Revista
Torreón Universitario
ISSN 2410-5708 / e-ISSN 2313-7215
Year 13 | No. 37 | June- September 2024

Competency-based teaching and quality of learning in Agroindustrial Engineering (UNAN - CUR Chontales)

Roberto Ariel Briceño Moraga
Dr. Management and Quality of Education.
MSc. Agricultural Economics; Professor UNAN - CUR Chontales, Department of Economics and Administrative Sciences.
https://orcid.org/0000-0001-9106-1391
abriceno@unan.edu.ni

Juan Gabriel Romero Moraga
Business Administration Lic.
MBA. Human Resources Management; UNAN - CUR Chontales, Department of Economics and Administrative Sciences
https://orcid.org/0000-0002-0125-9677
jromerom@unan.edu.ni

William René Pérez Aburto
Master in Agrotechnical Sciences, UNAN-CUR Chontales
Professor, Department of Science, Technology and Health.
https://orcid.org/0009-0008-7679-2063
william.perez@unan.edu.ni

Submitted on October 18th, 2023 / Accepted on May 23th, 2024
https://doi.org/ 10.5377/rtu.v13i37.18153

Keywords: Teaching-learning strategies, Competencies, quality of learning, Agroindustrial Engineering.

Education
SCIENTIFIC ARTICLES

ABSTRACT

The purpose of this research study is to analyze the impact of competency-based teaching on the quality of learning of students of Agroindustrial Engineering at the Regional University Center of Chontales, UNAN-MANAGUA, carried out in the first and part of the second semester of 2023. The methodology used is a quantitative, non-

experimental, cross-sectional study, with a correlational scope, since it examines the relationship between teaching-learning strategies based on competencies and the quality of learning in Agroindustrial Engineering, supported by documentary and field research. The population is composed of 5 teachers, including 3 staff and 2 hourly teachers. Data were collected through surveys and are presented in tables and figures, with frequencies translated into percentages to represent student responses. The findings reveal the need to improve infrastructure and teacher training in the Agroindustrial Engineering program at UNAN-CUR Chontales and highlight the effectiveness of active methodologies and ICT in student learning.

1. INTRODUCTION

UNAN-Managua has made notable efforts to improve academic quality through a series of actions, which have resulted in a curriculum that requires improvement.

This process of curricular transformation to develop competencies in the agroindustrial engineering major comes at a crucial moment, in which the rational use of natural resources, food security, and the search for solutions for the technification and addition of value to rural production; with the key agroexporting items that generate most of the country's income, are increasingly necessary issues to be addressed.

The purpose of this article is to analyze the relationship between teaching-learning strategies based on competencies and the quality of learning of agroindustrial engineering students at the Regional University Center of Chontales.

In this context, the performance level of agroindustrial engineering students is rigorously evaluated, using the criteria established by the competency-based curriculum.

This analysis can range from the evaluation of academic results to the understanding and effective application of knowledge, among other indicators that delineate educational quality.

The evaluation of this environment is crucial to understand how it can influence the effectiveness of competency-based strategies.

Finally, the teaching-learning strategies in the competency-based model are detailed, and the specific tactics that the Agroindustrial Engineering teachers use to facilitate the learning process of the students, all within the framework of competencies, are precisely described.

1.1. Characterization of the major

Agroindustrial engineering is a business major in the branch of engineering with a focus on manufacturing processes that deal with the transformation of raw materials of biological origin into intermediate and/or finished products for marketing and export. Its fields of action are food and non-food operations systems, agro-industrial quality and safety, sustainable

development and agro-industrial innovation, as well as agro-industrial supply and marketing. Agroindustrial engineering intervenes in the integration of manufacturing process systems with the use of new technologies to modernize the link of the productive and value chains, taking as a reference the raw materials of biological origin and consecutive transformation for the commercialization and export of products through the various branches of the food and non-food agroindustry.

1.2. Curriculum by Competencies in the Agroindustrial Engineering Major.

The process of curricular transformation to develop competencies in the agroindustrial engineering major began with a diagnosis that allowed to know the tasks that agroindustrial professionals perform in their different work activities. In this line, the curricular document of the agroindustrial engineering major at UNAN Managua (2021) states that: In 2007, a curricular diagnosis was carried out with agroindustrial companies and public and private entities, which revealed a majority demand for professionals with a profile in agroindustry, and in 2008 the first agroindustrial engineering major was opened in Chontales.

1.2.1. Competencies of the agroindustrial engineering curriculum.

The generic competencies established in the UNAN Managua curriculum are in accordance with the qualifications framework for Central American higher education (MCESCA as in Spanish), the result of the CSUCA study (2018). These generic competencies are established in the UNAN Managua curriculum document (2021).

1.3. Quality Apprenticeships

According to Johnson (2020), "quality refers to the excellence or degree of superiority of a product or service" (p. 45). In this sense, UNESCO (2005) states that the term quality is a relative measurement parameter, however, this concept has three elements in common, which are the need for relevance, equity of access and results, and adequate fulfillment of individual rights.

In this line, Chiavenato (2020) describes learning as "a basic process for the development of every person throughout his existence. And its main function is to adapt it in the best possible way to its environment while maintaining and ensuring its individuality" (p. 345).

Based on what UNESCO (2015) establishes in the 2030 Agenda, the quality of learning refers to the extent to which educational processes and learning experiences promote the comprehensive development of students and enable them to acquire knowledge, skills, abilities, and values that are relevant, effective and applicable to academic and practical situations.

1.4. Classroom climate

According to Uria (as cited in Torrego et. al., 2007, p.180); Chaux (2012, p.83); Lara et al. (2021, p.7) classroom climate is understood as the "working atmosphere and the quality of the relationship among students, and between teachers and students, in the classroom". According to Torrego et. al. (2007), four key elements are presented for the interpretation of classroom climate, being the organization of the classroom, the programming of contents and procedures, interpersonal relationships, and the teaching style.

1.5. Teaching-learning strategies

Teaching-learning strategies are methods, procedures, or resources that teachers and students use to facilitate the process of acquiring new knowledge in a meaningful, active, and collaborative way. In higher education, these strategies should be adapted to the specific situation of each professional field. These strategies should be designed to motivate, observe, analyze, express opinions, formulate hypotheses, seek solutions, and discover knowledge; therefore, teachers should organize the classroom as an environment for learning (Montealegre 2016).

In this line, Barriga and Hernández (2002) state that "Teaching strategies are procedures that the teaching agent uses reflexively and flexibly to promote the achievement of significant learning in students. (...) they are means or resources to provide pedagogical assistance" (p.141).

Likewise, Zavala and Zubillaga (2017) state that teaching strategies "are procedures and arrangements that teaching agents use flexibly and strategically to promote the greatest quantity and quality of meaningful learning in students" (p.12).

In the same vein, Anijovich and Mora (2010) state that:

> Teaching strategies are the set of decisions made by the teacher to guide teaching to promote student learning. They are general guidelines on how to teach disciplinary content, considering what we want our students to understand, why, and what for (p. 23).

Also, the authors emphasize that the teaching strategies that a teacher chooses and uses have an impact on:

- The content he/she transmits to the students
- The intellectual work they do
- The work habits, and the values that are put into play in the classroom situation
- The way of understanding social, historical, scientific, artistic, cultural, and other contents (p.24).

The following are some teaching strategies that emphasize the development of knowledge in three dimensions: knowing (concepts, facts, events, etc.), knowing how to do (procedures, practices, etc.), and knowing how to be (living together, valuing knowledge, etc.) and that are generally used by teachers of the Department of Technological Sciences and Health of the Regional University Center of Chontales, of the UNAN-MANAGUA (UNAN-CUR Chontales).

The case study involves presenting students with a real situation for analysis and reflection (Corredor et al., 2009). In contrast, the theoretical class is based on the verbal exposition of the teacher with a unidirectional direction toward the students (Puebla, 2015). On the other hand, laboratory work involves students performing practical demonstrations under the guidance of the teacher (UDLA, 2015).

Cooperative learning involves working in structured teams to solve specific tasks (Pimienta, 2012). Tutorials are directed by the teacher to support the student's learning process (UDLA, 2015). In problem-based learning, students seek solutions to problematic situations posed by the teacher, encouraging critical thinking and decision-making (UDLA, 2015).

Finally, the seminar consists of a presentation by the student, followed by discussion and debate, to develop research and critical thinking skills (Pimienta, 2012).

Learning strategies have the fundamental purpose of preparing the student to be an active agent in the construction of knowledge, both individually and collaboratively (Biggs, 1987, cited by Carrascal and Sierra, 2011). These strategies, motivated by curiosity and the need to solve real problems, allow the systematic construction of ideas based on concrete situations (Universidad Nacional Autónoma de Nicaragua, Managua, 2020).

Learning, according to Oviedo (2015), implies a change in behavior and an improvement in the student's personality. To achieve authentic and reflective learning, it is necessary to specifically address the modification of previous attitudes and behaviors, encouraging the formation of new and more effective ones, thus enriching the student's personality.

According to Barriga and Hernández (2002):

> A learning strategy is a procedure (set of steps or skills) and at the same time a psychological instrument that a student acquires and employs intentionally as a flexible resource, to learn significantly and to solve problems and academic demands. Its use involves a continuous decision-making activity, and metacognitive control and is subject to the influence of motivational, affective, and educational-social context factors (p.242).

Likewise, Paucar (2015) highlights that: "Learning strategies are procedures that a student follows reflexively, to perform a certain task and develop expected abilities and attitudes; as well as to build or reconstruct new knowledge" (p.45).

In this context, Valle et al. (1998, cited by Schneeberger, 2016) emphasize that if we understand that reaching the learning goal is a conscious process, then we can say that strategies are activities that are controlled by the student, as they will be executed, manipulated and controlled to achieve the stated objective and cannot be understood as routines executed automatically.

These strategies involve the selection and organization of information, review, and relation with previous knowledge, as well as techniques to maintain a positive learning climate (Schunk, 2012). In addition, they facilitate the process of encoding new material into long-term memory.

Learning strategies are executed voluntarily by the learner and can be classified into generic macrostrategies and specific microstrategies (Kirby, 1984).

Within these classifications, cognitive and metacognitive strategies are distinguished, each with their respective subcategories, such as review, elaboration, organization, and critical thinking strategies (Barriga and Hernández, 2002; Pintrich et al., 1991; Pintrich and García, 1993, cited by Carrascal and Sierra, 2011).

Metacognitive strategies comprise planning, control, and regulation processes, while resource management strategies include the organization of time and the study environment, effort regulation, collaborative learning, and help-seeking (De la Fuente and Justicia, 2003).

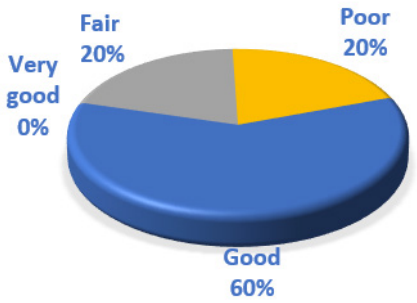
2. METHODOLOGY AND RESULTS

The present study was carried out using a quantitative methodology with a correlational scope, since it examines the relationship between teaching-learning strategies based on competencies and the quality of learning in the agroindustrial engineering major of the Department of Technological Sciences and Health of the Regional University Center of Chontales, of the UNAN - MANAGUA (UNAN - CUR Chontales). The study was carried out during the first and part of the second semester of 2023. The research was cross-sectional since the information on the study subjects was obtained only once at a given time. A documentary and field design was used to collect and analyze information. In this regard, Arias (2012) emphasizes that "field research is that which consists of collecting data directly from the subjects under investigation, or from the reality where the facts occur (primary data), without manipulating or controlling any variable, i.e., the researcher obtains the information but does not alter the existing conditions. Hence its character of non-experimental research" (p. 31).

The total sample of the study was composed of the 5 professors who teach directly in the major. The survey was used as an instrument to collect data.

Figure 1

Current situation of the technological infrastructure of the agroindustrial engineering major.



Note: Own data obtained from the survey.

The graph shows that although the Department of Technological Sciences and Health of the UNAN-CUR Chontales has space for agroindustrial equipment, it does not meet all the laboratory requirements. Sixty percent of the teachers consider the current situation to be good, but 20% see a need for improvement in infrastructure and equipment. In addition, the academic staff recognizes the need for continuous updating. A new building is being built for the development of specific competencies.

Table 1

Assessment of aspects that influence the quality of learning.

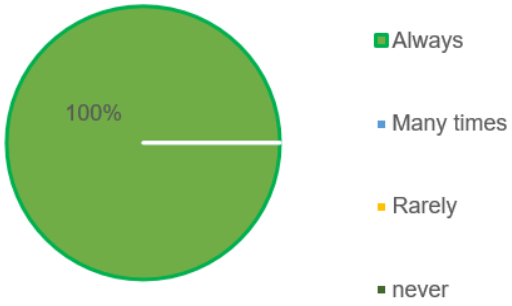
N °	Item	Very important	Important		
		N°	%	N°	%
1	Preparation and training of teachers	5	19%	0	0%
2	Experience of teachers	4	15%	1	8%
3	Availability of infrastructure	5	19%	0	0%
4	Crowded classrooms	1	4%	4	31%
5	Teaching methods	3	11%	2	15%
6	Student class attendance	3	11%	2	15%
7	Evaluating methods	3	11%	2	15%
8	Teaching resources	3	11%	2	15%
TOTAL	27	100%	13	100%	

Note: Own data obtained from the survey.

The table shows that teachers value training and infrastructure as very important factors for the quality of learning. They also consider the number of students per classroom, teaching methods, class attendance, and the form of evaluation to be important. The implementation of the competency-based curricular model is generating significant changes in teacher management, seeking better curricular integration and a stronger link with the world of work.

Figure 2

Climate of trust during class development

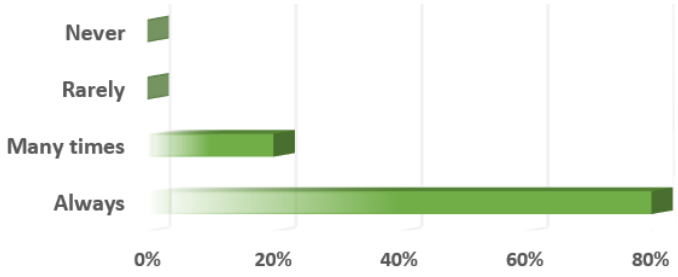


Note: Own data obtained from the survey.

All teachers foster a climate of trust in the classroom, seen not only as a motivator but as a holistic construct that influences the quality of learning. The competency-based curriculum model of UNAN-Managua emphasizes the active role of students in their learning, promoting personal initiative and responsibility in their education

Figure 3

It presents the topics in a motivating way offering examples from our context.



Note: Own data obtained from the survey.

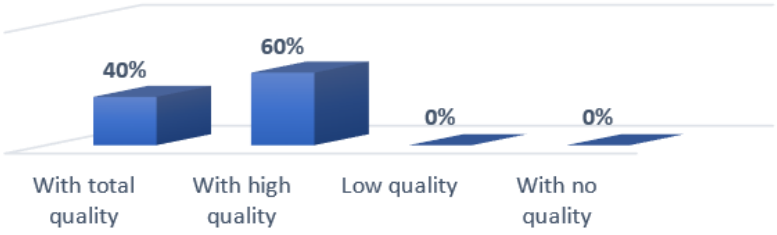
80% of the teachers of the Department of Technological Sciences and Health motivate students with relevant examples. Despite the challenges, the faculty is committed to the competency-based curriculum model recognizing the need to adapt to new ways of teaching.

Although there is resistance, it is understood that change is a gradual process that requires acceptance and understanding.

Figure 4

To what extent do you consider that your students are learning your subject with quality?

quality?



Note: Own data obtained from the survey.

Concerning the quality of the learning process, 60% of the teachers expressed that their students are learning their subject with "very high quality" and the remaining 40% perceive it as "total quality". The teaching strategies facilitate the acquisition of new methodologies, highlighting the implementation of Galperin's Theory that emphasizes the formation by stages of mental actions. This approach is being applied in the curricular transformation by competencies, promoting progressive and contextualized learning.

Table 2

What teaching methodologies do you consider to be the most appropriate within the framework of the competency-based curriculum?

	Responses		
		N.º	Percentage
Teaching methodologies	Theoretical lectures	1	5.9%
	Laboratory practicals	5	29.4%
	Cooperative learning	1	5.9%
	Problem-based learning (PBL)	4	23.5%
	Information and Communication Technologies (ICTs)	4	23.5%
	Field tour	1	5.9%
	Internships	1	5.9%
	Total	17	100.0%

Note: Own data obtained from the survey.

Judging from the results of the table, agroindustrial engineering teachers prioritize laboratory practices, Problem-Based Learning, and ICTs as the most appropriate methodologies. The effective combination of these strategies facilitates the development of cognitive and intellectual skills in students.

- ✓ **Are the students academically prepared to start their professional practices, taking into account that they meet all the competencies required by the different organizations?**

Teachers consider that students are prepared for internships in agroindustrial companies, but see the need for continuous improvement in academic preparation. This is reflected in the implementation of the competency-based curriculum model, which seeks to integrate education and work and requires constant updating of content to keep up with the rapid evolution of knowledge.

- ✓ **Do students meet the competencies required by the different organizations for their internships?**

Students generally meet the basic competencies required by the organizations. Companies positively value students in internships, but a more detailed record is needed to confirm this. In addition, it is crucial to review and improve the content objectives to foster the development of work competencies in students.

- ✓ **Is there a focus on business entrepreneurship upon graduation?**

Teachers recognize the presence of curricular elements that contribute to entrepreneurship in agribusiness but believe that they still need refinement. Subjects such as milk technology and meat technology, among others, facilitate the creation of products and business ideas that can be presented at fairs.

- ✓ **Is there a job market for agribusiness graduates?**

The teachers believe that there is a job market for graduates because agribusiness is a strategic sector for the country's development, contemplated in the PNLC-DH (National Plan for the Fight against Poverty and Human Development 2022-2026 as in Spanish) whose potential is evident in the country in addition to the range of opportunities for growth compared to primary activities.

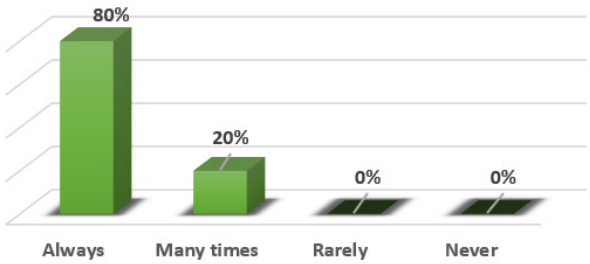
- ✓ **According to your knowledge, what jobs do agroindustrial engineering graduates currently hold? Do they meet the profile?**

Most of the graduates have been placed in food companies (meat, dairy, grains, oils), as well as in positions related to occupational hygiene and safety, operation managers, area

managers, quality control managers, and production managers. All of these positions meet the described profile of the major.

Figure 5

Facilitates learning with didactic resources (guides, videos, models, texts, manuals, laboratories, etc.).

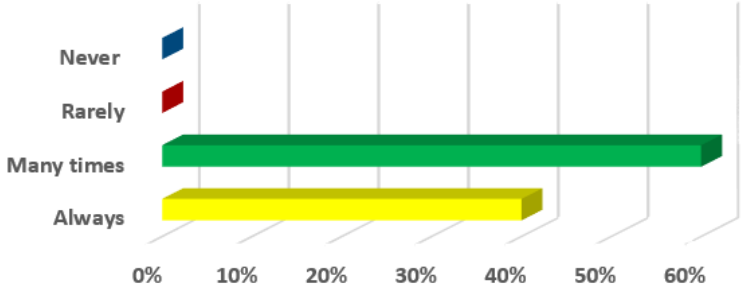


Note: Own data obtained from the survey.

Judging by the results of the table, 80% of the teachers "always" facilitate learning with didactic resources such as didactic guides, videos, texts, manuals, and laboratories, among others, and the remaining percentage does so "many times".

Figure 6

The procedures used to carry out the teaching-learning process promote learning (dynamize the classes).

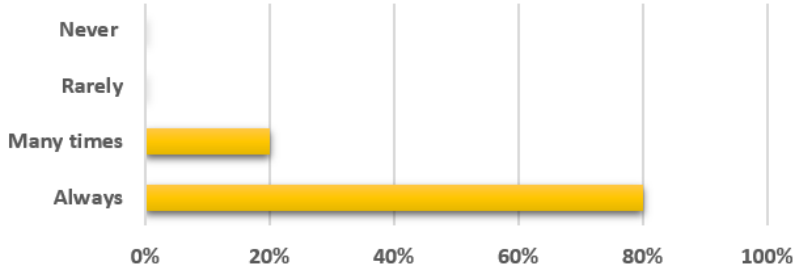


Note: Own data obtained from the survey.

The graph shows that most of the teachers (60%) often, and the rest (40%) always, use procedures that effectively promote learning making classes more dynamic. All teachers encourage dynamic teaching-learning processes, facilitating student learning. This reflects a shift from a teacher-centered approach to one where the student plays a leading role.

Figure 7

The resources used are relevant to the objectives and content of the class.



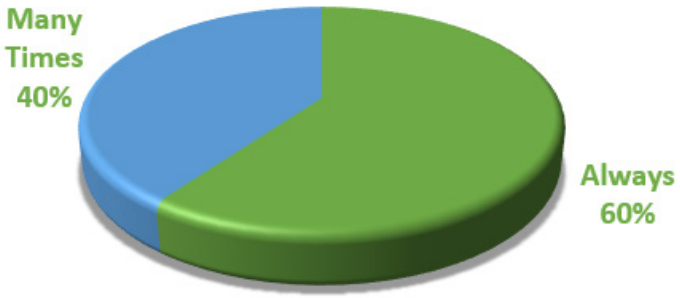
Note: Own data obtained from the survey.

80% of the teachers consider that the resources they use are pertinent for the development of class contents, facilitating the achievement of the proposed objectives, and 20% affirm that many times.

In this sense, it is necessary to use teaching strategies and methods that promote learning that take into account the diversity of the student body and its characteristics, with the irruption of information and communication technologies. Although encouraging learning is not the same as motivating learning, some may be motivated, while others may be unmotivated.

Figure 8

It relies on ICTs to encourage the E-A process.



Note: Own data obtained from the survey.

Sixty percent of the teachers say that they implement the use of ICTs to encourage the teaching-learning process while the remaining percentage of teachers often rely on ICTs. In addition, there is a need for simulators (software and corresponding hardware) of agroindustrial processes in the different areas of agroindustry (dairy, meat, cereals, fruit and vegetables, beverages, oil, roots and tubers, liquor, coffee, sugar, cocoa, as well as non-food items).

✓ **What would you suggest to improve the current agroindustrial engineering curriculum?**

According to the opinions of the teachers, they suggest:

- Improve the implementation of the competency-based curriculum design.
- Strengthen, update, and raise the academic level of the teaching staff, both at the pedagogical level as well as at the level of the key specialties of the major.
- Restructure the basic subjects for professionalizing subjects, strengthening the agro-industrial profile.
- Improve the infrastructure for the development of the educational process, according to the challenges implicit in the management of the competency-based curricular model.
- Create an economic fund to manage student products in regional or institutional fairs.
- Review the practical laboratory hours and particularly the technical nature of the profession (Frequency of these hours).
- Strengthen the integration and unification of the teaching groups that make up the teaching staff of the major, existing in the three Regional Multidisciplinary Faculties (Chontales, Matagalpa, and Estelí);

3. CONCLUSIONS

Based on the results of the study, it can be inferred that the Department of Technological Sciences and Health of the Faculty of Chontales has space for equipment related to agroindustry, but it does not meet all the laboratory requirements necessary for the development of laboratory courses. The academic staff needs to be constantly updated, both in postgraduate courses related to agroindustrial engineering and in internships in companies in the sector.

The importance of an atmosphere of trust in the classroom is emphasized, which goes beyond motivation, and facilitating learning. 80% of teachers use relevant didactic resources, favoring the diversification of teaching methods.

The preferred methodologies are laboratory practices, Problem-Based Learning (PBL), and Information and Communication Technologies (ICT). Students meet the competencies required for their labor market insertion, and most of the graduates are successfully integrated into agri-food companies.

It is suggested to improve the implementation of the competency-based curriculum design, strengthen and update the academic level of the teaching staff, restructure the basic components for professionalizing components, improve the educational infrastructure, create an economic fund to manage student products in fairs, and strengthen the integration of the teaching staff in the three Regional Multidisciplinary Faculties.

WORKS CITED

Barriga Arceo, F. D., & Hernández Rojas, G. (2002). Estrategias docentes para un aprendizaje significativo. Una interpretación constructivista (Segunda ed.).: McGraw-Hill.

Biggs, J. (2006). Calidad del aprendizaje universitario (Segunda ed.). Madrid: Narcea, S.A. de ediciones.

Bodero Delgado, H. (2014). El impacto de la calidad educativa. Dialnet, 4(1). https://dialnet.unirioja.es/servlet/articulo?codigo=5042937

Camilloni, A., Celman, S., Litwin, E., & Palou, M. d. (1998). La evaluación de los aprendizajes en el debate didáctico contemporáneo. Buenos Aires: PAIDÓS.

Carrascal, T. N., & Sierra, P. I. (2011). Contexto de enseñanza y calidad del aprendizaje. Factores críticos en educación superior. Fondo editorial Universidad de Córdoba.

Castañeda, M., & Castro Rubilar, F. (2012). Instrumentos para evaluar el currículum formal en carreras pedagógicas. Panorama, VI(10), 71 - 85. Recuperado el 3 de Agosto de 2015, de http://dialnet.unirioja.es/servlet/articulo?codigo=4780122

Chiavenato, I. (2020). Gestión del Talento Humano. McGRAW-HILL INTERAMERICANA EDITORES, S.A. de C.V.

CSUCA. (2018). Marco de cualificaciones para la educaicón superior centroamericana (MCESCA): resultados de aprendizaje esperados para los niveles técnico superior universitario, bachillerato universitario, licenciatura, maestría y doctorado. CSUCA.

Elola, N., & Toranzos, L. (2000). Evaluación Educativa. Una aproximación conceptual. -, 1-12.

Escobar, J. (2007). Evaluación de Aprendizajes. Un asunto vital en la educación superior. Revista Lasallista de Investigación, IV(2), 50-58. Recuperado el 22 de Agosto de 2015, de http://web.b.ebscohost.com/ehost/pdfviewer/pdfviewer?sid=e7bd0fb5-1a43-4045-b74d-c033dfd3a24f%40sessionmgr112&vid=6&hid=101

Gil, J. (2012). La evaluación del aprendizaje en la universidad según la experiencia de los estudiantes. Estudios sobre educación, XXII, 133-153. Recuperado el 17 de Agosto de 2015, de http://web.a.ebscohost.com/ehost/pdfviewer/pdfviewer?sid=a239f078-3eac-46e1-

a6be-871a1a08019c%40sessionmgr4001&vid=5&hid=4104

González, M. (2000). La Evaluación del Aprendizaje: Tendencias y Reflexión Crítica. Revista Cubana de Educación Superior, I(15), 85-96. Recuperado el 29 de Agosto de 20015, de http://bvs.sld.cu/revistas/ems/vol15_1_01/ems10101.pdf

Gutiérrez Pulido, H. (2014). Calidad y productividad. McGRAW-HILL INTERAMERICANA EDITORES, S.A. de C.V.

Hamodi, C., López, V., & López, A. (2015). Medios, técnicas e instrumentos de evaluación formativa y compartida del aprendizaje en educación superior. Perfiles Educativos, XXXVII(147), 146-161. Recuperado el 1 de Septiembre de 2015, http://www.redalyc.org/articulo.oa?id=13233749009

Johnson, A. (2020). Cconceptos de calidad en la gestión empresarial. Editorial Académica.

Kirby, D. A. (1984). Las estrategias de aprendizaje en la Educación formal: enseñar a pensar y sobre el pensar. s.n.

Mora, A. I. (2004). La Evaluación Educativa: Concepto, Períodos y Modelos. Actualidades Investigativas en Educación, 1-28.

Oviedo, P. E. (2015). Estrategias para la enseñanza y el aprendizaje en la educación superior (Primera ed.). Universidad de la Salle.

Paucar Miranda, P. (2015). Estrategias de aprendizaje, motivación para el estudio y comprensión lectora en estudiantes de la Facultad de Educación de la UNMSM. Lima - Perú: Facultad de Psicología.

Pintrich, P. R., & Schunk, D. H. (2006). Motivación en contextos educativos. Teoría, investigación y aplicaciones (2a. ed. ed.). Madrid: PEARSON EDUCACIÓN, S.A.

Rodríguez, G., & Ibarra, M. (2011). e-Evaluación orientada al e-aprendizaje estratégico en educación superior. Madrid: Narcea.

Rodríguez, T., Reyes, M., & Peña, J. (2009). Aproximación a un modelo para evaluar el currículo de la UPEL a partir de una propuesta de estructura curricular. Sapiens. Revista Universitaria de Investigación(1), 161. Recuperado el 7 de Agosto de 2015, de http://dialnet.unirioja.es/servlet/articulo?codigo=3175957

Schunk, D. H. (2012). Teorías del Aprendizaje. Una perspectiva educativa (Sexta ed.). México: Pearson Educación.

Tejedor, F., & García, A. (2010). Evaluación del desempeño docente. Revista Española de Pedagogía, 439-459.

Tenbrink, T. (2006). Evaluación. Guía práctica para profesores (Octava ed.). Madrid, España: Narcea, S.A. de ediciones.

UNAN-MANAGUA. (2021). Diseño curricular para desarrollar competencias en la

UNAN-MANAGUA. Managua, Nicaragua: UNAN-MANAGUA.

UNAN-MANAGUA. (2021). Documento Curricular de Agroindustria.

UNESCO. (2015). Revisión de la Educación para Todos en el Marco de la Agenda 2030 para el Desarrollo Sostenible: Informe de GEM 2015/2016. UNESCO Publishing.

Universidad de Las Américas (UDLA). (2015). Guía de métodos y estrategias de enseñanza y aprendizaje. UDLA.

Universidad Nacional Autónoma de Nicaragua, Managua. (2020). Eje Introducción a los desempeños ciudadanos y profesionales. UNAN - MANAGUA, Dirección de Docencia de Grado, Managua.