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Pedagogical strategies in the training of agricultural engineers

Estrategias pedagógicas en la formación de ingenieros agrónomos

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ABSTRACT

Studies on pedagogical strategies in agricultural higher education programs in Colombia are limited; hence, the need to identify the pedagogical strategies used by teachers in the training of agricultural engineers at the Faculty of Agricultural Sciences of the University of Nariño. To do so, information on the 54 subjects of the study plan was analyzed in the form "Thematic Programming by Subject" prepared by the teachers, and descriptive statistics were applied with a deductive approach. The investigation allowed the identification of the following variables: first, pedagogical strategies for knowledge transfer; second, forms of evaluation; third, origin of the bibliography recommended by teachers. The predominant strategy in the training of agricultural engineers is identified with the traditional paradigm in 36 subjects (66.7%), which correspond to the technical disciplines of the curriculum, and where the practical instruction of know-how and field research predominate. In addition, the close relationship between the programmatic contents and the development of competences in the practical field is confirmed. All the faculty in their pedagogical work still resort to the master class, a situation that demonstrates the prevalence of behavioral pedagogical strategies; likewise, most courses favor mixed evaluation; meanwhile, the individual evaluation is applied to a lesser extent, and most professors recommend bibliographical sources of foreign origin. The results constitute valuable information for the formulation of strategies aimed at strengthening the teaching-learning processes and improving the quality of Higher Education.

Keywords: evaluation; literature; master class; rural practices; study plan; technical subjects

RESUMEN

Los estudios sobre las estrategias pedagógicas en programas de educación superior agrícola en Colombia son escasos; de allí, surgió la necesidad de identificar las estrategias pedagógicas que utilizan los profesores en la formación de ingenieros agrónomos en la Facultad de Ciencias Agrícolas de la Universidad de Nariño. Para ello, se analizó información de las 54 asignaturas del plan de estudios, mediante los formularios "Programación Temática por Asignatura" elaborados por los profesores y se aplicó la estadística descriptiva con enfoque deductivo. La indagación permitió identificar las siguientes variables: Primero, estrategias pedagógicas para la trasferencia del conocimiento; Segundo, formas de evaluación; Tercero, origen de la bibliografía recomendada por los profesores. La estrategia predominante en la formación de ingenieros agrónomos se identifica con el paradigma tradicional en 36 asignaturas (66,7%) que corresponden a las disciplinas técnicas del plan de estudios y donde predominan la instrucción practica del saber-hacer y la investigación de campo; además, se confirma la estrecha relación entre los contenidos programáticos con el desarrollo de competencias en el terreno práctico. La mayoría de los profesores en su quehacer

pedagógico aún utiliza la clase magistral, demostrando una preferencia por estrategias pedagógicas conductistas y en la mayoría de las asignaturas predomina la evaluación mixta sobre la individual, y es común que los profesores recomienden fuentes bibliográficas extranjeras. Estos resultados brindan información valiosa para mejorar los procesos de enseñanza aprendizaje y la calidad de la educación superior.

Palabras clave: asignaturas técnicas; bibliografía; clase magistral; evaluación; plan de estudios; practicas rurales

INTRODUCTION

The concept of "education" is multifaceted and context-dependent, varying based on stakeholder perspectives, including those of educators, students, administrators, graduates, and society at large. Its interpretation is intrinsically linked to its contextual implementation—where, how, for what purpose, and when it occurs. From a formal standpoint, its definition is rooted in fundamental principles and sectoral public policies. In Colombia, the 1991 Political Constitution (Art. 67) recognizes education as a fundamental right and a public service aimed at facilitating access to knowledge, science, technology, and cultural values (Constitución Política de Colombia, 1991). For its part, Law 115 (Art. 1) of 1994 conceives education as a continuous process of personal, cultural, and social development, grounded in a comprehensive understanding of the human person, their inherent dignity, rights, and responsibilities. (Congreso de la República de Colombia, 1994).

The conceptualization of education is inherently shaped by the interpersonal dynamics among stakeholders within training processes, necessitating a critical examination of its scope and limitations within educational institutions. In academic settings, the relationships that educators establish with students and hold significance relevance; especially the pedagogical strategies employed in the teaching and learning processes, where the educator acquires an important role in the attainment of educational objectives.

Anijovich & Mora (2009) define pedagogical strategies as the set of decisions made by educators to guide instruction and foster student learning. This definition encompasses two interconnected dimensions: reflection, which involves thoughtful planning, and action, which entails the implementation of those plans. Quintar (2008) highlights the complex role of educators, posing the question: "What are we currently doing as educators in relation to the formation of subjects?" This question calls for reflection in the face of the new challenges, the opportunities of educational trends, and the demands of the community, where learning has become increasingly complex, that is, multidimensional (Calvache, 2013).

Palacios (2023), in a study examining pedagogical strategies within an agronomy program in Lima (Peru), defines these strategies as the interactive actions undertaken by both teachers and students to facilitate meaningful learning in agricultural sciences. This framework encompasses student learning strategies and teacher instructional methodologies, operating within a complex interplay of disciplinary knowledge, institutional contexts, environmental factors, and the unique characteristics of both student and teacher populations. Effective implementation of pedagogical strategies, essential for optimal student learning outcomes, relies heavily on the teacher's creative application of these tools to foster the development of essential skills, values, and competencies.

Posner (2001) assures that it is essential that teachers know about pedagogy to develop a competitive teaching practice. Consequently, intentional instructional design enables a transformative educational process wherein students cultivate critical thinking and knowledge construction rather than rote memorization.

Consequently, each Higher Education Institution (HEI), and its respective academic programs articulate a distinct philosophy regarding professional development.

Within this framework, pedagogical strategies assume critical importance, positioning educators as key agents who must engage in reflective practice concerning their instructional methodologies and classroom implementation (Parra-Rincón, 2006).

However, studies into classroom curricular dynamics and the mechanisms by which knowledge translation occurs within agricultural training programs remain limited. Consequently, Higher Education Institutions (HEIs) must implement robust mechanisms for the identification, evaluation, and enhancement of pedagogical strategies employed by educators in the dissemination of knowledge. In this context, since the enactment of Law 30 of 1992, quality assurance models for Higher Education, as established by the National Accreditation Council (CNA), have assumed a prominent role in institutional self-assessment processes. These models facilitate a systematic examination of pedagogical practices, aligning to ensure adherence to established quality guidelines within university education.

In alignment with the aforementioned quality assurance frameworks, the University of Nariño has implemented the Information and Quality Management System (SIGC), designed to optimize the core operational processes of support, monitoring, and evaluation within its teaching-learning framework. As part of its strategic follow-up mechanisms for these core processes, the institution conducts periodic surveys of students designated as “Satisfaction Surveys” (SE), which incorporate assessments on the curricular dynamics within the academic programs.

Data regarding the curricular practices within the Agricultural Engineering Program (AEP) were collected through pre-designed questionnaires completed by faculty members of the University of Nariño. The analysis of these data facilitated the identification and evaluation of: (1) pedagogical strategies employed by AEP instructors, (2) assessment methodologies utilized in their instructional delivery, and (3) the sources of recommended literature used to support the programmatic content of the courses. Consequently, the findings of this study provide critical insights for the development and implementation of evidence-based strategies aimed at enhancing the ongoing quality assurance of higher education within the AEP curriculum.

MATERIAL AND METHODS

The research was conducted in the AEP Faculty of Agricultural Sciences (FACIA) at University of Nariño-Colombia using descriptive statistics with a deductive approach as a reference.

Data were primarily derived from the analysis of 54 subject syllabi within the AEP curriculum, as documented in the ‘Thematic Programming by Subject’ forms (FOA-FR-07). These syllabi, developed by faculty and accessible to students, provide critical, periodic input to the Quality Management Information System (SIGC). The forms detail instructor identification, course title, semester,

contact hours, learning objectives, instructional methodologies, assessment criteria, credit-based content distribution, topical coverage, evaluation formats, and recommended literature.

Student Satisfaction Surveys (SS) were analyzed as a primary evaluation instrument; additionally secondary data sources, including thematic literature and institutional policy documents, were consulted to provide contextual information. The analysis focused on the following variables: 1. Pedagogical strategies employed by teachers in delivering the AEP curriculum content, 2. Evaluation methods applied to students, and 3. The sources of recommended literature provided by instructors (Table 1).

Table 1. *Evaluated variables, Agronomic Engineering Program-University of Nariño*

Variable	Denomination	Strategies/features
1. Pedagogical strategies*	Traditional Active-Participatory Mixed	Master class, reading control, laboratories, exhibitions and bibliographical research. Workshops, group work, debates, field research and problem analysis. Uses traditional strategies and Active-Participatory.
2. Evaluation methods	Individual CIuster Mixed	It applies to every student. It is applied in a group. It is applied individually and in groups.
3. Origin of the bibliography	National International	Corresponds to national texts. Corresponds to foreign texts.

Source: *Classification proposed by Goyes, Uscategui & Díaz del Castillo (1998). Adapted to this investigation.

RESULTS AND DISCUSSION

Pedagogical strategies

The analysis revealed that a hybrid pedagogical approach was the predominant instructional strategy employed within the AEP curriculum, while traditional methods were utilized to a lesser extent (Table 2).

Table 2. *Pedagogical strategies used by AEP teachers, University of Nariño*

Teaching strategy	Number of subjects	(%)
Traditional (T)	18	33.3
Mixed (M)	36	66.7
Total	54	100.0

Source: self-made.

Hybrid pedagogical approaches were predominantly implemented in technical courses, with increased application observed from the fourth semester onward. (Table 3).

Table 3. *Subjects that register mixed pedagogical strategies, Agronomic Engineering Program -University of Nariño*

Semester	Number of subjects	Name of the subjects
1	2	Introduction to Agricultural Sciences, Botany.
2	1	Ecology.
3	4	Geomorphology and Classification, Agroclimatology, Topography, Plant Propagation.
4	4	Plant Soil Relationship, Plant Physiology, Mechanization, GIS and Modeling.
5	3	Comprehensive Soil Fertility, Irrigation and Drainage, Entomology.
6	4	Integrated Pest Management, Plant Pathology, Soil Management and Conservation, Crop Physiology.
7	7	Agricultural Economics, Epidemiology, Plant Breeding, Integrated Crop Management I, Plant Propagation, Weeds, Project Management.
8	6	Integrated Crop Management II, Formulation and Evaluation of Projects, Extension and Rural Development, Prairie Management, Crossing Crops, Fertigation.
9	4	Agricultural Administration and Marketing, Integrated Crop Management III, Marketing and Business Management, Fruit Growing.
10	1	Internship.
Total	36	

Source: self-made.

A strong correlation was observed between the disciplinary contents of the Agronomic Engineering curriculum and the pedagogical strategies employed by instructors in the teaching and learning process. These strategies primarily involved collaborative activities, including workshops, group projects, discussions, field investigations, and problem-based analysis. In this sense, Palacios (2023) corroborated the use of these pedagogical strategies in an agronomy program in Lima (Peru). Additionally, Palacios (2023) emphasized that collaborative activities, field investigations, and problem-based analysis enhance students' practical agronomic skills in crop management. Similarly, Santa (2017) highlighted the facilitative role of practical application as a didactic strategy in agricultural disciplines.

Conversely, traditional instructional methods were employed in the remaining 18 courses, primarily within the basic training cycle. This aligned with Castaño & Álvarez (2019) who observed that in the Agronomic Engineering programs often rely on a behaviorist model, characterized by 'the setting and control of objectives and expected achievements through the segmented transmission of knowledge.

These traditional methods, including lectures, reading assessments, laboratory exercises, presentations, and literature reviews, were used in conjunction with lectures. They were predominantly applied in foundational courses spanning the first through fourth semesters, and in select courses within the fifth, sixth, and ninth semesters (Table 4).

Table 4. *Subjects that register traditional pedagogical strategies, Agronomic Engineering Program- University of Nariño*

Semester	Number of subjects	Name of the subjects
1	4	Cell Biology, Inorganic Chemistry, Basic Mathematics, Technical Writing.
2	4	Organic Chemistry, Differential Calculus, Plant Taxonomy, Hydrophysics.
3	2	Biochemistry, Integral Calculus.
4	2	Hydraulics, Biostatistics.
5	3	Experimental Design, Genetics, Microbiology.
6	2	Molecular Biology, Research Methodology.
9	1	Induction to Business Practice.
Total	18	

Source: self-made.

Among the traditional instructional methods, the lecture format was consistently employed across all subjects. Alarcón & Romero (2013) in their curricular analysis of Agronomic Engineering and Agronomy programs in Colombia, confirmed this trend, stating that in both programs, faculty most frequently employed the group lecture format as their primary instructional strategy. Similarly, Anijovich & Mora (2009) acknowledged the prevalence of this expository method. Hidalgo (2007) noted the persistence of lectures in many classrooms and recommended gradual pedagogical shifts towards social knowledge construction processes to foster student autonomy.

Goyes *et al.* (1998) corroborated the prevalence of the lecture format as a methodological strategy in higher education, attributing its persistence to its cost-effectiveness in expanding educational coverage. Zepeda & Lacki (2003) further argued that these traditional pedagogical methods used by educators can have a significant multiplier effect, on the future performance of professionals. However, as noted by Klein (cited in Olcott & Schmidt, 2002), students trained under this modality may retain only approximately five percent of the lecture content one day post-session. Nevertheless, the lecture format retains some utility within instructional practices.

In this regard, Solari (2023) states that, University agricultural education has relied on lectures to transfer knowledge. Cortes (2004) advocated that teachers should explore novel pedagogical modalities to enhance the training of agricultural professionals through discourse and content integration. For its part, Corredor *et al.* (2007) identified a deficiency in pedagogical and didactic training among faculty in Agronomic Engineering and Agronomy programs, suggesting this as a potential factor contributing to lower performance in state examinations, a concern prevalent in general higher education. Finally, Olivares and Hernández (2018) affirmed that society demands a creative agricultural engineer capable of addressing the problems in their field of training. Hence, the previous arguments underscore the need for instructors to reassess and diversify their current pedagogical strategies in agricultural professional training.

Student perceptions regarding pedagogical strategies. Although the previous opinions demand a change of pedagogical strategies, the results of the Student Satisfaction Surveys SS indicate that a significant majority of the AEP students reported satisfaction with the instructional strategies employed by

faculty in delivering course content. Conversely, a minority of students suggested potential areas for improvement (Table 5).

Table 5. *Students' perception concerning the pedagogical strategies used by the faculty from the Agronomic Engineering Program-University of Nariño*

Perception scale	Excellent	Good	Appropriate	Poor	Very poor	NA/NR
Percentage	14	60	22	3	1	0

Source: University of Nariño (2018).

Conversely research conducted related fields indicates that students in Agricultural Engineering and Agronomy programs often exhibit a deficient understanding of agricultural professional roles which can negatively impact academic performance and achievement (Corredor *et al.* 2007). Furthermore, Martínez-Royert & Pájaro-Martínez (2020) in a study from an agricultural program, reported that the majority of students favored traditional learning strategies with a lesser extent, for hybrid approaches.

Gros (2001) cautioned that the reevaluation of innovative learning environments is essential to address existing pedagogical deficiencies including attention, motivation, learning transfer, and memorization. Loaiza Zuluaga (2018) further recommended that institutions and instructors reconsider traditional curricular practices and transcend disciplinary boundaries by adopting context-sensitive pedagogical strategies to foster comprehensive student development. Consequently, these findings extend beyond mere statistical observations aiming to encourage reflective practice among educators and their work. In this regard, Corredor *et al.* (2007) emphasized that another identified weakness is the limited pedagogical training of faculty, a widespread issue in higher education that becomes particularly evident when competency development is established as a primary objective.

Course assessment methodologies

The analysis revealed that the majority of courses employed a hybrid assessment approach, combining individual and group evaluations, while individual assessment was utilized to a lesser extent (Table 6).

Table 6. *Evaluation methods applied by teachers, Agronomic Engineering Program-University of Nariño*

Evaluation Type	Number of subjects	(%)
Individual	14	26
Mixed	40	74
Total	54	100

Source: self-made.

The implementation of hybrid evaluation methodologies was observed to increase from the third semester onward, coinciding with a greater emphasis on technical disciplinary courses within the curriculum. In these courses, the theoretical components of these subjects were typically assessed individually, while the practical technical components were evaluated collaboratively (Table 7).

Table 7. *Subjects that register mixed evaluation, Agronomic Engineering Program-University of Nariño*

Semester	Number of subjects	Name of the subjects
1	1	Introduction to Agricultural Sciences.
3	4	Geomorphology and Classification, Agroclimatology, Topography, Plant Propagation.
4	6	Hydraulics, Biostatistics, Soil-Plant Relationship, Plant Physiology, Mechanization, Geographic Information Systems and Modeling.
5	6	Comprehensive Soil Fertility, Irrigation and Drainage, Entomology, Experimental Design, Genetics, Microbiology.
6	6	Integrated Pest Management, Molecular Biology, Phytopathology, Soil Management and Conservation, Research Methodology, Crop Physiology.
7	7	Agricultural Economics, Epidemiology, Plant Breeding, Integrated Crop Management I, Plant Propagation, Weeds, Project Management.
8	6	Integrated Crop Management II, Formulation and Evaluation of Projects, Extension and Rural Development, Grassland Management, Cross-Crops, Fertigation.
9	4	Agricultural Administration and Marketing, Induction to Professional Practice, Marketing and Business Management, Fruit Growing.
Total	40	

Source: self-made.

It is noteworthy that the contents of these courses reflect a strong correlation with the complex dynamics of the agricultural sector, characterized by the convergence of natural, environmental, cultural, and socioeconomic factors. Consequently, active-participatory field activities serve as a crucial source of knowledge and information, enabling students to apply classroom-acquired theoretical concepts in practical settings. Individual evaluation assessment was primarily used in introductory semesters corresponding to courses with a predominantly theoretical focus within the basic training cycle. Additionally, individual assessment was employed in the Integrated Crop Management III course (ninth semester) and the Business Internship course, the sole course within the final semesters (Table 8).

Table 8. *Subjects with individual evaluation, Agronomic Engineering Program-University of Nariño*

Semester	Number of subjects	Name of the subjects
1	5	Cell Biology, Inorganic Chemistry, Basic Mathematics, Botany, Technical Writing.

Semester	Number of subjects	Name of the subjects
2	5	Organic Chemistry, Differential Calculus, Plant Taxonomy, Hydrophysics, Ecology.
3	2	Biochemistry, Integral Calculus.
9	1	Integrated Crop Management III.
10	1	Business Internship.
Total	14	

Source: self-made.

The Institution supports academic evaluation through a regulatory framework of the Undergraduate Student Statute. This framework refers to it as a collection of procedures and actions aimed at evaluating the extent to which the student has: a) fulfilled the learning objectives of the subject or academic activity; b) enhanced their learning abilities; and c) internalized and applied the expected values. (Art. 89). It should be noted, according to the Institutional Evaluation Programs (Universidad de Nariño, 2018), teachers fully comply with the regulations, agreeing with students on evaluation aspects such as schedule, method, number, and percentage valuation, as outlined in the micro curriculum of each subject.

According to the previously mentioned arguments, collective evaluation is the method preferred by teachers to examine the thematic content of their subjects; however, individual assessment is still practiced to a lesser extent, especially due to the inherent characteristics of the theoretical contents of the basic subjects. This topic, in particular, even with the importance it implies for curricular development, has not been addressed in depth, and there are no known references to compare the results obtained; hence, it is important to undertake formal studies on this topic and propose improvements.

Origin of the bibliography recommended by teachers

The investigation allowed to establish that all the subjects of the AEP study plan include bibliographic consultation as a complementary curricular activity for the development of its programmatic contents. Regarding the results, there is a substantial preference for authors of foreign origins; meanwhile, the inclination for the bibliography of national origin is ostensibly lower (Table 9).

Table 9. *Prevalence of the bibliography recommended by professors, Agricultural Engineering Program - University of Nariño*

Bibliography prevalence	Number of subjects	(%)
National	14	26
International	40	74
Total	54	100

Source: self-made.

The study plan continues to reflect a strong technical orientation, drawing largely from international knowledge and curricular models—a trend shared by most agricultural higher education programs in the country. This situation

is rooted in the framework established by Law 115 of 1994, which can be summarized as follows:

The incursion of agricultural programs arose after the 1950s of the 20th century, in the Universities of Nariño, Tolima, and Caldas, among others, and the dominance exercised by foreign missions in agricultural curricula in Colombia and Latin America was evident under the pattern of the Green Revolution. In addition to the financial aid that strengthened Higher Agricultural Education in Colombia, it also meant the establishment of development models based on the intensive use of agrochemical inputs, with enormous socioeconomic effects, which are barely dimensioned today (Torres-Martínez, 2014).

The analysis also reveals that in the subjects of Genetics in the fifth semester and Epidemiology in the seventh semester, the bibliography recommended is entirely foreign, and most other subjects also prioritize international sources. This behavior about the subjects of the basic training cycle, such as Mathematics, Chemistry, Botany, and Calculus, is obvious, considering that traditionally, the generation of knowledge has its origins in foreign cultures. However, its prevalence is also observed in disciplinary topics, among others, Comprehensive Soil Fertility, Irrigation and Drainage, Entomology, Microbiology, Integrated Pest Management, Molecular Biology, and Crop Physiology (Table 10).

Table 10. *Subjects with a prevalence of bibliography of international origin recommended by teachers, Agronomy Engineering Program - University of Nariño*

Semester	Subjects	National bibliography (%)	Foreign bibliography (%)
1	Cell Biology	40	60
	Inorganic chemistry	20	80
	Basic mathematics	10	90
	Botany	20	80
2	Organic Chemistry	10	90
	Differential calculus	10	90
	Plant Taxonomy	40	60
	Hydrophysics	10	90
3	Biochemistry	30	70
	Integral calculus	10	90
	Geomorphology/Classification	30	70
	Agroclimatology	40	60
4	Hydraulics	10	90
	Soil Plant Relationship	40	60
	Plant Physiology	5	95
	Mechanization	10	90
	GIS and Modeling	30	70
5	Comprehensive Soil Fertility	10	90
	Irrigation and drainage	15	85
	Entomology	20	80
	Experimental design	15	85
	Genetics	0	100
	Microbiology	25	75
6	Integrated pest management	30	70
	Molecular biology	20	80
	Phytopathology	30	70
	Soil Management/Conservation	10	90
	Investigation methodology	45	55
	Crop Physiology	20	80

Semester	Subjects	National bibliography (%)	Foreign bibliography (%)
7	Epidemiology	0	100
	plant breeding	30	70
	Weed science	20	80
	Projects management	30	70
8	Extension/Rural Development	30	70
	Prairie Management	30	70
	Crossbreeding of Crops	30	70
	Fertigation	30	70
9	Integrated Crop Management III	40	60
	Marketing/Business	30	70
	Management fruit growing	30	70

Source: self-made.

The situation reveals a lack of interest in content and knowledge of local, regional, and national origins and reveals a low degree of application for the development of its program content. On the other hand, the AEP study plan registers 14 subjects prioritize national bibliography, with Ecology, located in the second semester and Integrated Crop Management II, in the eighth semester having the highest proportion, in the subject of Internship, located in the last semester, the bibliography is clearly national (Table 11).

Table 11. *Subjects with prevalence of bibliography of national origin recommended by teachers, Agricultural Engineering Program, University of Nariño*

Semester	Subjects	National bibliography (%)	Foreign bibliography (%)
1	Introduction to Agricultural	60	40
	Sciences technical writing	60	40
2	Ecology	80	20
3	Topography	60	40
	Plant Propagation	60	40
4	Biostatistics	60	40
7	Agricultural Economics	55	45
	Integrated Crop Management I	60	40
	Plant Propagation	60	40
8	Integrated Crop Management II	70	30
	Formulation and evaluation of projects	55	45
9	Agricultural Administration and Marketing	60	40
	Induction to Professional Practice	60	40
10	Internship	100	0

Source: self-made.

As listed above, and as a recommendation, it is important to implement strategies to make visible the production of scientific knowledge of agricultural disciplines generated at the local, regional, and national levels, and that AEP teachers grant it greater relevance and applicability in their curricular dynamics.

CONCLUSIONS

The predominant pedagogical strategy in the training of agricultural engineers favors the indistinct use of traditional and active-participatory strategies. For its part, the traditional teaching paradigm is used with greater emphasis on subjects of the basic training cycle in the initial semesters of the Agronomic Engineering career. Most of the subjects of the study plan favor mixed evaluation and, to a lesser extent, individual evaluation is used, which, for the most part, corresponds to the subjects of the basic training cycle located in the initial semesters of the Agronomic Engineering Program. The influence of literature and foreign patterns in the adoption of knowledge that directs the instrumental character in the training of agronomists is overwhelming. The directors of the Agricultural Engineering program recommend to promote scenarios for reflection among teachers regarding the strategies used in the training processes and to support studies that allow, in the medium term, to undertake curricular reforms to improve the teaching-learning processes of agronomy.

CONFLICT OF INTEREST

The authors declare that there is no conflict of interest.

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