SEVEN publicações acadêmicas

CHAPTER 63

Creative approaches to undergraduate research

https://doi.org/10.56238/sevened2024.018-063

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ABSTRACT

Higher Education Institutions are par excellence centers of knowledge production, an activity that is generated from the substantive functions of Teaching, Research and Extension. This dialectical triad, duly interrelated, constitutes the foundation of its raison d'être. The purpose of this study was to contribute to the development of the culture of research at the Universidad Católica Andrés Bello, Guayana extension, enhancing the research skills of professors and students through the development of the Innovative Formulas for Undergraduate Research Project. The methodological approach was guided by Participatory Action Research, considering the need to progressively convert the organization into a research university, encouraging the participation of professors and students in the collective construction of knowledge, considering problematic situations of the environment, implementing actions to increase, through unconventional strategies, research at the headquarters. The project was developed over five semesters, with the participation of teachers and students from the eight schools. At the end of the 202415 semester, 85 professors participated and 114 products were materialized, which have been disseminated through various media, preferably in the institutional repository Saber Ucab, followed by publication in national and international journals and research conferences. The products obtained have contributed to demystify the belief that doing research from the classroom is difficult, producing satisfaction and obtaining more and better learning. The assessment of the experience by the university's Strategic Planning department reports great satisfaction and recognition, while the Academic Vice-Rectorate is urged to continue developing these activities.

Keywords: Innovative formulas, Research culture, Research professor, Research in the classroom.

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INTRODUCTION

The Andrés Bello Catholic University (UCAB) is an institution of public service, of Christian inspiration and entrusted to the Society of Jesus. Its research, teaching and extension functions, as well as its management processes, are committed to the integral formation of the person, characterized by human and professional excellence and social commitment.

On the campus located in Guayana, the Center for Regional Studies (CER), under the direction of Dr. Aiskel Andrade, has been developing, since 2021, the Innovative Formulas for Undergraduate Research Project. The purpose of this is to encourage the culture of research at the headquarters, through the development of research competencies in teachers and students, from the research activities carried out in the different learning spaces, the generation of relevant and pertinent products, and the visibility and dissemination of the knowledge generated.

REFERENCES TO THE EMERGENCE OF THE PROJECT

The Institutional Training Plan of the Andrés Bello Catholic University (2013) defines competencies as "a dynamic, integrative and assessable set of knowledge, skills, abilities, values and attitudes that the student develops during his or her training and that the professional demonstrates in the social and labor scenario" (p.45). In this sense, the development of teaching, research and extension processes aligned with the purpose of developing competencies in students is proposed.

Particularly in terms of research, at the UCAB it is assumed:

> … as a way of generating knowledge it is an activity of the university, a means and a substantive part of the curriculum. In addition, it must be relevant and innovative, governed by deontological principles, open to all currents of thought, based on contemporary knowledge, and be able to be basic, theoretical and applied; integrated into comprehensive training; it motivates its actors in a critical and comprehensive attitude, promoting dissemination mechanisms inside and outside the university. (PFI, pp. 52-53).

Hence, among the research policies, it establishes the promotion and stimulation of members of the academic community for the development of research, favoring the formation of multidisciplinary teams.

Another reference to consider is referred to in the 2023 Plan of the UCAB (UCAB 2023) in which, for the Connect axis, it presents as a strategic objective the deepening of research and transfer processes, improving the platforms and capacities that allow the development of relevant, useful research work that affects the solution of the problems and needs of today's society. In this order of ideas, it establishes as strategic initiatives the proposal of a training program for the development of research competencies, aimed at both academic staff and students.

Additionally, among the special challenges for Guayana, the need to design research projects aimed at obtaining means to finance their execution was established, as a strategy to generate financial resources for the university.

Based on the challenges for Guayana, with the reference of the special plan for the promotion of postgraduate research proposed among the *Strategy for the Improvement of Postgraduate Studies* (UCAB, 2019), the development of the project Innovative Formulas for Undergraduate Research was established as a strategic initiative, under the coordination of the Center for Regional Studies.

The development of the project applied in the Guyana Extension was aimed at promoting the culture of research through the incentive to the development of research competencies, from research activities linked to teaching and learning in all disciplines, the generation of relevant and pertinent products, and the dissemination of knowledge. All this in order to achieve greater projection of the university inside and outside the walls, which could result in the generation of products and services that could generate resources for the institution.

THEORETICAL CONSIDERATIONS

The **university** is an institution that plays important roles for human, regional, and sustainable development in contemporary society. Its primary function is to ensure that its graduates are able to acquire new knowledge and apply it to social reality, ensuring that it is accessible to all society, at all social levels so that there is social inclusion, exercising both a social and political function, being able to return the investment they receive from the community through the development of studies, research and social extension projects, compatible with the real needs of the population for the common welfare, that is, they must contribute to solving the current problems of society. Also to ensure **that students obtain a formulated and critical opinion regarding the social reality in which they must interact so that there is scientific, technological and cultural progress. (Bilski, n.d.)**

Universities, in order to achieve the purposes aimed at the creation, production and dissemination of scientific, humanistic and technological knowledge, need to have dynamic governance systems and sufficient means to promote adaptations to the requirements of the Knowledge Society, represented by globalization, the development of ICTs, uncertainty, complexity, inter- and transdisciplinarity.

A main function of universities is the management of knowledge in professors and students, which is promoted, from the action of professors, learning to learn, from the development of teaching skills to teach to learn from their permanent interest in learning to teach. The other function is related to the production of knowledge from research, which implies having the capacity to promote new

and innovative knowledge, based on the recognition that the teaching-research relationship is the driving force of university activity.

University teaching must be exercised in close relationship with research, for this reason universities must promote research activities in students from the beginning in professional training programs, for this they must have professors who are not only dedicated to teaching but, based on the disciplinary knowledge they possess and the experience acquired in professional practice, be able to articulate theoretical knowledge with practical knowledge so that students acquire better training. Teachers, by assuming their teaching practice from this perspective, transmit to their students not only theoretical knowledge related to concepts, theories, principles and characteristics, but also criteria, orientations, trends and doubts, which cultivate amazement, encourage creativity and promote the search for meaningfulness in learning.

Research should be the basis of university education, because it teaches critical thinking, understanding, dissent, arguing and creating new information, knowledge and technologies. It enables the training of professionals with creativity, willing to innovate, create and recreate the acquisition of knowledge from the intellectual, psychomotor cognitive and affective cognitive aspects. It is important to highlight that the knowledge, information and technologies generated through research play a great role in the integral development of the country; therefore, there should be greater coordination between the various instances of higher education institutions with organizations, companies and public and private instances.

Research, in general, has become one of the bases for evaluating universities. It must be encouraged and valued, without pressuring researchers to do *useful or profitable* science.

ROLE OF THE TEACHER

In the opinion of Padilla Zamora (2016), the pedagogical strategies of undergraduate teachers should be aimed at providing students with the tools so that, based on research, they can carry out interventions in their environment. These tactics must include individual and group advice, tutorials, collaboration, cooperation, consultation and debate from a constructive point of view, forging research to identify, describe, characterize, explain and understand the different phenomena and offer answers to problems of different nature.

Additionally, as fundamental aspects in training, collaborative work, self-learning, respect for others, tolerance, co-responsibility, ethics and systematization should be promoted in students, as a basis and starting point for the resolution of real problems in professional life, which will provide them with significant learning, by awakening their vocational interest in solving them.

Morales, Rincón & Romero, 2005 (c.p. Padilla Zamora, 2016) provide a theoretical-methodological proposal that can contribute to students learning about research and researching: a)

reading research on published related areas; b) make conceptual presentations on the research process, seen globally, as a system; c) accompany the researcher in the research process; d) teach research by investigating; (e) research in and with the community; f) writing as a recursive process of collaboration in the research process; (g) to carry out meaningful research; h) formative evaluation; (i) teaching by example; j) disseminate information on the lines of research; k) Maintain an assertive teacher-student relationship in the research process.

THE TEACHER AS RESEARCHER IN THE CLASSROOM

The teacher, when deploying his teaching action, mediates and regulates between theory and practice. This reconciliation is carried out through a double process, on the one hand, from the cognitive level, they have knowledge of their discipline and, in view of the curricular contents, they value and interpret the information from their own knowledge schemes, and decide what is pertinent for teaching. On the other hand, he acts as a reflective practitioner, who constantly makes decisions about his performance, which is influenced by emotional, cognitive and attitudinal variables. "This double dimension... it shows the importance of making explicit their schemes of professional knowledge and analyzing their relationship with their performance in the classroom." (Porlan & Martin, 1999, pp. 15-16)

In order to promote and coordinate research in the classroom, the teacher identifies and diagnoses problems, questions reality, raises hypotheses, plans intervention in different contexts, designs strategies, selects and applies methods, techniques and tools to obtain information whose analysis leads to responding to the concerns raised.

ROLE OF THE STUDENT RESEARCHER

The generation of research skills in university students mainly originates through the articulation of previous knowledge, the theoretical foundations provided by professors, the identification of needs and demands of the profession and the environment, "from the reinforcement of scientific capacities from a humanistic point of view and the acquisition and application of technological tools, from a multidisciplinary, trans and intradisciplinary vision, which allows the student to have a holistic training." (Padilla Zamora, 2016, p. 22.)

According to Sierra Pérez (2011), "the economic success or failure of a nation no longer depends on the technology or machinery it possesses, but on what it does with its people" (n.p.). If this thinking is transferred to the field of university education, the development of research skills in students should stimulate critical thinking, self-management, encourage teamwork, argumentation, the spirit of help and collaboration and the search for solutions to the problems of reality with creativity and innovation.

In the opinion of Calderón, Hernández, and Villalobos (2011), university students should:

a) Make decisions. Individual and group and be active agents of their own learning;

b) Discover the phenomena to be studied, reflect on their own ideas and concepts to achieve an understanding of the world and begin to enjoy, predict and generate their own new knowledge;

c) Work collaboratively;

d) Provide constructive criticism about their work and that of their classmates;

e) Participate in the deconstruction of knowledge and co-construction of new knowledge while generating learning situations that develop their capacities and attitudes to accept and weigh evidence and,

f) Transfer and apply the knowledge acquired to new experiences, that is, develop skills to apply the knowledge achieved in other contexts or situations.

In short, it is necessary for both teachers and students to form a bond that promotes research at the university. In most institutions there are specialized centers that provide support to the research that is carried out and also have research policies that guide and protect the work that is carried out there. (Giménez, 2017).

INNOVATIVE FORMULA FOR UNDERGRADUATE RESEARCH

To construct an approximation to the definition of Innovative Formulas for Undergraduate Research, the following considerations were made about the meaning given to the words Formula, Innovation and Research.

A Formula is understood to be any pattern or rule on the following of which the solution of a matter depends. *A formula is a conventional practical method or procedure that, based on certain symbols, rules, steps and/or values, allows problems to be solved or processes to be executed in an orderly and systematic manner, in order to obtain a specific and controlled result*

Innovation is defined by the practical or useful purpose that it brings to obtain or develop processes or products different from those established... it refers to what is new in the practical context in which it is developed, leading to immediate applications. Innovation can also be conceived as the production of things, the same or different, but changing the methods of production.

To specify the term investigation, the synonyms of the term are used: inquiry, inquiry, inquiry, search, inquisition, exploration.

Based on the previous exposition, Innovative Formulas for Undergraduate Research will be understood as the practical and systematic procedure for the application of unconventional research strategies, promoted and coordinated by teachers, with the participation of students, aimed at solving problematic situations, evidenced in learning spaces and in the surrounding reality.

The Innovative Formulas for Undergraduate Research project conceives six alternative formulas from which the teacher can choose which one to apply, taking into account the characteristics of the subject, considering the general and specific competencies to be developed, the programmatic content, the didactic strategy contemplated; in addition to the willingness of the students to participate in the project.

The Innovative Formulas for Undergraduate Research referred to are: Undergraduate Pulse, Case Study, Classroom Research, Debates for the Public, Expert Vision and Sandbox.

It should be noted that the original project, proposed for postgraduate studies at the Caracas campus, proposed the formula called Classes of postgraduate students. This consisted of the participation of postgraduate students as guest professors in undergraduate chairs. At the suggestion of the School of Computer Engineering, of the Guayana campus, the SandBox was incorporated to replace the aforementioned formula.

The six innovative formulas to be selected by teachers to apply and the expected products are described below:

- **Undergraduate pulse:** refers to current reports on the practices carried out by Venezuelan organizations. It includes data on key management areas for the competitiveness of organizations, such as social networks, compensation, technology, labor aspects, among others. The minimum desirable product must reflect current information on the practices carried out by organizations based in the Guayana region, in areas of knowledge associated with the selected subjects. The presentation of the product may be made graphically, through tables or graphs.
- **Case studies:** consists of the documentation of case studies that describe the experiences of Venezuelan organizations considering specific aspects, as well as business success stories. The minimum desirable product must present successful experiences of organizations based in the Guayana region, in a specific topic associated with the contents of the selected subject. The presentation of the product may be made in a document that includes the description of the case and the instructions for its approach.
- **Research in the classroom:** involves the development of empirical or bibliographic research, through fieldwork or the construction of a theoretical framework or state of the art. The minimum desirable product must refer to the collection, processing and analysis of data, based on the application of techniques and instruments. The presentation may be made by means of a research note, research report or graphic presentations.
- **Debates for the public:** consist of the identification of specific relevant and current topics for a lecture, which are developed by the students, guided by the professor; with a previously defined methodology. The minimum desirable product will be the

documentation or recording of the activity that may be presented in a document or a recording published on a platform

- **Expert vision:** accounts for the application of in-depth interviews with experts on topics relevant to the subject, with a guide or specific guidelines for its development, and duly documented in a publishable format. The minimum desirable product will be evidence of the interview in a document or recording.
- **Sandbox:** consists of the creation of technological solutions, with projects in the area of information and communications technology (ICT) and Artificial Intelligence. They refer to proposals for algorithms to solve problems or illustrate processes, proposals for degree projects, construction of theoretical frameworks or state of the art. It involves interdisciplinary teamwork and the achievement of goals beyond a school of affiliation and the duration of a semester. The minimum desirable product will be the computer algorithm.

DESCRIPTION OF THE PROCESS OF APPLICATION OF INNOVATIVE RESEARCH FORMULAS

PROJECT IMPLEMENTATION

The execution of the Innovative Formula for Undergraduate Research Project, in the Guayana extension, began in July 2021, with the adaptation of the project originally created for the postgraduate program at the Caracas campus. Between July and August of the aforementioned year, it was presented to undergraduate schools and has been applied during the 2022-15, 2022-25, 2023-15, 2023-25 semesters and is being implemented in 2024-15.

The experiences are developed in three phases: planning, execution and evaluation. In the first phase, planning, activities have been carried out prior to the start of each semester: promotion of the project through visits to the school directors, who are involved in the start of the process; contact with all active teachers for the semester, separated by the school of affiliation, emphasizing those suggested by the directors; presentation of the project and the roadmap for the semester to the professors who expressed their interest in participating; and consolidation of the group of participating teachers.

The implementation phase, which corresponds to the application of the selected formula, is represented in the roadmap drawn up for this purpose. It begins with the selection of a curricular unit by the teacher who expresses his or her willingness to join. This is followed by the review of topics and contents of at least one of the subjects attended, in order to choose the one that allows the development of research activities. Next, the selection of the innovative formula to be applied is declared. Then, the lesson plan of the subject is designed, including the activity to be carried out that

will allow the consolidation of the minimum expected product. The execution of the work plan is reported through progress reports submitted to the CER.

During this period, teachers and students receive the accompaniment and advice of the operational managers of the project. It is important to mention that, depending on the formula selected, the execution can be carried out during the semester or at a particular time; it can even take more than a semester. At the end of each semester, participating faculty are expected to formally deliver the consolidated product. In order to guide the consolidation of products, a document was prepared that presents general provisions.

The last phase, the evaluation, includes the evaluation by the operational managers of the consolidated products presented by the participating teachers, with the subsequent recommendations for dissemination.

IDENTIFICATION OF ALTERNATIVE MEANS OF DISSEMINATION OF THE PRODUCTS GENERATED

The suggested platform for the publication of the final products obtained by applying the selected formula is the institutional repository Saber UCAB, as it is the space par excellence to share the intellectual production of the members of the UCAB community.

Additionally, from the Center for Regional Studies, the Observatory of the Guayana Region and the Revista Guayana Moderna are offered as alternatives, depending on the quality of the products and compliance with editorial standards. This without detracting from other means of dissemination selected by the professors, according to their purposes, thematic area and characteristics of the product conceived.

VALUATION OF GENERATED PRODUCTS

The assessment of the products generated is applied by the operational managers of the project in accordance with the indicators described below: A) Relevance: refers to the fact that the product shows that it is adapted to the objective, and that it evidences the development of the associated competencies. B) Relevance: implies that the content is significant and important, that it is

associated with real or simulated situations. C) Adequacy: indicates that the expected product is associated with the selected innovative formula.

EXPERIENCES OF APPLYING INNOVATIVE RESEARCH FORMULAS IN UNDERGRADUATE STUDIES

FIRST EXPERIENCE: SEMESTER 2022-15

The first experience was carried out between October 2021 and February 2022. 14 teachers participated, attached to the schools of Administration and Accounting, Social Communication, Law, Education, Computer Engineering and Industrial Relations. The list of participants by schools, the selection of innovative research formulas to be applied and the products delivered are reflected in Annex 2. The innovative formulas selected were classroom research, expert vision and sandbox. The products generated were 15.

SECOND EXPERIENCE: SEMESTER 2022-25

This second experience of the project took place between the months of April and August 2022. 18 professors participated, some of whom continue the project of the previous semester. The participating professors represented the schools of Administration and Accounting, Social Communication, Education, Civil Engineering, Computer Engineering and Industrial Relations. The innovative formulas selected were classroom research, expert vision and sandbox. The details are set out in Annex 3. 20 final products were generated.

THIRD EXPERIENCE: SEMESTER 2023-15

The third experience of the project was implemented between October 2022 and February 2023. The new group was made up of 15 teachers. The participating professors represented the schools of Administration and Accounting, Social Communication, Law, Education, Civil Engineering, Computer Engineering and Industrial Relations. The innovative formulas selected were classroom research, expert vision, sandbox and debate for the public; as shown in Annex 4. As a result of the experience, 21 products were consolidated.

FOURTH EXPERIENCE: SEMESTER 2023-25

The fourth experience of the project was implemented between March and July 2023. The schools of Administration and Accounting, Social Communication, Law, Civil Engineering, Industrial Engineering, Computer Engineering, Industrial Relations and the Chair of Identity and Mission were represented. The innovative formulas selected were classroom research and sandbox (see annex 5). As a result of the experience, 40 products were consolidated.

FIFTH EXPERIENCE: SEMESTER 2024-15

The fifth experience of the project began in September 2023 and will conclude in January 2024. It is hoped that by February we will have the data associated with the participation of teachers.

ANALYSIS OF THE RESULTS OF THE EXPERIENCES DEVELOPED

FIRST EXPERIENCE: SEMESTER 2022-15

The development of the first experience reported the following results: the schools with the highest participation were Industrial Relations, Computer Engineering and Education; The teachers of these schools were found to be most willing to participate in this first one. Research in the classroom prevailed as a selected innovative formula. Research reports accounted for 80% of the products and the most widely disseminated platform was Saber UCAB.

Figure 1. Teacher Participation by School

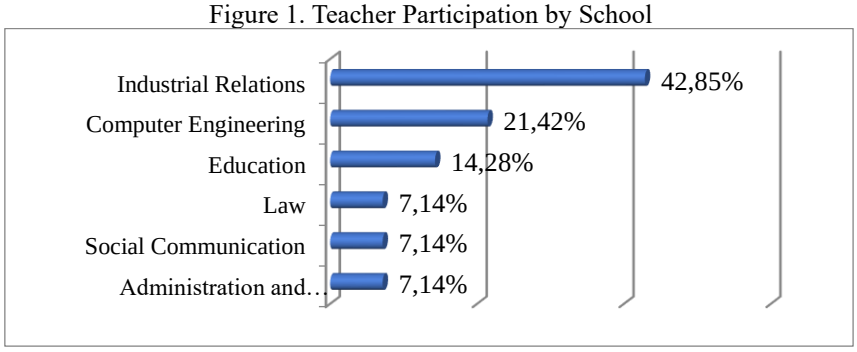
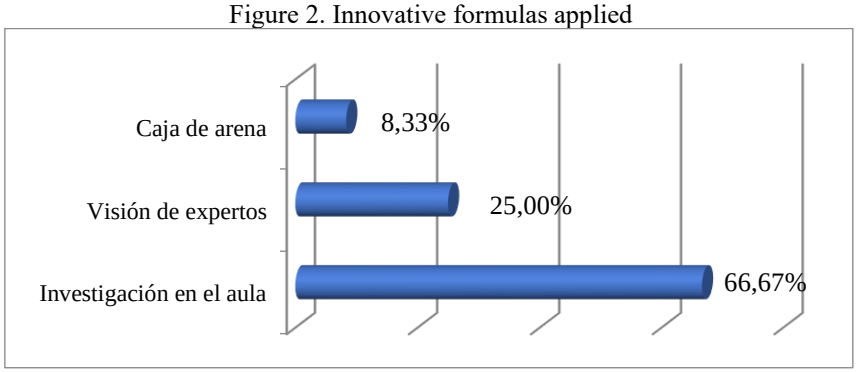


Figure 2. Innovative formulas applied



Secondly, the publication of two articles in two university journals (carried out by professors with experience in the publication of articles) and a considerable percentage of unpublished products can be seen; the latter was perhaps due to the lack of knowledge of the diversity of options and opportunities offered by the Saber UCAB repository to disseminate the product of the work generated in the classrooms.

Figure 3. Consigned products

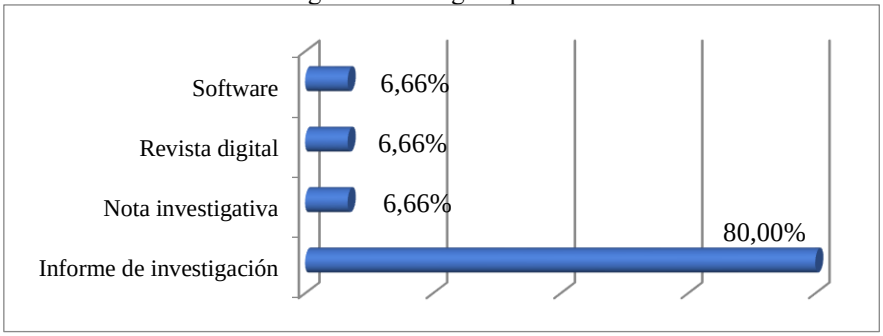
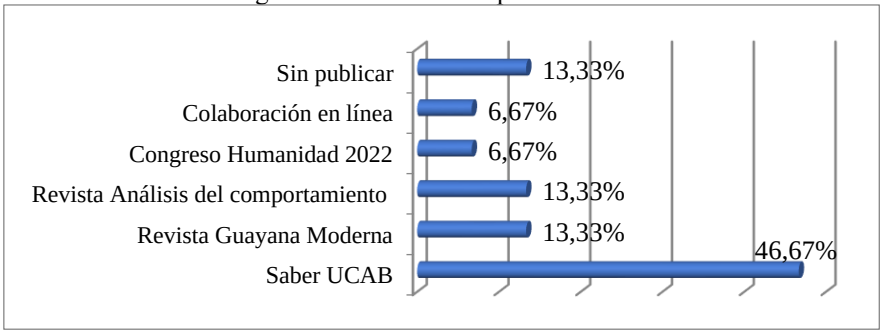


Figure 4. Dissemination platforms used



SECOND EXPERIENCE: SEMESTER 2022-25

The schools with the highest participation in the second experience were Computer Engineering and Social Communication, followed by Education and Administration and Accounting. Research in the classroom is repeated as the greatest innovative formula selected by teachers.

Figure 5. Teacher Participation by School

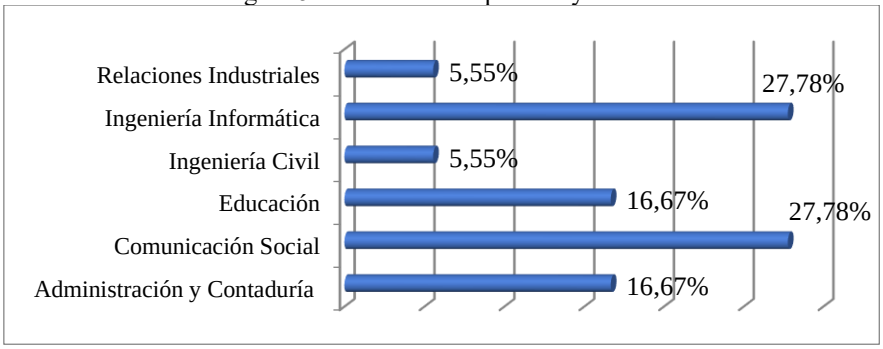
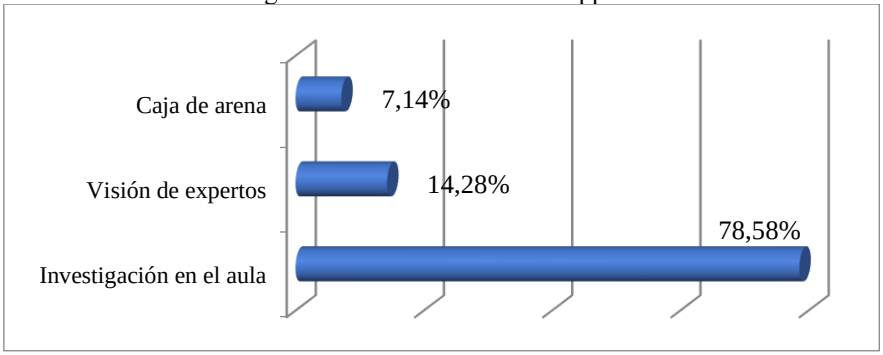


Figure 6. Innovative formulas applied



As the variety of products that Saber UCAB allows to be incorporated is known, the research reports represent the largest percentage of products; but PowerPoint presentations represent a considerable number of contributions.

Graph 7. Consigned products

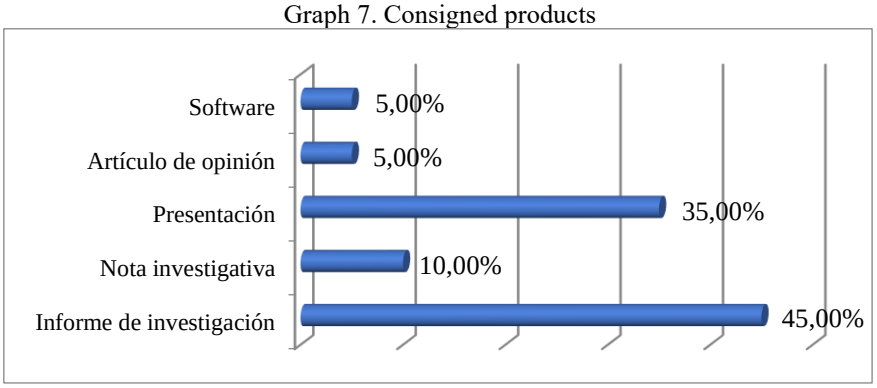
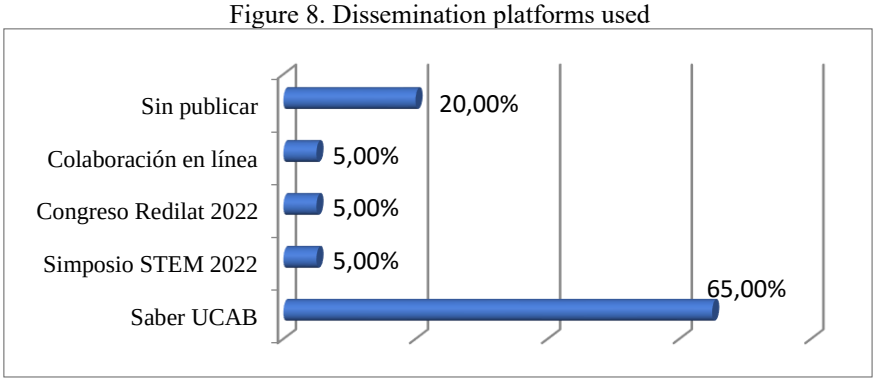


Figure 8. Dissemination platforms used



THIRD EXPERIENCE: SEMESTER 2023-15

As a result of the third experience, the schools of Computer Engineering, Administration and Accounting, and Social Communication belong to the largest number of professors who participated. Civil Engineering is incorporated into the spectrum of schools. Research in the classroom continues to lead as a selected innovative formula and research reports and Saber UCAB constitute the largest volume of products and the greatest possibility of dissemination.

Figure 9. Teacher Participation by School

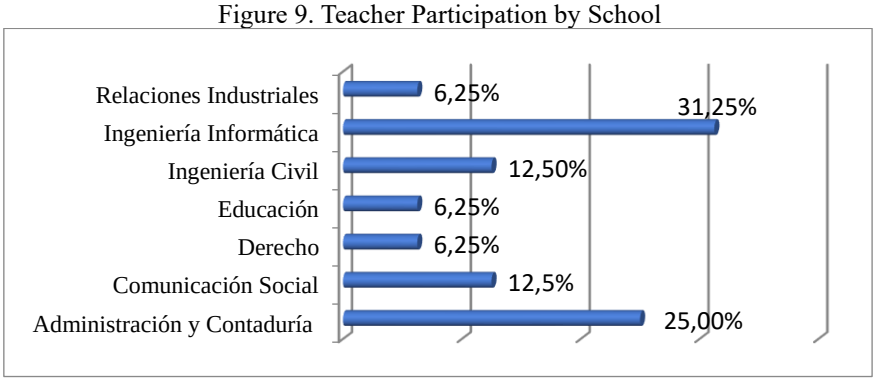
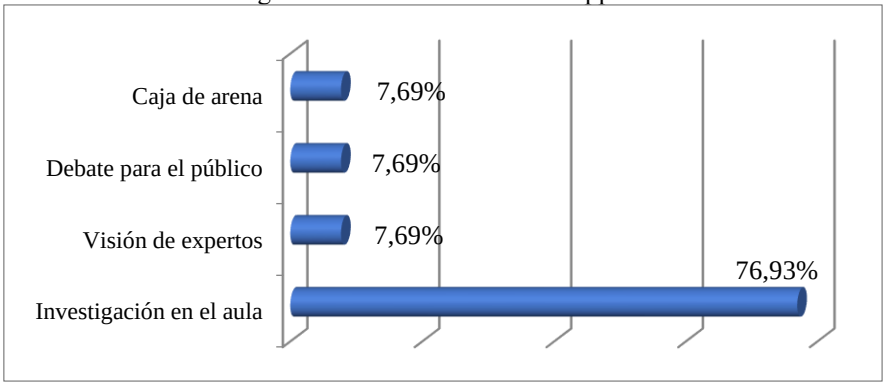
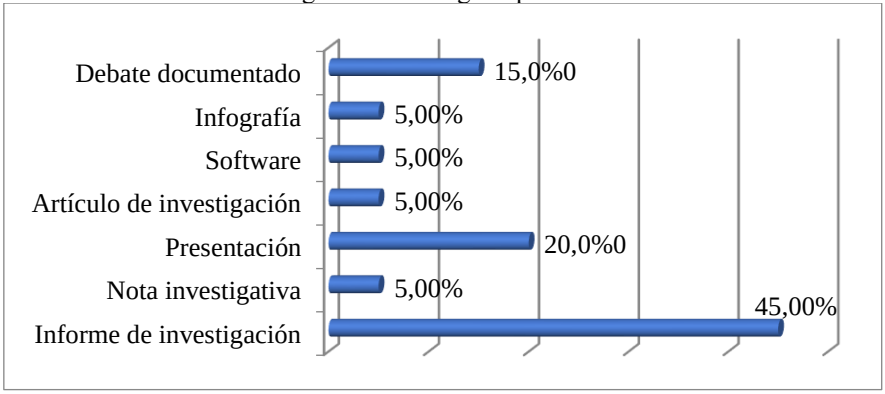


Figure 10. Innovative formulas applied

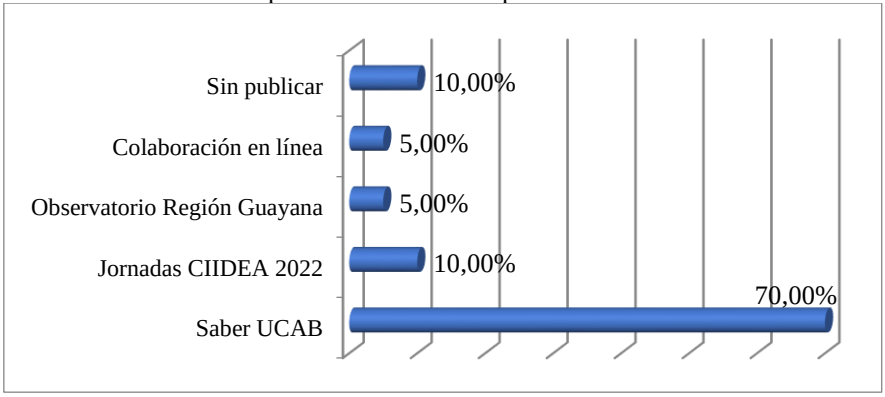


It is worth mentioning that some products generated during this semester provided information for the Observatory of the Guayana Region and served as inputs to participate in the IV CIIDEA 2022 Conference. These last two means of dissemination allow greater visibility to the research activities carried out by teachers and students in learning spaces.

Figure 11. Consigned products



Graph 12. Dissemination platforms used



FOURTH EXPERIENCE: SEMESTER 2023-25

In the fourth experience, it can be seen according to graph 13 that Computer Engineering, Administration and Accounting and Social Communication maintain the leadership in participation, Civil Engineering continues; but Industrial Engineering and Law are incorporated.

Graph 13. Teacher Participation by School

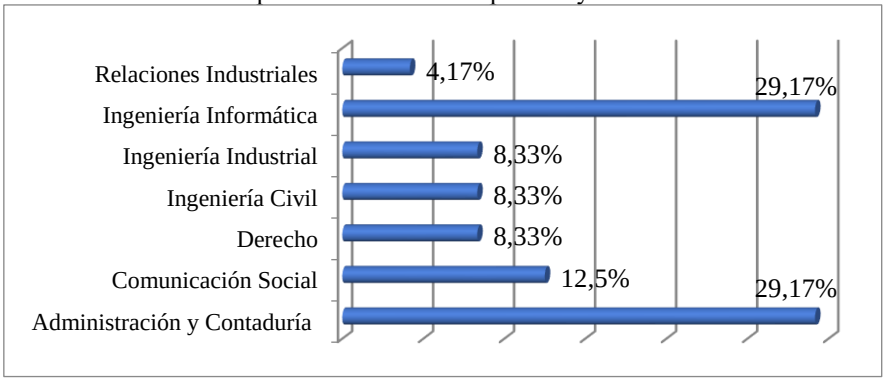
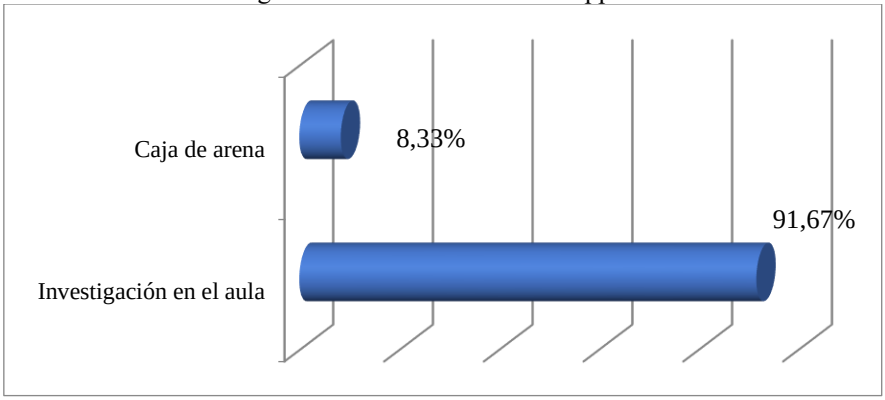


Figure 14. Innovative formulas applied



Classroom research continued to be the most widely used formula, and in terms of contributions, research reports, presentations, and infographics make the biggest contributions. As for the dissemination of the products, it stands out in 90% without publication.

Graph 15. Consigned products

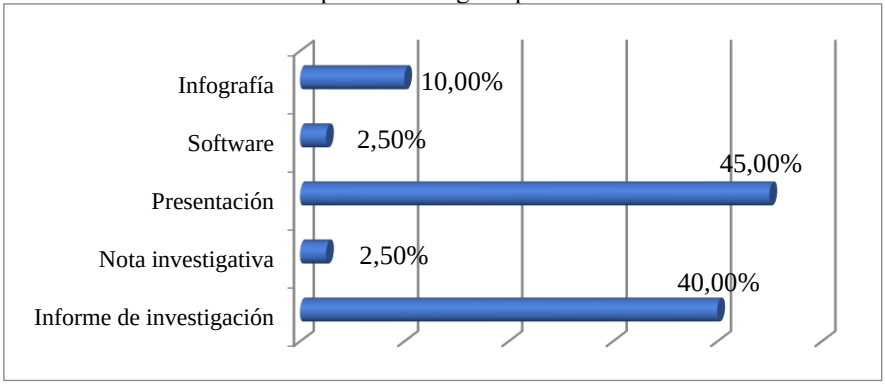
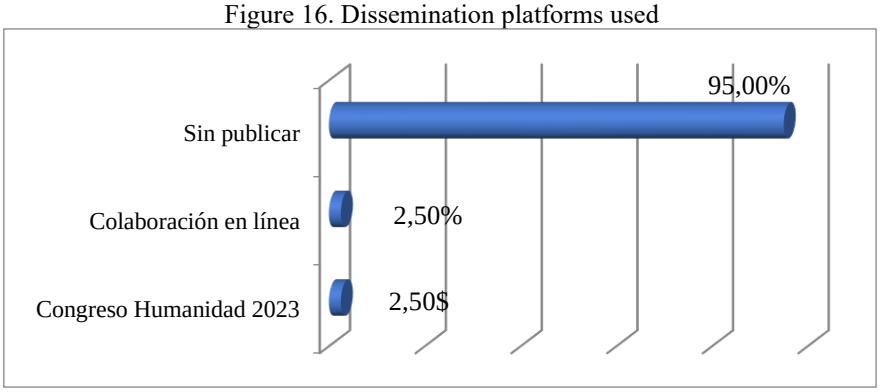
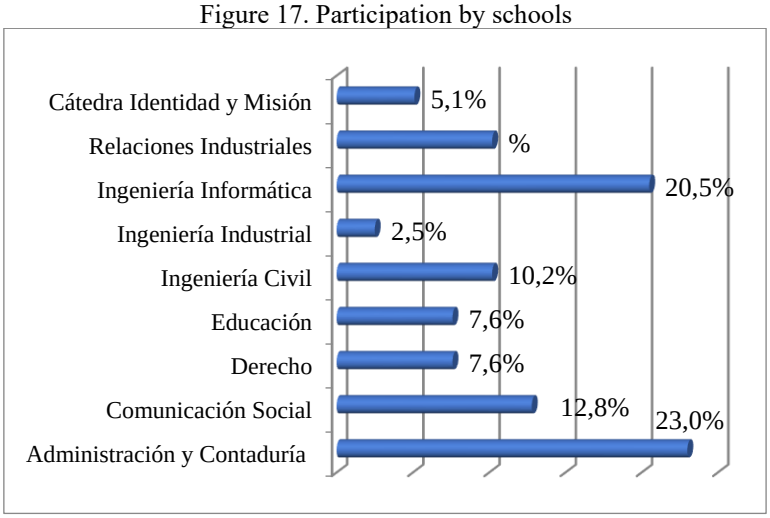


Figure 16. Dissemination platforms used



The Innovative Formulas for Undergraduate Research Project has been fully applied over four semesters (2022-15 to 2023-25). 39 teachers participated. Some have remained in the project in each of the semesters. There has also been the case of teachers who have participated representing two different schools. The school with the highest representation was Administration and Accounting (23.0%), followed by Computer Engineering (20.5%).

Figure 17. Participation by schools



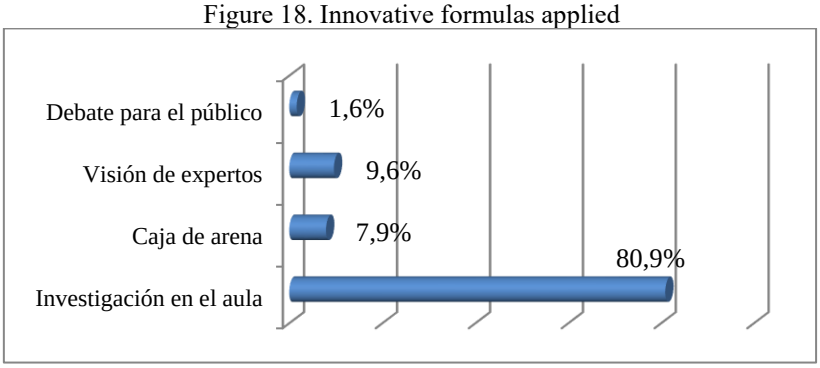
It is significant to consider the proportion of participants in the project, differentiated by school, given the variability in the number of active teachers during the four semesters referred to. From this perspective, it is possible to observe that the participation of the professors attached to the School of Computer Engineering is the most significant.

Table 1. Proportion of participants per school

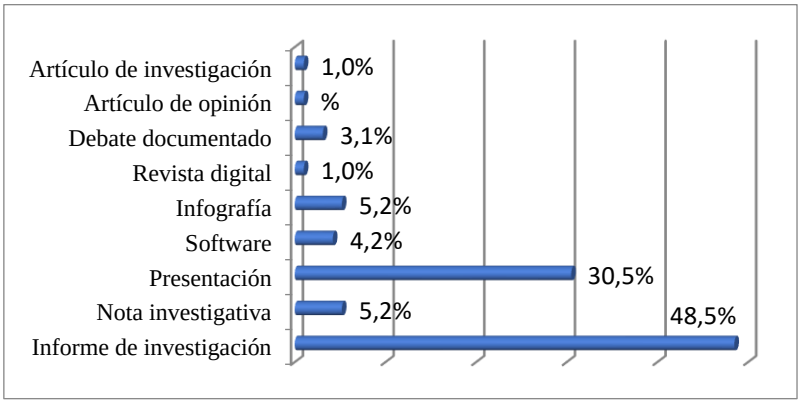
School	Number of teachers							
	202215		202225		202315		202325	
Administration and Accounting	46	2,17%	44	6,81%	43	9,30%	45	15,55%
Social sciences	22	27,27%	14	7,14%	11	9,09%	7	14,28%
Social Communication	58	1,72%	53	9,43%	52	3,84%	48	6,25%
Education	20	10,00%	23	13,04%	9	11,11%	2	0,00%
Right	36	2,77%	34	0,00%	35	2,85%	35	5,71%
Civil engineering	26	0,00%	22	4,54%	22	9,09%	21	9,52%
Computer engineering	17	17,64%	17	29,41%	17	29,41%	18	38,88%
Industrial Engineering	21	0,00%	22	0,00%	18	0,00%	20	10,00%
Engineering Common Subjects	16	0,00%	15	0,00%	12	0,00%	13	0,00%
Total	**262**		**244**		**219**		**209**	

When referring to the innovative formulas applied by teachers, it is observed that the most frequent was research in the classroom (80%), followed by expert vision (9%), sandbox (7%) and debate for the public on only one occasion.

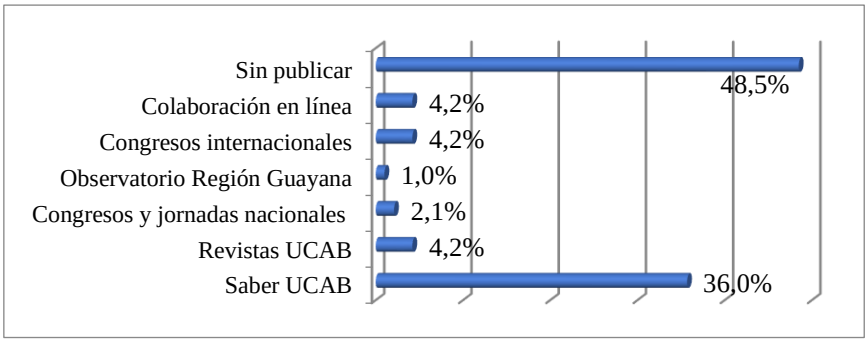
Figure 18. Innovative formulas applied



During those semesters, 95 products were generated, of which research reports were the most presented (48%), followed by presentations (30%), infographics and research notes (5% each), software (4%) and other types of products (6%).



Finally, it is important to refer to the publication of the products generated between the 2022-15 and 2023-25 semesters. On UCAB platforms, 41.2% are available; 6.3% have been presented at national and international conferences and congresses. However, 48.5% have not yet been published.



REFLECTIONS ON THE EXPERIENCES DEVELOPED

The development of the Innovative Formulas for Undergraduate Research Project for five consecutive semesters allows us to reflect on the lessons learned. It is possible to identify good practices and challenges to enhance the project, in relation to the purpose for which it was designed, to encourage the culture of research at the Guayana headquarters.

GOOD PRACTICES

REGARDING THE DEVELOPMENT OF RESEARCH COMPETENCIES IN TEACHERS AND STUDENTS, FROM THE RESEARCH ACTIVITIES CARRIED OUT IN THE CLASSROOMS

- The conceptualization of the project, the definition of the expected products and the identification of alternative means of dissemination to provide references for the formulas to be selected and the strategies to be applied.
- The design of the guidance guide for the development of the minimum expected products per formula applied.
- The promotion of the project with presentations to school directors and teachers of the headquarters in mixed modality, both face-to-face and virtual, through the Zoom platform.
- The strategies implemented to encourage teachers, which allowed the significant increase in the number of participants in each semester, among which it is possible to mention: visiting schools, requesting principals and academic coordinators that, after reviewing the lesson plans, identify those teachers who declared the realization of research activities as part of the strategies for development. Without detracting from the carrying out of research activities, and the obtaining of products, even if they have not been planned.

- The strategies of accompaniment to the teachers, in the conception of the minimum expected products and in the evaluation of the products, monitoring the development during the semester until consolidation. Among them: individual and group counseling; the sending of support material; meetings with specialists to meet the special needs of some of the participants.
- The orientations, from the beginning of the semester, to the directors of the schools, to the academic coordinators and to the professors assigned to them, ensuring that the professors were able to understand the purpose of the project and identify the activities contemplated in their lesson plans, associated with the research processes that they have been developing with their students.
- The active participation of the students, who, under the coordination of their professors, carried out research activities, such as the design and application of data collection instruments, data analysis, product design, including presentations, digital magazine, and survey management software with geolocation, created by students in the sandbox.
- Holding meetings with school principals to present the adjustments made, the results obtained, and to request the identification of potential participants based on the review of the research activities declared by the professors in the lesson plans of the previous semester.

REGARDING THE GENERATION OF RELEVANT AND PERTINENT PRODUCTS

- The definition of the minimum expected outputs per formula applied; this given that not all professors intend to conceive research reports or articles for peer-reviewed journals.
- The generation of research products that have been applied by units of the university. Among them: the software for the management of surveys called UCAB Forms 2.0, created by the Computer Engineering team, and used by the Center for Regional Studies, and some professors, for the collection of data from several of the projects it executes.
- The development of workshops for the writing of scientific and academic articles and publication in Saber UCAB, aimed at the teachers of the headquarters.
- Activities carried out to stimulate students, such as visits and taking photographs in the classrooms, in order to leave evidence of their participation.

REGARDING THE VISIBILITY AND DISSEMINATION OF THE KNOWLEDGE GENERATED

- The significant contribution of the project to the academic community by publishing the products on different UCAB platforms, such as Saber UCAB and the journals Guayana Moderna and Analogías del behavior.
- The participation of teachers in national and international conferences and congresses. Among them: Conference of the Center for Research, Innovation and Academic Development; Science , Technology, Engineering and Mathematics Symposium 2022; Humanity Congress 2022; Latin American Researchers Network Congress 2022.

RECOMMENDATIONS TO ENHANCE THE PROJECT

To promote the Innovative Formulas for Undergraduate Research Project, it is recommended:

- The selection of participating teachers from the schools, identifying in their lesson plans opportunities to encourage research with their students, to generate knowledge that can be shared with their peers.
- The materialization of the workshops on Saber UCAB and the Harvard Method for case studies.
- The enabling of the Saber UCAB platform to carry out file uploads.
- To promote the recognition of students participating in research activities and to reward outstanding products.

FINAL CONSIDERATIONS

The Innovative Formulas for Undergraduate Research Project, during the five semesters in which it has been applied, has made it possible to advance in the proposed objective. To date, 39 teachers representing all schools have participated in the project; four of the innovative formulas proposed in the project have been applied; 95 research products have been submitted by teachers; and the products have been disseminated in various media.

It is possible to point out that significant progress has been made in the development of research competencies in teachers and students, and the production of knowledge from the research carried out in the classrooms, with the work in teams made up of teachers and their students. As well as the generation of products that contribute to making visible the generation of knowledge in the UCAB Guayana through institutional platforms, such as Saber UCAB, the Revista Guayana Moderna, the Revista Analogías del Conducta and the Observatory of the Guayana Region.

A greater participation of professors, representing all schools, is aspired in order to continue promoting the development of the culture of research in the University. The Centre for Regional

Studies will continue to participate in the promotion of the culture of research by programming and carrying out activities that contribute to the achievement of the declared purpose of the project.

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