made it possible to determine the degree of impact of the Teaching and Research process of the HGDC on the teaching, assistance, academic, research and training activities of human talent in health of the sample mentioned above (584 participants).

In order to guarantee the results, for the validation of the reliability or trustworthiness of the questionnaire used for the research, it was performed through the "Cronbach's Alpha coefficient ( $\alpha$ ), which allows identifying the absence of measurement errors in a test, or as the precision of its measurement" (Ruiz, 2019, para. 2). Instruments with questions that have more than two answers can be evaluated with this test. "The Cronbach's  $\alpha$  score is a number between 0 and 1. An acceptable reliability score is one that is equal to or greater than 0.7" (QuestionPro, 2019, para. 17).



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As mentioned in previous lines, Cronbach's Alpha presents a high or acceptable reliability score of 0.926, evaluating 25 (quantitative variables) of the 33 items of the applied questionnaire. This result shows that the method, the instrument and the research sample selected were reliable and the results obtained are guaranteed.

Data tabulation and analysis was performed using the statistical software SPSS.25 and Excel 2019. Before entering into the analysis of the results, it is necessary to point out the proposed levels of impact evaluation and some key methodological components. For Baker (2000)

Impact evaluation is the process of determining in general terms whether the program produced the desired effects on individuals, households and institutions and whether these effects are attributable to the program intervention. Impact evaluations also allow for the examination of unintended consequences on beneficiaries, whether positive or negative (p. 75).

Four levels have been identified to evaluate the impact of the actions of the Teaching and Research Process; these levels have been considered as a system, since there is a causal and sequential relationship between them.

- **Academic process and resources.** - Seeks to know the impact of the academic process by analyzing the academic planning, assignments, syllabus, time load and the digital platform used for teaching activities.
- **Evaluation and research.** - Seeks to know the impact of evaluation and research on professional training in students who perform their rotation at the HGDC.
- **Learning, training and knowledge transfer.** - Seeks to evaluate to what extent the education, learning, training and knowledge transfer are being applied by future health professionals in the units/areas in which they perform their rotation.
- **Clinical-surgical practice and performance.** - Seeks to evaluate how the Teaching and Research process contributes to improve clinical-surgical practice and performance in the units/areas in which they perform rotations.

It is also important to mention that an indicator is "a comparison between two or more types of data that serves to elaborate a quantitative measure or a qualitative observation. This comparison yields a value, a magnitude or a criterion, which has meaning for the person analyzing it" (Billorou et al., 2011. p. 38-40). The indicators and instruments are aimed at measuring the four levels of impact evaluation mentioned above. The methodological guidelines underpinning the construction of indicators, as cited by Billorou et al.:

- **Management indicators.** - They are used to monitor the processes, inputs and activities that are executed in order to achieve the specific outputs of a policy or program.
- **Outcome indicators.** - They relate to the goods and services generated by the training action; they result from the transformation activities of the inputs and generate an increase in the outputs applicable to training.
- **Effect indicators.** - They refer to the immediate consequences of training and development of competencies on individuals, companies and society. They represent the encounter of the training actions with the demand of the participants.



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- **Impact indicators.** - They represent the expected change in the situation of the participants once the upgrading, knowledge transfer and training are carried out. They can usually be measured in medium or long term periods due to the fact that a period of time is required to observe the improvement of clinical-surgical practice, working conditions and work performance.

The indicators considered for the study were those of management, effect and impact. With regard to the data collection instruments, two surveys were used, which were designed via the web with an access link for students and teachers, respectively.

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The indicators considered for the study were those of management, effect and impact. Regarding the data collection instruments, two surveys were used, which were designed via web with an access link for students and teachers, respectively, for teachers and assisting personnel who are part of the teaching, research and professional training process and who are responsible for the accompaniment, control and monitoring of the students who perform their rotation at HGDC in period.

- **Form C.1.-** Survey Management indicators. - They are used to monitor processes, inputs and activities that are executed in order to achieve the specific outputs of a policy or program.
- **Form C.2.-** Survey for students (undergraduate, rotating internship and postgraduate) who are part of the professional training and who are or were doing their rotation at the HGDC in the different areas/units assigned. A representative sample is made and they are randomly selected.

Finally, the use of the Balanced Scorecard-BSC tool (Kaplan & Norton, 1992) has been considered for monitoring the impact evaluation indicators; through this matrix, the continuous control of the impact evaluation indicators is carried out to determine whether or not the proposed objectives have been met and to make strategic decisions in order to guarantee a highly effective teaching and research process.



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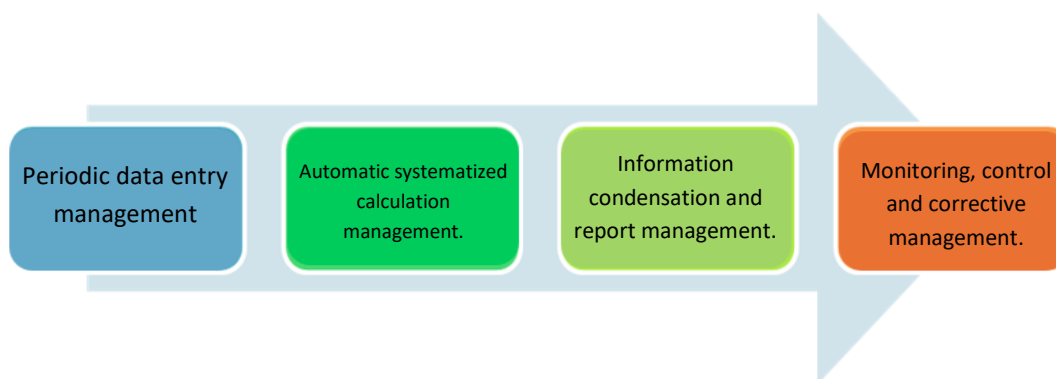


Figure 1. BSC Matrix assessment process

### 3. Presentation of results

The following are the results of the Impact Evaluation Study of the Teaching and Research Process of the Calderón General Teaching Hospital-HGDC for the period 2016-2022. It is important to indicate that the qualification and weighting was measured through an ordinal scale and for the tabulation it was parameterized through a Likert scale and each weight responds to the weighted weights method, which is used for the quantification of variables or alternatives through a numerical value. For the study, 5 measurement groups were determined as follows:

RATING VALUES
<b>1=Bad (&lt;= 30%)</b>
<b>2=Regular (&gt; 30% y &lt;= 50%)</b>
<b>3=Good (&gt; 50% y &lt;= 70%)</b>
<b>4=Very good (&gt; 70% y &lt;= 90%)</b>
<b>5=Excelent (&gt; 90%)</b>

Table 2. Rating values by variables

#### 3.1 Analysis by levels

Of the sample under study in the reference period, 86.30% of the participants were students (504) and 13.70% were teachers and assistants (80).

##### 3.1.1 Academic process

The level of impact of the academic process from the perspective of teachers and health care personnel reached an average impact of 76.03%, equivalent to very good. From the results by subcomponents, 80.36% of the participants expressed that the planning of academic activities was very good, 89.09% considered that the teaching load was very good, 89.07% stated that the tasks and academic material was very good, 69.84% that the curricular design was good, 69.62% considered that the curricular design was very good, 69.62% considered that the academic material was very good, 70.60% stated that the duration of the modules and the teaching load were very good, and 63.67% stated that university-teacher communication was good.

##### 3.1.2 Training resources

The impact of the resources for training from the students' perspective reached an average impact of 63.32%, equivalent to good. Analyzing the subcomponents of this axis, 65.88% consider that the material resources have been good for their training, 64.12% that the



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digital platform provided by the university for academic activities is good, 65.19% consider that the duration of the modules is good and 58.10% state that the organization of class schedules has been good.

It is important to note that the control of this axis is the responsibility of the HEI, however, the results reflect that the Teaching Management of the HGDC should put more emphasis on these parameters analyzed.

### 3.1.3 Evaluation and investigation

The impact of evaluation and research from the perspective of teachers and health care personnel reached an average impact of 86.17%, equivalent to very good. Analyzing the subcomponents of this axis, student participation in the teaching assistance activities reached an average of 86.32%, equivalent to very good; the teaching assistance evaluation system applied to the student reached an average of 89.76%, equivalent to very good; the scientific activities achieved an excellent average of 91.28%; in reference to the motivation of the HGDC and teachers to work in the field of research, a very good level of achievement of 75.60% is evidenced. Finally, regarding the capacity for synthesis, reasoning, reflection and criticism developed by the student, it reached an average of 87.87%, equivalent to very good.

Continuing with the analysis of the impact of evaluation and research from the students' perspective, it reached an average impact of 80.97%, equivalent to very good. Within this axis, the following results have been obtained: students consider that the teaching assistance evaluation system is very good, 85.39% average; scientific activities achieved an average of 79.74% equivalent to very good, in reference to the motivation by the HGDC and teachers to work in the field of research, a level of achievement of 71.36% equivalent to very good is evidenced; at the level of the evaluation made by the teacher or tutor is considered very good with a level of achievement of 82.42%. Finally, regarding the student's qualification on his participation in the teaching assistance activities, an average of 85.95% was achieved, equivalent to very good.

### 3.1.4 Learning, training and transfer of knowledge

The impact of learning, training and knowledge transfer, from the perspective of teachers and healthcare personnel, reached an average impact of 80.94%, equivalent to very good. It is highlighted that, at the level of knowledge of hospital regulations and norms, it is very good with an average impact of 79.44%, the functionality of the hospital infrastructure for care and academic activities reached an average of 76.17% equivalent to very good, the use of classrooms, residences and dining room reached an average of 80.44% equivalent to very good. When inquiring about the level of knowledge and professionalism of the health care staff-teaching staff, an average score of 82.80% was reached, equivalent to very good; the interpersonal relationships between teachers-health care staff-students reached a level of achievement of 85.88%, significant to very good.

The impact analysis of the learning, training and knowledge transfer axis from the students' perspective reached an average impact of 80.38%, equivalent to very good. Within this axis, the following results are evident: knowledge of hospital regulations and norms is very good with an average impact of 73.52%, the functionality of the hospital infrastructure for assistance and academic activities reached an average of 81.23%, equivalent to very good, the use of classrooms, residences and dining room reached an average of 78.29%, equivalent to very good. When asked about the level of knowledge and professionalism of the health care staff-teaching staff, this reached an average score of 80.17%, equivalent to very good; the interpersonal relationships teacher-health care staff-student reached a level



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of achievement of 85.34%, significant to very good. Finally, in the transfer of knowledge from the teachers to the students, it reached an average of 83.72%, equivalent to very good.

### 3.1.5 Clinical-surgical practice and performance

The results on the impact of the clinical-surgical practice and performance from the perspective of teachers and assisting personnel achieved an average impact of 80.85%, equivalent to very good. When analyzing the subcomponents, the supervision of student practices reached a result of 85.64%, equivalent to very good, and the teaching assistance process aimed at improving clinical-surgical practice reached an average of 75.85%, equivalent to very good. When asked if the training process will allow the student to perform adequately in the functions or activities, it reached an average impact of 80.48%, equivalent to very good. Finally, when asked about the qualification of their teaching-assistance performance, this reached an average of 81.43%, equivalent to very good.

Continuing with the analysis of results on the impact of clinical-surgical practice and performance from the students' perspective, this reached an average impact of 81.32%, equivalent to very good. The following results stand out within this axis: on average, the supervision of practices performed on students at HGDDC reached an impact of 82.92%, equivalent to very good; the process destined to clinical-surgical practice reached an average of 75.16%, equivalent to very good. When asked if the training process will allow the student to perform adequately in the functions or activities, it reached an average impact of 81.62%, equivalent to very good. Finally, when asked about the qualification of their general rotation at the HGDC, it reached an average of 85.59%, equivalent to very good.

### 3.1.6 Overall weighted results

Under the Balanced Scorecard (BSC) philosophy, three weighting levels were identified: efficient >90%, precaution between 70% and 90%, and danger <70%. These values are detailed in section 3.2, with the traffic light scale. In Figure 2, the weighted results of the Impact Evaluation of the Teaching and Research process of the HGDC 2016-2022 under the BSC approach and from the perspective of teachers and assisting staff reached a weighted average of 81% which evidences that this axis has a caution alert, where the first evaluation axis on the academic process obtained a rating equivalent to 76.03% with a caution alert, the second axis on evaluation and research reached a score equivalent to 86.17% with a caution alert, the third axis on learning, training and knowledge transfer reached a score equivalent to 80.94% with a caution alert. Finally, the fourth axis referring to clinical-surgical practice and performance achieved a score equivalent to 80.85% with a caution alert.



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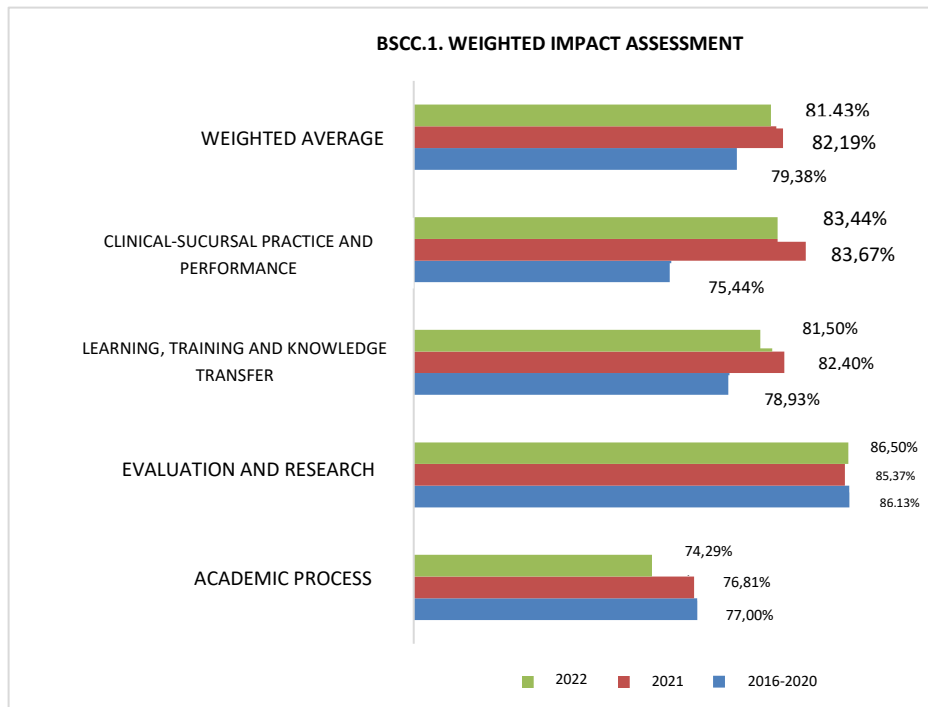


Figure 2. Weighted impact assessment, faculty and staff perspective, period 2016-2022, IDU-HGDC

In Figure 3, the weighted results of the Impact Evaluation from the students' perspective reached a weighted average of 76.50% which shows that this axis has a caution alert, where the first evaluation axis on the resources used for training obtained a score equivalent to 63.72% with a danger alert, the second axis on evaluation and research reached a score equivalent to 80.97% with a caution alert, the third axis on learning, training and knowledge transfer reached a score equivalent to 80.38% with a caution alert. Finally, the fourth axis referring to clinical-surgical practice and performance achieved a score equivalent to 81.32% with a caution alert.

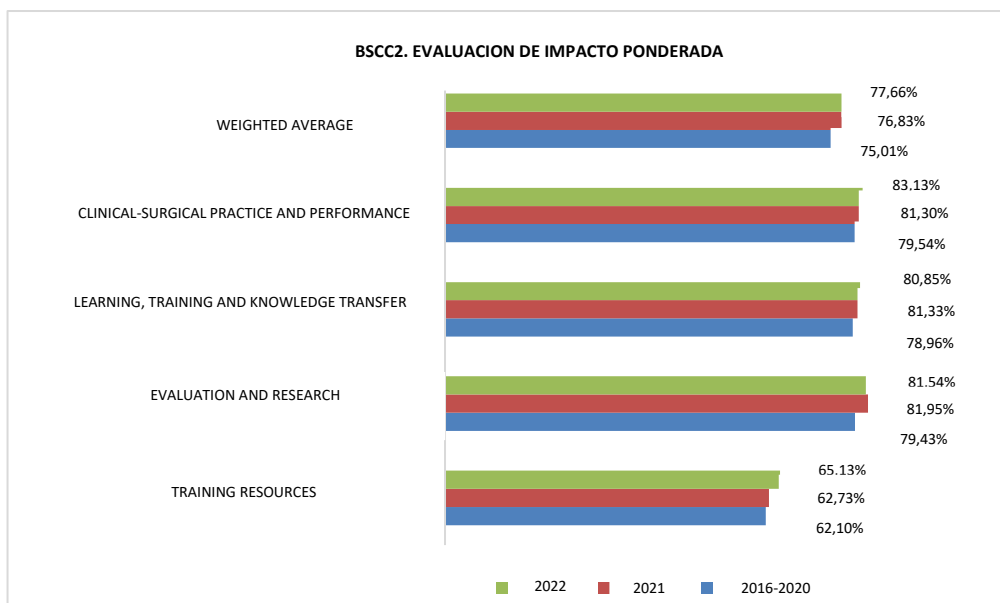


Figure 3. Weighted impact assessment, student perspective, period 2016-2022, UDI-HGDC



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### 3.2 Impact Results by indicators, Balanced Scorecard matrix (BSC)

It should be noted that in the follow-up matrix, in the "Measurement" column, the results processed for each of the questions in Forms C.1 and C.2 are located. This column is marked with a traffic light and each selection of visual codes makes it possible to obtain differences between the goals and the effectiveness of the processes. Thus, in summary:

- **Green color:** The weighting is above the target value, depending on the case it can be good or it can be bad. For the study, efficient green color >90%.
- **Yellow color:** The weighting is within normal measurement parameters. Caution yellow color value between 90% and 70%.
- **Red color:** The weighting is below the quantitative target value to be reached and indicates that urgent corrective action is needed. Danger red color value <70%.

MONITORING MATRIX				BASE LINE	MEASURE MENT 2	MEASUREM ENT 3	
LEVELS	INDICATOR	TYPE OF INDICATOR	FÓRMULA	VALUE TARGET	2016-2020	2021	2022
ACADEMIC PROCESS AND RESOURCES	EFFECTIVENESS OF THE PLANNING OF ACADEMIC ACTIVITIES	MANAGEMENT	Number of teachers who consider the planning of academic activities to be adequate activities is adequate $\frac{\text{Number of teachers who consider the planning of academic activities to be adequate}}{\text{Total number of participants surveyed}} \times 100$	90%	88.39 %	67.69%	85.00%
	EFFECTIVENESS OF THE TEACHING LOAD	MANAGEMENT	Number of teachers who consider the teaching load to be adequate $\frac{\text{Number of teachers who consider the teaching load to be adequate}}{\text{Total number of participants surveyed}} \times 100$	90%	87.74 %	90.77%	88.75%
	EFFECTIVENESS OF ASSIGNMENTS AND ACADEMIC MATERIAL	MANAGEMENT	Number of teachers who consider the tasks and academic material to be adequate is adequate $\frac{\text{Number of teachers who consider the tasks and academic material to be adequate}}{\text{Total number of participants surveyed}} \times 100$	90%	86.45 %	90.77%	90.01%
	EFFECTIVENESS OF SYLLABI AND GUIDE TEXTS	MANAGEMENT	Number of teachers who consider the syllabus and guide texts to be optimal $\frac{\text{Number of teachers who consider the syllabus and guide texts to be optimal}}{\text{Total number of participants surveyed}} \times 100$	90%	70.97 %	72.31%	66.25%
	TECHNOLOGICAL PLATFORM EFFICIENCY	EFFECT	Number of teachers who consider that the technological platform used for teaching activities is adequate. $\frac{\text{Number of teachers who consider that the technological platform used for teaching activities is adequate}}{\text{Total number of participants surveyed}} \times 100$	90%	70.97 %	75.38%	62.50%
	EFFECTIVENESS OF MODULES AND SCHEDULES	EFFECT	Number of teachers who consider that the modules and class schedules are adequate $\frac{\text{Number of teachers who consider that the modules and class schedules are adequate}}{\text{Total number of participants surveyed}} \times 100$	90%	68.71 %	73.08%	70.00%
	EFFECTIVENESS OF INTER-INSTITUTIONAL COMMUNICATION	MANAGEMENT	Number of teachers who consider that inter-institutional communication is efficient or excellent $\frac{\text{Number of teachers who consider that inter-institutional communication is efficient or excellent}}{\text{Total number of participants surveyed}} \times 100$	90%	65.81 %	67.69%	57.50%
	EFFECTIVENESS OF TRAINING RESOURCES	EFFECT	Number of students who consider that the syllabus, bibliography, guide texts and complementary materials are adequate, guide texts and complementary material are adequate $\frac{\text{Number of students who consider that the syllabus, bibliography, guide texts and complementary materials are adequate, guide texts and complementary material are adequate}}{\text{Total number of participants surveyed}} \times 100$	90%	63.87 %	66.27%	67.50%
		EFFECT	Number of students who consider that the technological platform is adequate $\frac{\text{Number of students who consider that the technological platform is adequate}}{\text{Total number of participants surveyed}} \times 100$	90%	60.59 %	63.73%	68.04%



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EVALUACIÓN E INVESTIGACIÓN	EFFECT	Number of students who consider the duration of the modules to be adequate is adequate	90%	64.62 %	64.53%	66.43%	
		$\frac{\text{---}}{\text{---}} \times 100$					
	EFFECT	Total number of participants surveyed Number of students who consider the organization of class schedules to be of class schedules are adequate	90%	59.33 %	56.40%	58.57%	
		$\frac{\text{---}}{\text{---}} \times 100$					
	EFICIENCIA DE PARTICIPACIÓN ACTIVIDADES ASISTENCIALES DOCENTES	EFFECT	Total number of participants surveyed Number of faculty and support staff who believe that student participation in teaching support activities is the most effective way to ensure student participation in teaching support activities	90%	84.89 %	85.33%	88.75%
		$\frac{\text{---}}{\text{---}} \times 100$					
	EFFECT	Total number of participants surveyed Number of students who consider their participation in teaching assistance activities to be participatory teaching assistance activities is participatory	90%	83.95 %	86.93%	86.6%	
		$\frac{\text{---}}{\text{---}} \times 100$					
	EFICIENCIA DEL SISTEMA DE EVALUACIÓN ASISTENCIAL DOCENTE	IMPACT	Total number of participants surveyed Number of students who consider the teaching assistance evaluation system to be efficient the teaching assistance evaluation system is efficient	90%	83.03 %	87.60%	85.54%
		$\frac{\text{---}}{\text{---}} \times 100$					
	IMPACT	Total number of respondents Number of teachers and assistants who consider that the system for evaluating teachers and assistants is efficient the system of evaluation of teaching assistants is efficient	90%	89.78 %	92.00%	87.50%	
	$\frac{\text{---}}{\text{---}} \times 100$						
	IMPACT	Total number of participants surveyed Number of students who consider that the evaluation by the teacher or tutor is permanent	90%	81.51 %	85.20%	80.54%	
	$\frac{\text{---}}{\text{---}} \times 100$						
EFICIENCIA DE ACTIVIDADES CIENTÍFICAS E INVESTIGACIÓN	EFFECT	Número total de encuestados Number of students who consider that scientific and research activities are always carried out	90%	69.23 %	68.09%	73.12%	
		$\frac{\text{---}}{\text{---}} \times 100$					
	EFFECT	Número total de participantes encuestados Number of faculty and staff who believe that scientific and research activities are always carried out scientific and research activities are always carried out	90%	84.43 %	77.83%	77.26%	
	$\frac{\text{---}}{\text{---}} \times 100$						
EFICIENCIA DE REFLEXIÓN, RAZONAMIENTO Y SÍNTESIS	EFFECT	Total number of participants surveyed Number of teachers and assistants who consider that always teaching-assistance activities allow students to develop their reflection, reasoning and synthesis skills.	90%	85.78 %	85.33%	92.50%	
		$\frac{\text{---}}{\text{---}} \times 100$					
PERCENTAGE OF KNOWLEDGE OF HOSPITAL REGULATIONS	EFFECT	Total number of participants surveyed Number of students who are aware of hospital regulations regulating academic-administrative activities	90%	71.34 %	73.87%	75.36%	
		$\frac{\text{---}}{\text{---}} \times 100$					
LEARNING, TRAINING AND KNOWLEDGE TRANSFER	EFFECT	Total number of participants surveyed Number of teachers and healthcare personnel familiar with hospital regulations governing academic-administrative activities	90%	78.22 %	81.33%	78.75%	
		$\frac{\text{---}}{\text{---}} \times 100$					



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CLINICAL-SURGICAL PRACTICE AND PERFORMANCE

			_____ x 100 Total number of participants surveyed				
EFFICIENCY OF INFRASTRUCTURE FUNCTIONALITY	EFFECT		Number of students who consider that the hospital infrastructure allows for the optimal development of academic assistance activities.	90%	80.84 %	82.13%	80.71%
	EFFECT		_____ x 100 Total number of participants surveyed Number of teachers and healthcare personnel who consider that the hospital infrastructure allows for the optimal development of academic healthcare activities.	90%	76.00 %	80.00%	72.50%
EFFICIENCY OF USE OF CLASSROOMS, RESIDENCE HALL AND DINING HALL	EFFECT		_____ x 100 Total number of participants surveyed Number of students who consider that the classrooms, residence and dining room are used in an adequate manner and at the established times.	90%	76.13 %	80.53%	78.21%
	EFFECT		_____ x 100 Total number of participants surveyed Number of teachers and care staff who consider that the classrooms, residence and dining room are used adequately and at the pre-established times.	90%	78.67 %	82.67%	80.00%
INTERPERSONAL RELATIONS EFFICIENCY INDEX	EFFECT		_____ x 100 Total number of participants surveyed Number of students who consider hospital interpersonal interpersonal relationships is collaborative	90%	84.45 %	86.93%	84.64%
	EFFECT		_____ x 100 Número total de participantes encuestados Number of faculty and staff who consider hospital interpersonal relationships to be collaborative. hospital interpersonal relations are collaborative	90%	82.22 %	86.67%	88.75%
LEVEL OF EXPERTISE AND PROFESSIONALISM	EFFECT		_____ x 100 Total number of participants surveyed Number of students who consider the level of knowledge and professionalism of the teaching and care staff.	90%	79.71 %	80.00%	80.80%
	EFFECT		_____ x 100 Total number of participants surveyed Number of faculty and support staff who rate the level of knowledge and professionalism of the support and support staff as excellent the level of knowledge and professionalism of the teaching and care personnel	90%	79.56 %	81,33%	87,50%
EFFECTIVENESS OF KNOWLEDGE TRANSFER	IMPACT		_____ x 100 Total number of participants surveyed Number of students who consider that the transfer of knowledge has allowed them to put it into practice	90%	81.26 %	84.53%	85.36%
EFFICIENCY SUPERVISION OF INTERNSHIPS	IMPACT		_____ x 100 Total number of participants surveyed Number of students who consider the supervision of internships to be adequate of internships are adequate	90%	78.99 %	84.93%	84.82%
	IMPACT		_____ x 100 Total number of participants surveyed Number of faculty and staff who believe that supervision of student internships is efficient and ongoing supervision of students is efficient and permanent.	90%	81.33 %	89.33%	86.25%
			_____ x 100 Total number of participants surveyed				



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EFFECTIVENESS OF CLINICAL-SURGICAL PRACTICE	IMPACT	Number of students who consider the clinical-surgical practice to be adequate or excellent	90%	74.87 %	73.47%	77.14%
		$\frac{\text{Number of students who consider the clinical-surgical practice to be adequate or excellent}}{\text{Total number of participants surveyed}} \times 100$				
	IMPACT	Number of faculty and staff who consider the design of the clinical-surgical practice to be adequate or excellent.	90%	70.22 %	77.33%	80.00%
		$\frac{\text{Number of faculty and staff who consider the design of the clinical-surgical practice to be adequate or excellent.}}{\text{Total number of participants surveyed}} \times 100$				
STUDENT PERFORMANCE LEVEL	IMPACT	Number of students who consider that the training they have received and/or received allows them to perform adequately and/or given allows them to perform adequately	90%	80.08 %	81.73%	83.04%
		$\frac{\text{Number of students who consider that the training they have received and/or received allows them to perform adequately and/or given allows them to perform adequately}}{\text{Total number of participants surveyed}} \times 100$				
	IMPACT	Number of teachers and assisting personnel who consider that the training received and/or given to the students allows them to perform adequately	90%	76.44 %	80.00%	85.00%
		$\frac{\text{Number of teachers and assisting personnel who consider that the training received and/or given to the students allows them to perform adequately}}{\text{Total number of participants surveyed}} \times 100$				
LEVEL OF SATISFACTION WITH THE ROTATION AT THE HEALTH CENTER	EFFECT	Number of students who are satisfied with the rotation performed at the assigned health performed in the assigned medical home	90%	84.20 %	85.07%	87.50%
		$\frac{\text{Number of students who are satisfied with the rotation performed at the assigned health performed in the assigned medical home}}{\text{Total number of participants surveyed}} \times 100$				
PERCENTAGE OF TEACHING AND ASSISTANCE PERFORMANCE	IMPACT	Number of teachers and assistants who evaluate their teaching-attendance performance I	90%	73.78 %	88.00%	82.50%
		$\frac{\text{Number of teachers and assistants who evaluate their teaching-attendance performance I}}{\text{Total number of participants surveyed}} \times 100$				

Table 2. HGDC Teaching and Research Process Impact Assessment BSC Monitoring and Indicator Matrix, period 2016-2022

## 4 Discussion

“Teaching presents a challenge when it comes to finding new dynamics and ways of transmitting knowledge to others, especially in times when information is almost immediate and the dynamics of socialization have changed” (CGFGlobal, 2016, para. 1). However, a large part of university students, have difficulties in their academic preparation on a regular basis. “Difficulties are expressed in lack of motivation for certain subjects or study programs; also due to inadequate school-family environments or spaces, disorganization of autonomous schedules, weakness in the management of study techniques, among others” (Barreno et al., 2022, p. 75-97).

According to Denegri, impact evaluation in higher education is a systematic process carried out to measure and evaluate the results of an intervention or educational program. The goal of impact evaluation is to determine whether educational programs or interventions are achieving the desired outcomes and whether they are having a positive impact on students, the university community, and society at large (Denegri, 2023, para. 1). Impact evaluation should be approached and managed as a management process that determines to what extent the initially stated purposes or objectives have been achieved. It consists of identifying, obtaining and providing useful and descriptive information on the value and merit of the goals, planning, implementation and impact of an intervention on a need or problem identified and intended to change its condition (Aponte and Pérez, 2021, p. 16-19).



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The educational community, according to Bayona et al., as the main axis around which higher education institutions-IES revolve, should always be the main beneficiary of the interventions that are carried out in order to improve the scope of their mission and objectives. The better the quality of the HEI, the better the conditions it can offer to the entire educational community; if something benefits the institution, it will directly or indirectly benefit its members (Bayona et al., 2022, p. 18). Impact evaluations always have the intention of benefiting the participants; it is possible to say that the more a student is exposed to the different interventions developed by the HEI, the more benefits he/she can receive from them. Likewise, the more the impact of the interventions is evaluated, the more efficient they will be and, therefore, the benefits for the students will also be greater and greater (Cambridge Assessment International Education, 2019).

Commonly, the interventions proposed by an HEI according to Abdala are focused on implementing strategies that improve some identified aspect to turn it into a strength. By virtue of this, the efforts and resources allocated for their implementation and evaluation are usually focused on addressing the priority needs of students within the institutions (Abdala, 2004, p. 32). In general, the guiding bodies of HEIs, such as professors, managers, administrators, etc., propose interventions that, in spite of achieving their objectives, are not positively valued by their participants. It is important to emphasize that the deeper the analysis, the better the results and the greater the conclusions of the interventions carried out.

It is important to mention that the General Teaching Hospital of Calderón, since its creation, has had a formative and research focus, has incorporated several promotions of rotating interns in nursing, medicine, nutrition and obstetrics; in addition to this, students from several undergraduate careers perform pre-professional internships in careers such as: Statistics, Psychology, Social Work, Pharmaceutical Chemistry, Clinical Chemistry, Clinical Laboratory, Physical Therapy, Environmental Engineering, Psychiatry, Nutrition, Communication, Administrative Sciences, among others. Not to mention the fourth level students from several HEIs that perform the postgraduate rotation at the HGDC (UDI-HGDC, 2016-2022).

Under these considerations, the Global Effective Impact Evaluation of the Teaching and Research process of the HGDC in the period 2016-2022 reached a rating of 87.39% of effectiveness, which indicates that the teaching-teaching activities are adequate and that certain specific aspects of the academic process need to be reviewed, which is the responsibility of the Higher Education Institutions-IES that work directly with the Calderón General Teaching Hospital.

The Global Effective Impact Evaluation from the perspective of teachers and health care personnel achieved an 89.12% effectiveness rating, showing that the teaching and health care process has been very good during the study period. Among the aspects highlighted is the functionality of the infrastructure and classrooms that the HGDC has set aside for the training of students, the interpersonal relations between teachers, assistants and students is very good and the high level of collaboration and participation stands out. One of the areas for improvement is the academic process in general (planning of activities, timetable, syllabus, digital platform and university-faculty communication), which is a net competence of the HEIs.



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The Global Effective Impact Evaluation from the students' perspective reached a rating of 85.48% equivalent to very good, which reflects that students in the study period support the management of the Teaching and Research process. There are specific aspects to improve, such as academic resources for training, which is a competence of the HEIs. Internally, as HGDC will motivate teachers, assistants and students to develop research and the promotion of scientific activities to strengthen their knowledge.

The central idea behind the design and application of the impact evaluation methodology is that it should be an instrument that can be replicated in other health units where future health professionals rotate and do their internships. It is also important that once several evaluations have been carried out and a baseline has been established, the impact of the teaching and research process should continue to be evaluated periodically in order to compare the variations of the indicators and the actions for continuous improvement to be implemented. The forms designed for the collection of information can be applied both virtually and physically, which makes it possible to obtain highly reliable information.

In terms of methodology and applicability of the research, it is important to consider the limitation for the collection of information, in many cases the web surveys do not have the due acceptance due to the boom of information received by e-mail and social networks. As this was internal research of the Calderón General Teaching Hospital, a presentation of the study was made to teachers, assisting personnel and students to encourage the participation of all the participants.

## 5. Conclusions

In the axis on the academic process, it was evidenced that there is a need to improve: the communication system, the duration of modules and schedules, the digital platform and the curricular design, as a competence of the higher education institution-IES. Regarding the resources allocated for training, these are not totally efficient and it is pertinent to carry out an analysis so that students have academic resources that go hand in hand with their training.

**The evaluation and research axis** presented a high incidence in the students' training and the results reflect that the students have a good acceptance of the current evaluation system and that research is gaining more space. **In the learning, training and knowledge transfer axis**, the results show that this practice is very good and that what was learned in the internship and/or in the pre-professional practices have allowed the students to improve their performance in the units or services where they work. **The axis of clinical-surgical practice and performance** should be strengthened and the interaction between the teacher, the assisting staff and the student should be improved; associated to this, supplies, materials and equipment should be provided to enhance the clinical-surgical practice.

Finally, in order to guarantee accurate decision-making and continuous monitoring of the proposed impact evaluation indicators, the Teaching and Research Unit of the Calderón General Teaching Hospital should apply the Impact Evaluation Methodology once a year in order to compare the results in the indicator follow-up matrix, as well as the design and updating of the research, including the sample size.

## Bibliographic references



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- Abdala, E. (2004). *Manual para la evaluación de impacto en programas de formación para jóvenes*. Montevideo: CINTERFOR-OIT.
- [https://www.oitcinterfor.org/sites/default/files/file\\_publicacion/man\\_eva.pdf](https://www.oitcinterfor.org/sites/default/files/file_publicacion/man_eva.pdf)
- Aponte, C. y Pérez, A. (2021). *Evaluaciones de impacto en la educación superior*. SCRIBD. Colombia
- Baker, J. (2000). *Evaluación de impacto de los proyectos de desarrollo en la pobreza*. Estados Unidos: Banco Mundial.
- Barreno-Freire, S., Haro-Jácome, O., Martínez-Benítez, J., & y Borja-Naranjo, G. (2022). Análisis de factores determinantes en el rendimiento académico del estudiantado de la Facultad de Filosofía de la UCE. *Revista Cátedra*, 5(2), 75-97. <https://doi.org/10.29166/catedra.v5i2.3552>
- Bayona-Umbarila, J. M., Rodríguez-Hernández, C. F., & Peña Ortega, L. O. (2022). *Evaluación de Impacto en Instituciones de Educación Superior*. Documento de Trabajo. Tecnológico de Monterrey. <https://hdl.handle.net/11285/649985>.
- Billorou, Pacheco, & Vargas. (2011). *Guía de Evaluación de Impacto de la Formación*. Montevideo: OIT-CINTERFOR.
- Cambridge Assessment International Education (CAIE). (2019, April 28). Getting started with evaluating impact. [University of Cambridge website]. <https://www.cambridge-community.org.uk/professional-development/gswei/index.html#group-Glossary-AyXNWgMDJA>
- CGFGlobal. (2016). *CGF Global Aprende Libre*. <https://edu.gcfglobal.org/es/educacion-virtual/que-es-la-educacion-virtual/1/>
- Denegri, J. (2023). *Evaluación del Impacto en educación superior*. [https://es.linkedin.com/pulse/evaluaci%C3%B3n-del-impacto-en-educaci%C3%B3n-superior-jesus-denegri?utm\\_source=share&utm\\_medium=guest\\_desktop&utm\\_campaign=copy](https://es.linkedin.com/pulse/evaluaci%C3%B3n-del-impacto-en-educaci%C3%B3n-superior-jesus-denegri?utm_source=share&utm_medium=guest_desktop&utm_campaign=copy)
- Kaplan, & Norton. (1992). *The Balanced Scorecard*. Universidad de Harvard.
- Malhotra, N. K. (2004). *Investigación de Mercados, Un enfoque Aplicado (4ta. ed.)*. México: Pearson Prentice Hall.
- MSP. (2012). *Estatuto Orgánico de Gestión Organizacional por Procesos de los Hospitales del Ministerio de Salud Pública*. Quito: MSP.
- QuestionPro. (2019). *Validez y confiabilidad alfa de cronbach*. <https://www.questionpro.com/blog/es/que-es-la-validez-y-confiabilidad-en-la-investigacion/>
- Ruiz, M. L. (2019). *Psicología y Mente*. <https://psicologiymente.com/miscelanea/alfa-de-cronbach>
- UDI-HGDC. (2020-2021). *Base de Datos Unidad de Docencia e Investigación-HGDC 2020-2021*. MSP. Quito: UDI.
- UDI-HGDC, (2016-2022). *Reseña institucional HGDC*. MSP. Quito: UDI

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**LUIS OLMEDO-PÉREZ:** conceptualization, methodology, validation, formal analysis, research, data curation and analysis, visualization, state of the art, related concepts, writing - first draft and final editing.

**PATRICIA BENAVIDES-VERA:** related concepts, organization and integration of collected data, conclusions, supervision, writing - revision and editing.

**FERNANDO DURÁN-LUCIO:** conceptualization, validation, conclusions, writing - review and editing.



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