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Articulation between teaching, research and extension: Motivation tool for Scientific Initiation

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Abstract

The articulation between Teaching, Research and Extension represents a legal condition for the existence of Higher Education Institutions - IES, according to the Federal Constitution of 1988, Article 207, which establishes: "Universities enjoy didactic-scientific, administrative and of financial and patrimonial management, and will obey the principle of inseparability between Teaching, Research and Extension", sine qua non condition for critical training of future professionals and citizens based on the production and socialization of knowledge, promoting the articulation between the real situation and the ideal of the different operational and administrative, conceptual and pedagogical acts. The article has as general objective to evaluate the articulation between teaching, research and extension as a motivating instrument for the student to participate in Scientific Initiation programs. This is a documental research

that sought to analyze the indicators of the Pedagogical Project of Courses-PPC of a Higher Education Institution, regarding evidence of teaching, research and extension articulation. It was observed that once the articulation between teaching, research and extension is not identified in the course evaluation instrument, there are no elements that motivate students to participate in scientific initiation programs, due to the lack of requirement of the National Institute of Studies and Educational Research Anísio Teixeira – INEP.

Keywords: Articulation; Search; Extension; Teaching;

1. Introduction

The articulation between the axes that make up the tripod: teaching, research and extension, is dedicated to promoting the inseparability on which the university and higher education are sustained, in a deeper analysis. The inseparability between teaching, research and extension is a guiding principle of the quality of university production, because it ensures as necessary the three-dimensionality of autonomous, competent and ethical university work. Thus, the university assumes its role as a space for analysis and debates that have highlighted teaching, research, and extension (SGUISSARD, 2009).

However, when the articulation between extension and research excludes teaching, the formative dimension that represents the university's raison d'être is excluded. As Silva (2000) points out, the articulation between teaching, research and extension stems from conflicts around the definition of the university's identity and role throughout history, which often does not occur in practice.

For the generation of autonomy and the formation of a critical spirit in the student, combining research and teaching, extension appears as a third driver in academic training, in response to the criticism and pressure suffered by the university, arising from various sectors and social demands (Silva, 2000).). Teaching, research and extension appear, then, at the end of the 20th century, united by the aforementioned constitutional principle of inseparability. The university itself renews itself in the process and in the conception of knowledge based on the articulation between teaching, research and extension. Ribeiro (2019) points out teaching as the best example of this renewal, as, integrated with the knowledge produced through research to meet the aspirations of society and benefited communities in which extension activities take place, higher education fulfills its role. as a university community responsible for the construction and reconstruction of knowledge. The inseparability between the practice of teaching, research and extension must contemplate interdisciplinarity and transversality as pointed out by Bulgraen (2010), which basically represents two connections: the teaching/extension connection, in which the democratization of academic knowledge must occur, and the research/extension connection, a movement that promotes the production of knowledge and contributes positively to significant changes in social relations.

Research and extension are linked to teaching and build a space that allows dialogue between different areas of knowledge, this causes the development of interdisciplinary and interprofessional actions. LDB nº 5.540/1968, in its art. 20, ratifies the provisions contained in Decree-Law No. 252/1967: universities and higher education institutions will extend to the community, in the form of courses and special services, the teaching activities and research results inherent to them. The same law, art. 40, item “a”, consigns the

participation of the student body in programs to improve the living conditions of the community and in the development process, through extension activities.

Regarding the inseparability of the tripod that sustains higher education, the National University Extension Policy - FORPROEX, establishes that "The guidelines that should guide the formulation and implementation of University Extension actions, [...] The University Extension Policy affirms the University Extension as an academic process. From this perspective, the assumption is that extension actions become more effective if they are linked to the process of training people (Teaching) and generating knowledge (Research)" (FORPROEX, 2012).

According to Resolution No. 7 of December 18, 2018 of the Ministry of Education, art. 13, for the purpose of complying with the provisions of the National Education Plan (PNE), institutions must include in their Institutional Development Plan (PDI), the following terms, among others: the concept of extension, which fits the principles established in the this Resolution, to be applied in the formulation of pedagogical projects for higher education courses, when necessary; planning and institutional extension activities; the form of registration to be applied in higher education institutions, describing the modalities of extension activities that will be developed; curricular accreditation strategies and student participation in extension activities; the policy for the implementation of the self-assessment process of the extension, the strategies and indicators that will be used to comply with the provisions contained in art. 4 of this Resolution; forecasting and financing strategies for extension activities.

Research and extension activities are strengthened from a theoretical point of view, promoting transformations for the assisted communities, fulfilling the role of universities, overcoming the challenge of linking theory to practice in articulated actions between teaching, research and extension. Thus, there is the tripod that sustains higher education beyond the construction of knowledge, overcoming social and regional inequalities (FEITOSA E DIAS, 2019).

The HEIs, in a pedagogical, interdisciplinary, political, educational, cultural, scientific and technological process in which they articulate teaching with research and extension, must consider with due attention the social and economic needs of communities to promote change and transformation. This will be a new educational proposal promoting its role as a protagonist in the construction of its own knowledge while benefiting society/community by transforming itself into a critical and socially responsible autonomous individual (PINHEIRO, 2020).

It becomes a great challenge for HEIs to ideally implement the effective articulation between teaching, research and extension, culminating in Social Responsibility. This articulation makes it possible to deepen the learning process to better train citizens who will serve the labor market and society (SANTOS, 2021).

2. Materials and methods

The articulation between teaching, research and extension as a motivating instrument for the student to participate in Scientific Initiation programs - IC can be evaluated through the analysis of the IC aspects contemplated in the Pedagogical Project of the Courses - PPC. The analysis of the CI aspects was based on the Assessment Instrument for On-site and Distance Undergraduate Courses of the National System of Assessment in Higher Education – SINAES (SINAES, 2017). For this study, a Brazilian private institution

in the State of Amazonas was chosen. The PPC's were chosen based on the criterion of students' participation in CI programs. The PPCs of the following undergraduate courses were considered: Biomedicine, Nursing, Environmental Engineering, Civil Engineering, Nutrition and Psychology. The indicators referring to the undergraduate PPC's selected above were: Educational context, Institutional policies within the scope of the course, Course objectives, Professional profile of the graduate, Curricular structure, Curriculum contents, Methodology, Complementary activities and Course Completion Work (TCC). The analysis of the indicators was based on the scores attributed by the evaluation of the Ministry of Education of the Federal Government of Brazil – MEC. Grades are assigned from 1 to 5, where 1 characterizes that the criterion was not met, 2 and 3 present in an incipient form, 4 in an ideal form and 5 in an excellent form.

Indicator I - Educational context: This indicator clearly and objectively assesses the effective demands of an economic and social nature that justify offering the course in the region where it is located.

Indicator II - Institutional policies within the scope of the course: This indicator makes it possible to evaluate the institutional policies for teaching, extension and research contained in the PDI of the IES, and if the mechanisms for their implementation are explained in the PPC.

Indicator III - Course objectives: This indicator made it possible to assess the course objectives, clearly described in the PPC and aligned with the professional profile of the graduate, the course's curricular structure and its educational context. Here it is possible to assess what type of professional the course in question will be able to insert in the job market, whether thinking professionals or simply mere reproducers of theories that were presented to them during the course without the experience of practice that allows them to build and reconstruct of new knowledge.

Indicator IV - Professional profile of the graduate: The professional profile of the graduate was evaluated based on the skills clearly proposed in the PPC and articulated to the course objectives, and also based on the National Curriculum Guidelines-DCNs.

Indicator V - Curricular structure: The curriculum structure of the course, during the on-site visit, receives important attention from the evaluators as it represents the instrument at the base of academic training. It contains clear information on all curricular components, compulsory and optional subjects, complementary activities, the Course Completion Work and the Supervised Curricular Internship.

Indicator VI - Curricular contents: This indicator allowed assessing whether the curricular contents guarantee the development of the professional profile of the graduates proposed in the PPC. The aspects of updating, adequacy of workloads, in hours (60min), and the bibliography contained in the PPC are considered in the evaluation.

Indicator VII - Methodology: In this indicator, it was evaluated whether the methodologies planned or implemented are adequate for the execution of the PPC, taking into account the objectives of the course, the profile of the graduate, the DCNs and the integration of teaching, extension and research , the latter when applicable.

Indicator VIII - Complementary activities: This indicator evaluated the complementary activities and what are their offer and realization conditions. Here, the relationship between the number of complementary activities and the total course load will be evaluated; as well as the diversity of activities and forms of use related to CI.

Indicator IX - Course Completion Work (TCC): This indicator made it possible to evaluate the forms of orientation and coordination of the TCC and the presentation methodology, considering CI aspects.

3. Results and discussion

3.1 Indicator I - Educational context

This indicator is analyzed according to five criteria: demand of an economic nature, demand of a social nature, demand of a cultural nature, demand of a political nature and of an environmental nature.

Regarding the effective demands of an economic nature, all courses obtained grade four, that is, they all satisfactorily meet the effective demands of an economic nature (Figure 1).

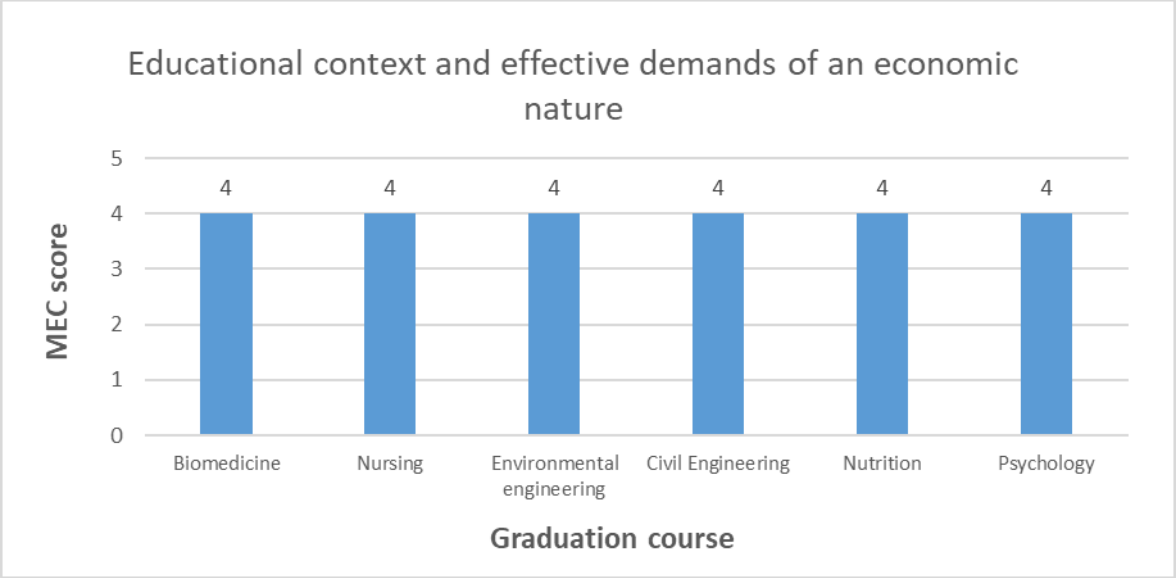

Figure 1 - Educational Context of the Course according to the effective demands of an economic nature.

In the effective demands of a social nature, it was observed that the Environmental Engineering and Psychology courses obtained the maximum concept, while the Biomedicine, Nursing, Civil Engineering and Nutrition courses obtained the fourth concept (Figure 2). All courses meet the effective demands of a social nature satisfactorily.

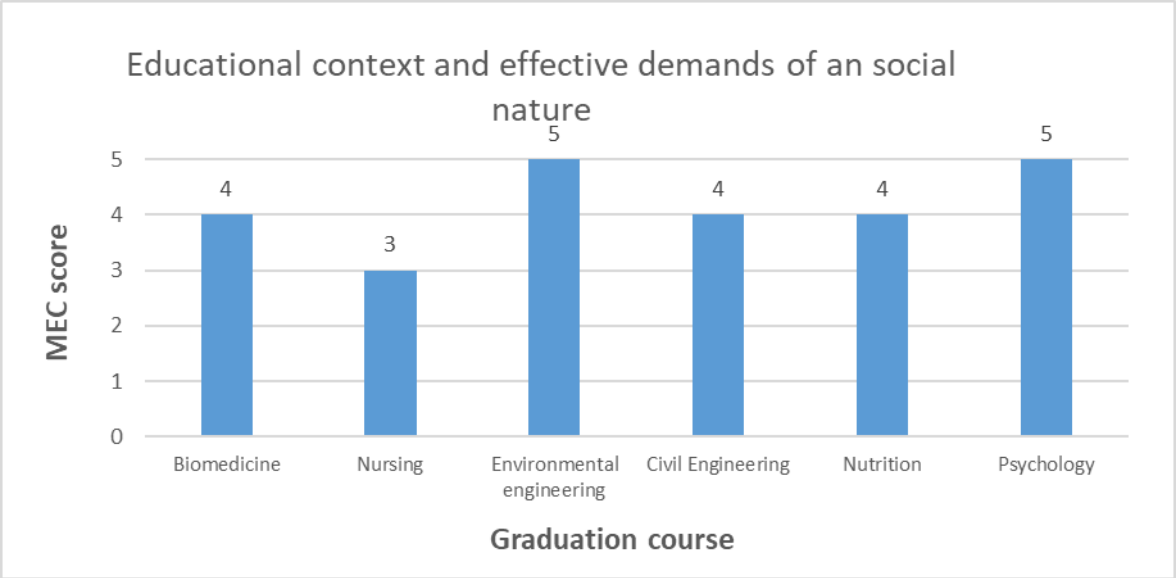

Figure 2 - Educational Context of the Course according to the effective demands of a social nature

Regarding the effective demands of a cultural nature, it was observed that all courses obtained a score equal to four, characterizing that all courses satisfactorily meet the effective demands of a political nature (Figure 3).

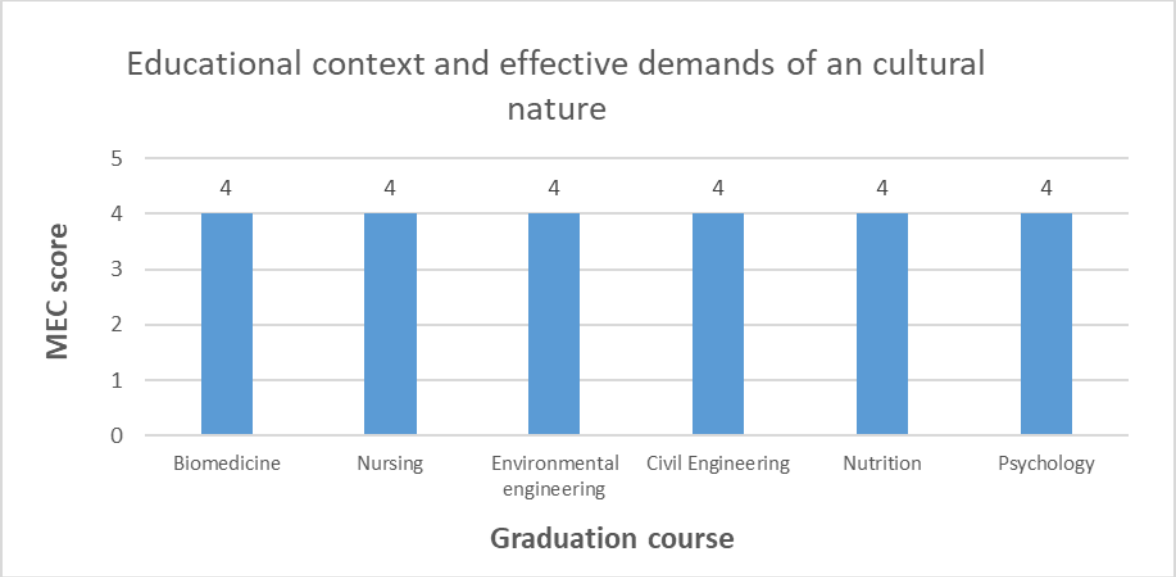

Figure 3 - Educational Context of the Course according to the effective demands of a cultural nature

In the effective demands of a political nature, the Biomedicine, Environmental Engineering, Nutrition and Psychology course obtained a grade of four and the Nursing and Civil Engineering courses obtained a grade of three, characterizing that all courses satisfactorily meet the effective demands of a political nature (Figure 4) .

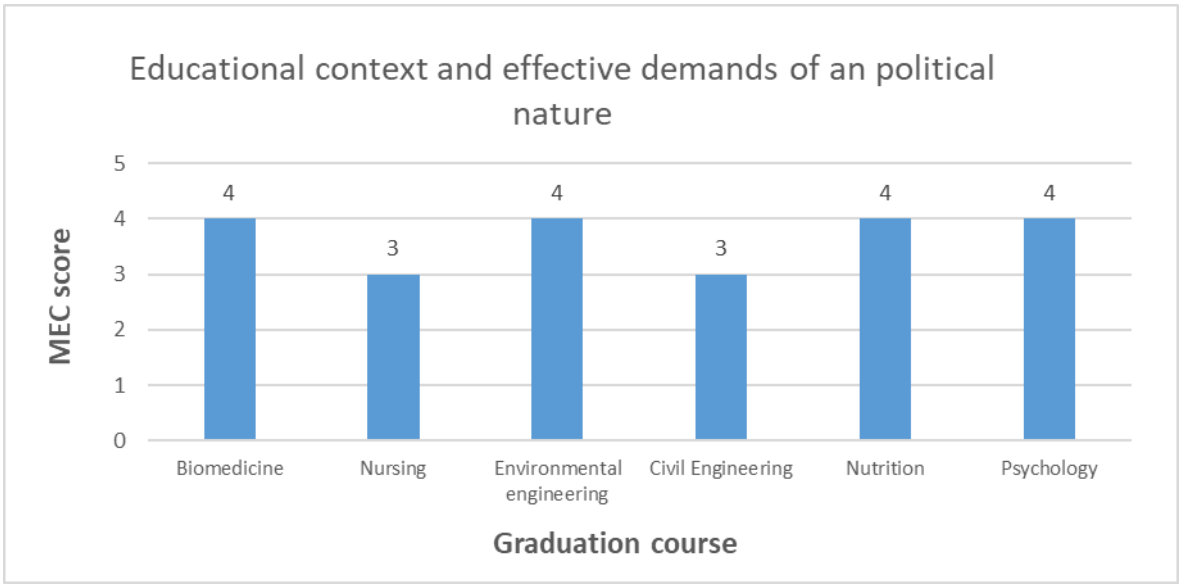

Figure 4 - Educational Context of the Course according to the effective demands of a political nature

Regarding the effective demands of an environmental nature, all courses obtained a grade equal to four, except for the Nursing course, which obtained a grade equal to three, thus characterizing that all courses also satisfactorily meet the demands of an environmental nature (Figure 5).

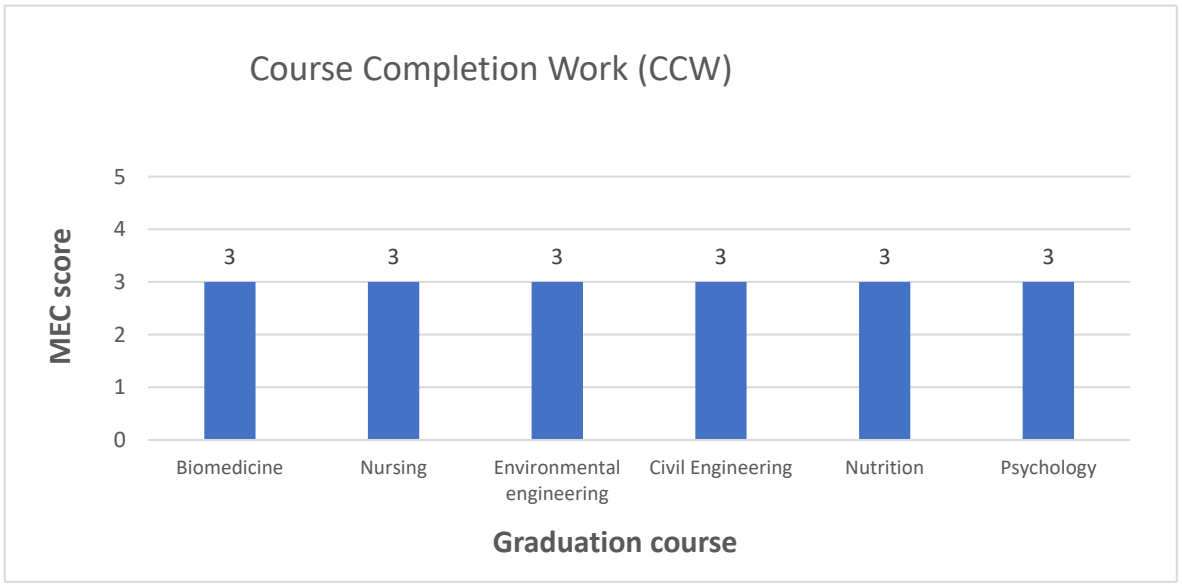

Figure 5 - Educational Context of the Course according to the effective demands of an environmental nature

However, it is not evidenced by the evaluation of the MEC, in any of the evaluated criteria, how the HEI meets the effective demands with a focus on the tripod, teaching, research and extension. Thus, this indicator does not show that the HEI promotes this articulation.

Social transformation, being one of the guidelines of university extension, establishes the university's interrelation with other sectors of society. Therefore, the educational context must be aimed at the interests of society and not the market. These demands of an economic, social, cultural, political and environmental order alone cannot be considered individually, because in the expectation of FORPROEX (2012) when

establishing the impact and social transformation" as a guideline of university extension is a social reconstruction , which refers to a political character (BATISTA DE GOD, 2018).

The changes in society must be accompanied by the knowledge generated in the universities, from the activities developed in the articulation of teaching with research and extension, which gives the HEIs an overview of social reality.

3.2 Indicator II - Institutional Policies within the scope of the Course

In the analysis of indicator II, the courses obtained a concept equal to four, which characterizes that all of them meet "very well" the institutional policies within the scope of the course (Figure 6).

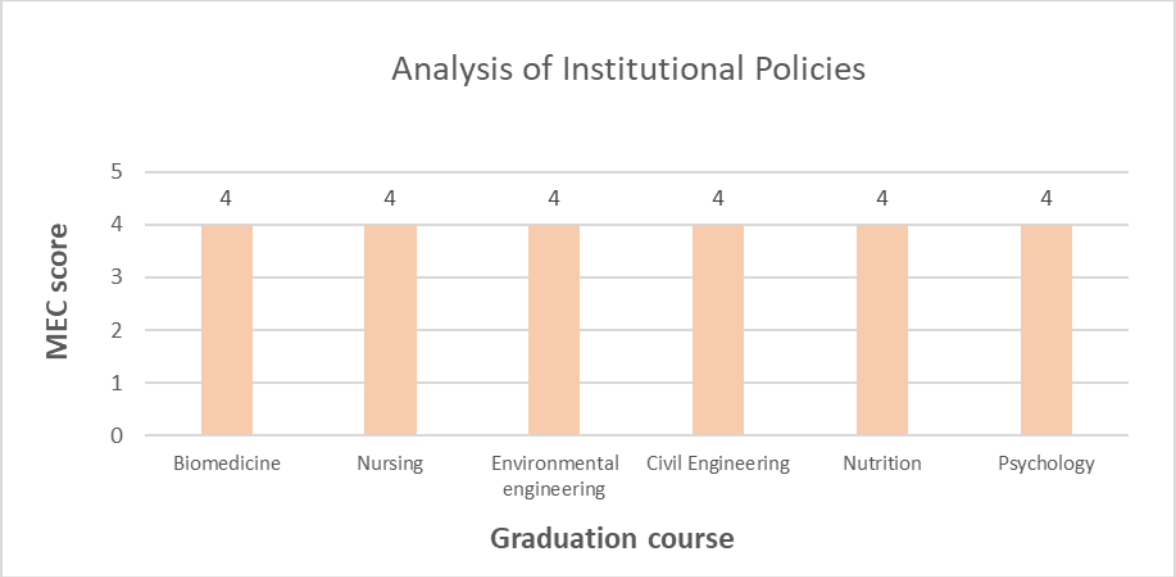

Figure 6 - Indicator II - Analysis of Institutional Policies.

It indicates that there are institutional policies for teaching, research and extension and that the mechanisms for implementation are included in the PPCs. However, this does not guarantee that there is articulation between teaching, research and extension. For higher education to comply with the tripod that sustains it, it is necessary that methodologies, projects and activities present in the entire curriculum be present in institutional policies and that evidence the interdependence of research and extension teaching in the formation of the student. Generally, curricula do not address professional practical reality, generating uncertainty and conflicts (SCHÖN, 2000). Hence arises the need for curricula to promote reflective training that gives them autonomy to use knowledge for their own benefit and for the benefit of others.

3.3 Indicator III - Course Objective

Regarding indicator III, which refers to the objectives of the course, the Biomedicine and Psychology courses obtained a concept equal to five, with these two courses being the courses with the highest scores. The Nursing course obtained a concept equal to four and Environmental Engineering, Civil Engineering and Nutrition obtained a concept of three, as shown in Figure 7.

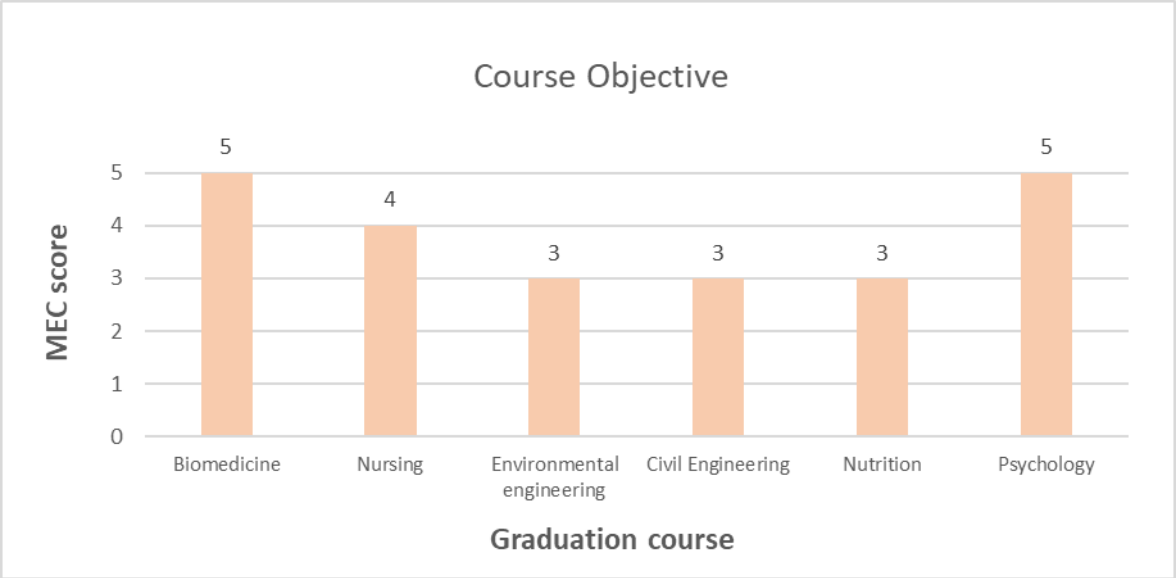

Figure 7 - Indicator III - Course Objective

The biomedicine and psychology courses present excellent coherence, in a systemic and global analysis, with the aspects: professional profile of the graduate, curriculum structure and educational context, focusing on the tripod: teaching, research and extension. The course objectives, described in the PPC, must always align with the professional profile of the graduate, as well as with the course's curricular structure. In this indicator, it is possible to identify the profile of the professional formed by the course in question, whether they will be thinking professionals or just reproducers of the content presented to them during the course. The articulation of teaching, research and extension enables the experience of practice and enables the construction and reconstruction of new knowledge (COSTA, 2018). The extension is based on a dialogic interaction capable of promoting changes in the community that will strengthen the student's learning process while giving them the opportunity to practice the theories studied in the classroom. In this sense, it also promotes changes in the university towards the reduction of social injustices and the promotion of knowledge democracy (FORPROEX, 2012).

The inseparability of teaching, research and extension is characterized by the dimensions of interdisciplinarity and bilaterality between university and community (COSTA, 2018). Interdisciplinarity promotes the interaction of concepts and models in structuring the work of actors in the extension process. Bilaterality favors the democratization of knowledge, making the community part of the process of social transformation (CORRÊA, 2003). Therefore, these dimensions coexist, being at least institutionally necessary. When this does not occur, it weakens in everyday life and then fragments in which the university extension does not materialize with the student's performance in the community.

3.4 Indicator IV - Profile of the Graduated Professional

As for indicator IV, which assesses the profile of the graduating professional, all courses obtained a concept equal to four, characterizing that all of them meet this requirement “very well” (Figure 8).

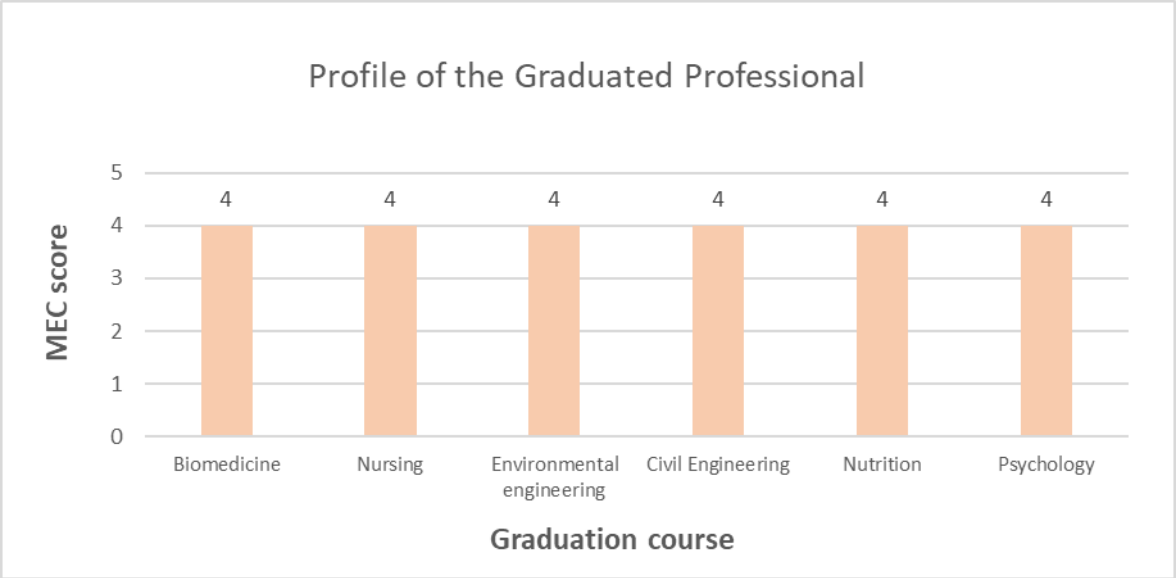

Figure 8 - Indicator IV - Profile of the Graduated Professional

Interdisciplinary, one of the necessary conditions for the inseparability of teaching, research and extension, promoting interprofessionality, which already places the student in the scenario of the labor market that requires an interactive performance of various areas and professions.

The interaction between groups and knowledge where there is a flow in a coming and going of knowledge, lacks participatory methodologies placing the student as a protagonist, will enable him to use his acquired knowledge in favor of solving society's problems: a primordial function of the sciences.

When the university's role in society and before science is based on a dialogic interaction with different groups and sectors, there is a gain for both parties with the exchange of knowledge involving everything from empirical knowledge to scientific knowledge. This interaction between the university and the community takes place in a participatory way, which favors the learning process by providing the student with the protagonist role in the construction and reconstruction of their knowledge.

The confrontation between the reality of the student and the reality of the community, through Extension projects, allows the promotion of applying in practice what is learned in the classroom. In this way, the community enjoys the benefits of science and the main actor – the student, wins by reinforcing their technical training and humanistic spirit while "...teaches what they learn and learns what they are teaching (CORA, 2007).

3.5 Indicator V - Curriculum Structure

Regarding the analysis of indicator V, which assesses the course's curricular structure, the Biomedicine, Nursing, Nutrition and Psychology courses obtained a concept equal to four and the Environmental Engineering and Civil Engineering courses obtained a concept equal to three (Figure 9). Indicator V considers, among other aspects, the approach to content relevant to Environmental Education, Human Rights Education and Ethnic-Racial and Indigenous Relations Education policies, promoting the articulation between teaching, research and extension. However, the Anísio Teixeira-INEP National Institute of Educational Research Studies Assessment Instrument for On-site and Distance Undergraduate Courses does not make it clear how to highlight the articulation between teaching, research and extension

with the approach of these transversal contents.

Evidence of methodologies and activities present in the curricula would be necessary to guarantee the student a deepening of the aforementioned aspects, directing them to the articulation of the tripod that sustains higher education.

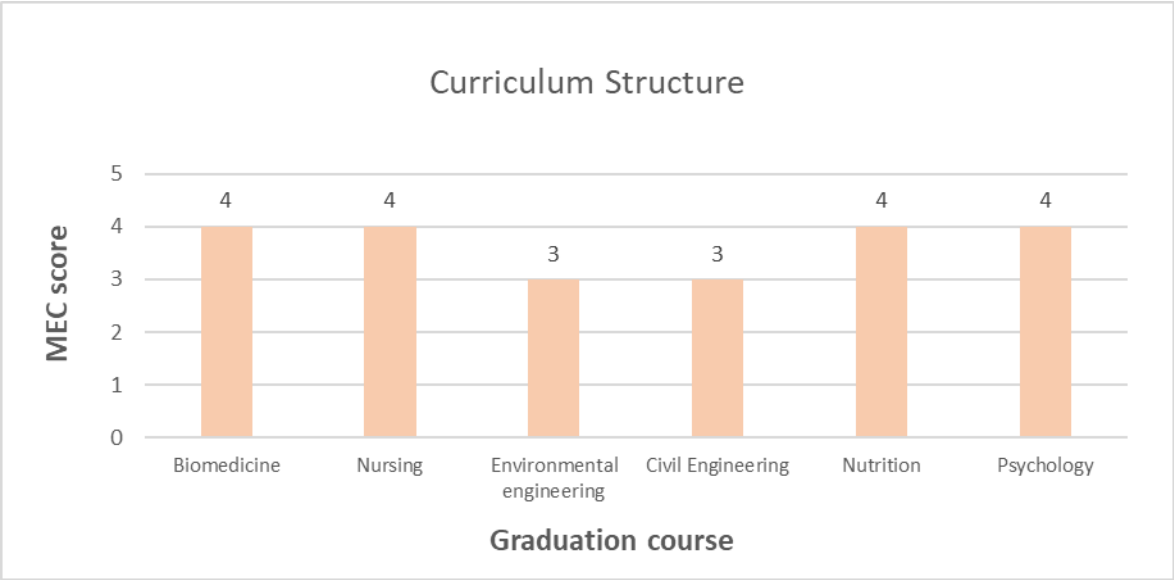

Figure 9 - Indicator V - Curriculum Structure

The inseparability of the tripod that sustains higher education consists of the transmission of known and systematized knowledge through teaching, with research being responsible for the construction of new knowledge culminating in the materialization of this knowledge through extension. This process is fed back when it generates new knowledge in a dialogic iteration between university and community (MARSIGLIA, 2007; DOS SANTOS, 2021.).

In order for the articulation between the tripod that sustains higher education to occur, it is essential to perceive the feedback of the pillars of the aforementioned tripod, because if the research does not support the extension, and this does not feed the research with new knowledge, it incurs the error of not applying to reality (PRATES, 2017; DE SOUSA, 2019.). Discussions and legal frameworks in themselves do not guarantee the effectiveness of inseparability, as in the case of funding agencies that require the direction of projects categorizing them into teaching, research or extension (COSTA, 2022.).

Brazilian higher education, Cartesian and imposing, does not allow a curricular structure for the exercise of citizenship by the graduate. The fragmentation of teaching, research and extension with origins in the military dictatorship that followed the model of the North American university trained professionals for the market with only technical skills not applicable to the effective change of social reality (BOMBARDA, 2019).

3.6 Indicator VI - Curriculum Contents

As for indicator VI, which assesses curricular contents, the Biomedicine course obtained a concept of five, the Nursing, Civil Engineering, Nutrition and Psychology courses obtained a concept of four and the Environmental Engineering course received a concept equal to three (Figure 10).

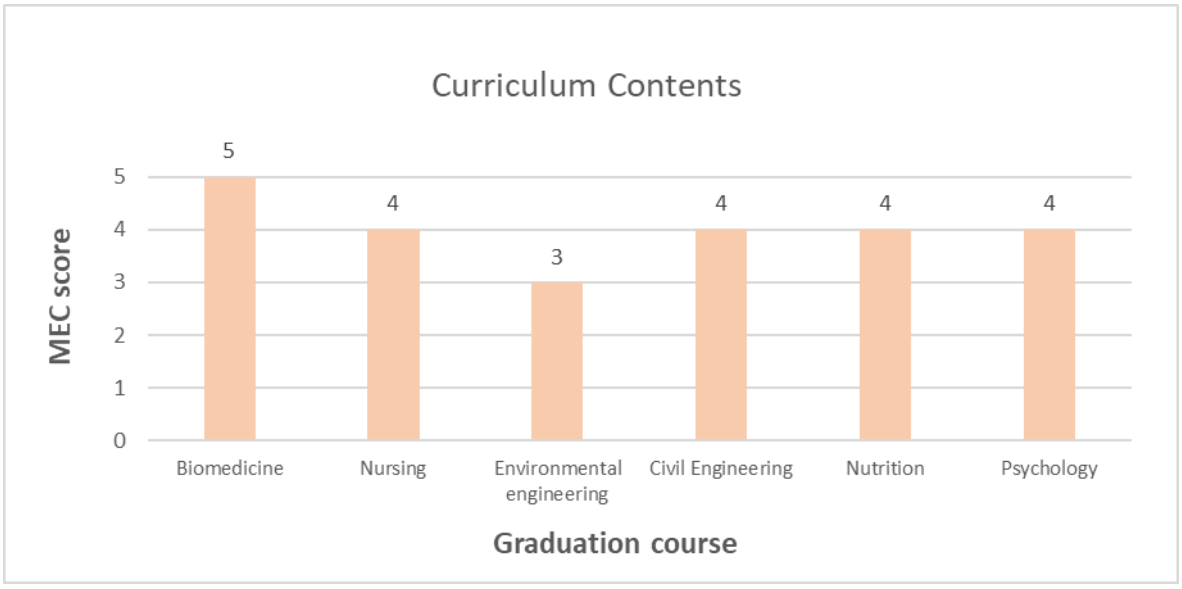

Figure 10 - Indicator VI - Curriculum Contents

Indicator VI considers, for the formation of the profile of the graduates, the assessment of aspects regarding "updating, accessibility, adequacy of working hours (in hours), adequacy of the bibliography, approach to content relevant to environmental education policies, human rights education and education of ethnic-racial relations and for the teaching of Afro-Brazilian, African and indigenous history and culture, focusing on the tripod: TEACHING, RESEARCH AND EXTENSION". However, INEP's own course evaluation instrument does not establish that the aforementioned aspects should be implemented with a focus on the aforementioned tripod, but in an articulated way. What happens is the fulfillment of the curricular contents worked in a dissociated way. Therefore, the Biomedicine course complies with what is required in Indicator VI, but does not guarantee that the much-discussed articulation will occur there.

3.7 Indicator VII - Methodology

As for indicator VII, which evaluates the methodology, it shows that all courses obtained a concept equal to three, which characterizes, according to the INEP course evaluation instrument, that all of them satisfactorily meet the required methodology (Figure 11).

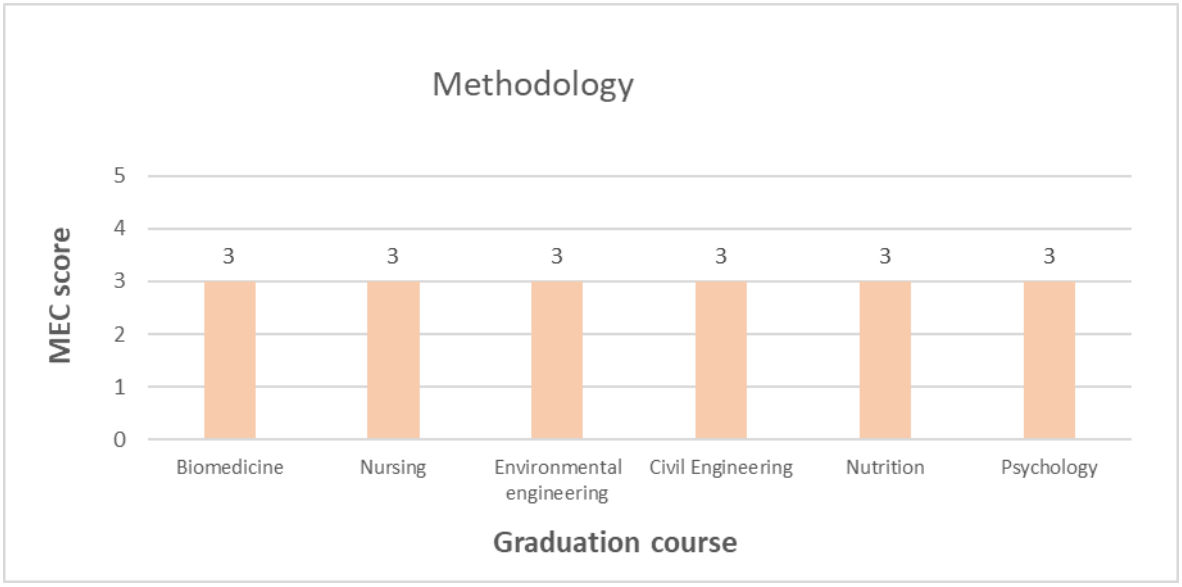

Figure 11 - Indicator VI - Methodology

It follows that the methodologies applied in the analyzed HEI courses are included in the Institutional Development Project - PDI, from which all PPCs are built and therefore, there is a similarity in the form of content presentation in all analyzed courses.

However, the methodologies mentioned above in the PDI and PPCs of the courses do not guarantee the articulation of the tripod that supports higher education, as they do not direct the knowledge of teaching, research and extension in an associated way. Since the extension can bring a rich experience accumulated when it comes to teaching, as it causes the displacement of the orthodox teacher-student pedagogical structure to the student-community pedagogical structure, creating a new concept for higher education with the teacher acting as co-participant, advisor, educator, tutor and with the resignification of the concept of educator (EIDT, 2021). INEP could include more clearly which methodologies can promote the discussed articulation between research, teaching and extension, enabling a view of the interrelationship of content of the disciplines, so that the student can develop in himself skills to solve everyday problems in which you will be inserted as a professional in the future.

3.8 Indicator VIII - Complementary Activities

As for indicator VIII, which assesses complementary activities, the courses obtained a concept of three, characterizing that all of them satisfactorily meet this requirement (Figure 12). According to the INEP course evaluation tool, a grade of three in the evaluation of this item will be assigned when "Complementary activities are institutionalized and consider the workload, the diversity of activities and ways of taking advantage of it, and adherence to general training" of the student, constant in the PPC" (INEP, 2017). Complementary activities are understood to be those that will complement the contents contained in the curricula. However, these complementary activities in the way they are evaluated by INEP do not guarantee the articulation between teaching, research and extension. Thus, it does not allow the student to develop a critical and analytical spirit, which occurs when he participates in scientific initiation, strengthening the contents learned in the classroom, corroborated by research culminating in social responsibility representing the extension.

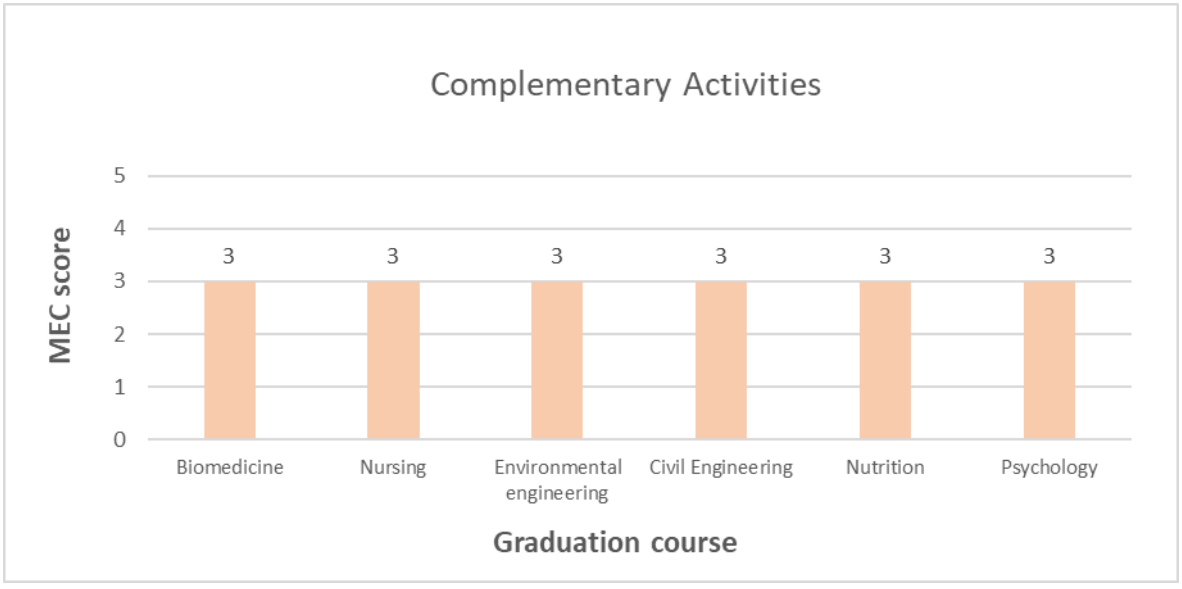

Figure 12 - Indicator VI - Complementary Activities

Among the methodologies mentioned in this work to articulate research, teaching and extension, one can make use of complementary activities, always related to the principles of CI, which enable a vision of the interrelationship of contents from various disciplines, so that the student, can develop skills to solve everyday problems in which the student will be inserted as a professional, in the future.

Extracurricular or non-mandatory activities are considered: participation in monitoring, scientific initiation, extension projects, study and research groups, in student representation bodies, in scientific congresses and events, paid or unpaid internships, among others (BARDAGI AND HUTZ, 2012; FIOR AND MERCURI, 2009). Among these activities, monitoring, scientific initiation and extension are the ones that provide the opportunity to explore aspects of training that are often not considered by the curriculum of undergraduate courses (TEIXEIRA et al., 2008). However, extension activities articulated with teaching and research should not be considered only extracurricular activities, since they are part of the tripod that sustains higher education and, therefore, are inseparable.

3.9 Indicator IX - Course Completion Work (CCW)

As for indicator IX, which assesses TCC, the courses obtained a concept equal to three, characterizing that all of them satisfactorily meet this requirement (Figure 13). The concept assigned to the courses indicates that the Course Completion Work is established and considers the workload, forms of presentation, guidance and coordination present in the PDI.

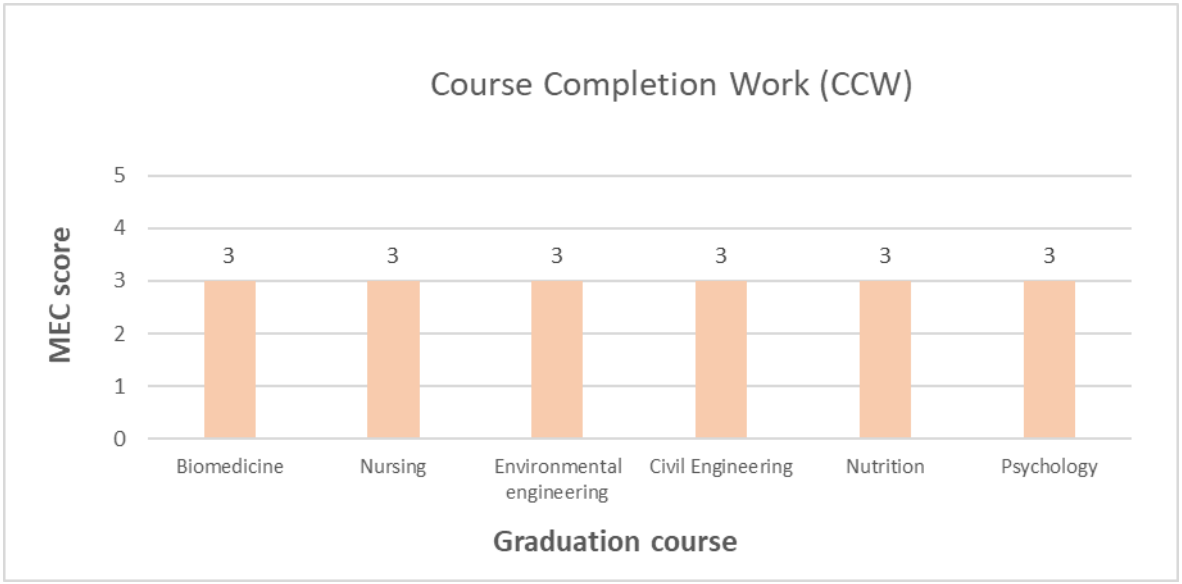

Figure 13 - Course Completion Work (CCW)

There is no indication in the INEP GRADUATION COURSE EVALUATION INSTRUMENT of articulation of teaching, research and extension in the conclusion work, which would be an opportunity to consolidate the precept of inseparability of teaching, research and extension. Since the course conclusion work must contemplate theory and professional practice with activities of synthesis and integration of knowledge and consolidation of research techniques, it becomes an important moment of consolidation of the principle of inseparability raised (QUINTANILHA, 2016).

The motivating instrument for students to participate in scientific initiation characterized by the articulation between teaching, research and extension is structured when this student, from the first period, comes into contact with research as an educational principle (DEMO, 2006) articulated with teaching and extension , already entering the path of scientific initiation. In view of this, it can be seen that once the articulation between teaching, research and extension has not been identified in the course evaluation instrument, there are no elements that motivate students to participate in scientific initiation programs, due to the lack of requirement from INEP itself.

6. Acknowledgement

To the HEIs of which we are a part, and mainly to the Nihon Gakko-PI University, and to FAMETRO, HEIs that are serious about training autonomous citizens with a critical and analytical sense to contribute to science in solving society's problems.

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