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SUMARIO • SUMMARY • RESUMO

Editorial

This issue of the journal brings together a series of papers that address diverse issues in the field of education, from mental health and academic performance to institutional management, mathematics teaching and technological integration in higher education. Each study, from its particular methodological approach and geographical context, offers perspectives that broaden the understanding of how different social, psychological, pedagogical and technological factors affect the teaching and learning processes. Taken together, these works reflect the dynamism and complexity of today's educational field, marked by the constant need for adaptation, innovation and equity.

The first article examines the relationship between depression and academic performance in high school students, analyzing biological, psychological and social factors that affect school performance. The results show that depression affects motivation and concentration, although the relationship with grades is not always direct, which invites consideration of moderating variables such as family support or school resources. This holistic view highlights the importance of addressing emotional health as an essential part of educational policies.

In continuity with the reflection on educational quality, the second study analyzes curricular alignment in the engineering programs of the Higher Polytechnic Institute of Benguela (ISPB). Through a blended approach, gaps between learning objectives, teaching and assessment are identified. It is proposed to strengthen teacher training in active methodologies and update curricula, stressing the need for internal coherence to ensure the development of real competencies in future professionals.

The third paper shifts the gaze to the teaching of architecture from a social perspective, taking as a case study the fieldwork in the La Cancha de Lo Barnechea Camp, Chile. Through ethnographic methodologies and co-creation processes with the villagers, the students developed contextualized project proposals, which allowed them to understand invisible social realities. This experience renewed teaching practices, fostering situated learning and more flexible methodologies in architectural education.

The fourth study addresses language assessment in Colombia, focusing on the design of feedback reports for candidates repeating the IELTS test. A model is proposed that favors the understanding of individual strengths and weaknesses, incorporating practical strategies for improvement. This work highlights the relevance of personalized feedback that promotes autonomy, motivation and self-confidence, transforming evaluation into a more humane formative tool.

The fifth article focuses on the pedagogical leadership of managers in public secondary schools in Bata, Equatorial Guinea. Through a qualitative study, it became evident that the strengthening of managerial competencies has a direct impact on the improvement of teaching practices and, therefore, on student learning. The findings highlight the need for policies that prioritize educational leadership as a strategic axis for institutional development and pedagogical quality.

This study examines the management and organization of a public school in São Paulo (Brazil) from the perspective of educational policies. A documentary and contextual analysis reveals the shortcomings in the supply of professional qualification programs in peripheral areas. This research not only denounces educational inequality, but also encourages the formulation of public policies that promote real training opportunities for young people and adults in vulnerable contexts.

From a more technological point of view, another article reviews the role of web portals in higher education. Digitization has transformed the way universities and

academic communities access information and manage their resources. The study reflects on the gaps, benefits and current challenges of these platforms, promoting their development as key tools for inclusion, participation and educational modernization.

Finally, the last paper focuses on the teaching of the exponential and logarithmic function from the Didactic Analysis approach, in an Argentine institution. The implementation of a carefully designed didactic unit significantly improved student performance and comprehension. This study demonstrates how evidence-based instructional planning can transform learning outcomes and foster deeper mathematical thinking.

It can be affirmed that the research gathered in this edition share a common objective: the idea of addressing emotional well-being, curricular relevance, social justice, institutional management or pedagogical innovation from integral, collaborative and contextualized approaches. The commitment of the academic community to a more inclusive, critical and transformative education is reaffirmed.

Antonio Pantoja Vallejo
Editor Jefe / Editor in chief / Editor Chefe

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Beyond Grades: Depression as a Determining Factor in the Academic Performance of Adolescents

Más Allá de las Calificaciones: La Depresión como Factor Determinante en el Rendimiento Académico de los Adolescentes

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ABSTRACT

This article examines the relationship between depression and academic performance in high school students, focusing on the biological, psychological, and social factors that contribute to the onset of depression in adolescents. The research studies the theory and analyzes two existing cases to determine how these factors can influence academic performance by reviewing studies conducted in diverse educational contexts to identify common patterns and significant differences. The findings indicate that depression negatively impacts key aspects of academic achievement, such as motivation, energy levels, and concentration, resulting in poorer school performance. However, some studies fail to identify a direct relationship between depression and academic grades, highlighting the importance of exploring other moderating variables, such as family support, school resources, and individual coping strategies. These differences underscore the need for further research that addresses the specific characteristics of different educational and cultural settings. Lastly, the article provides practical recommendations for educators, parents, and policymakers. Among these, it emphasizes the importance of implementing psychological support programs in schools and designing interventions tailored to adolescents' cultural and emotional needs to mitigate the impact of depression on academic performance.

Keywords: Academic Performance, Adolescents, Depression, Mental Health, Secondary Education.

RESUMEN

Este artículo examina la relación entre la depresión y el rendimiento académico en estudiantes de secundaria, con un enfoque en los factores biológicos, psicológicos y sociales que contribuyen a la aparición de la depresión en adolescentes. La investigación se centra en estudiar la teoría y analizar dos casos existentes para determinar cómo estos factores pueden influir en el desempeño escolar, evaluando estudios realizados en contextos educativos diversos para identificar patrones comunes y diferencias significativas. Los hallazgos muestran que la depresión afecta negativamente aspectos clave del rendimiento académico, como la motivación, el nivel de energía y la capacidad de concentración, lo que se traduce en un desempeño escolar deficiente. A pesar de ello, algunos estudios no logran identificar una relación directa entre la depresión y las calificaciones académicas, lo que resalta la importancia de explorar otras variables moderadoras, como el apoyo familiar, los recursos escolares y las estrategias de

Palabras clave:
Adolescentes, Depresión, Educación Secundaria, Rendimiento Académico, Salud Mental.

	afrontamiento individuales. Estas diferencias enfatizan la necesidad de realizar más investigaciones específicas que aborden las particularidades de distintos entornos educativos y culturales. Finalmente, el artículo propone recomendaciones prácticas dirigidas a educadores, padres y formuladores de políticas. Entre estas, se destaca la importancia de implementar programas de apoyo psicológico en las escuelas y diseñar intervenciones adaptadas a las necesidades culturales y emocionales de los adolescentes, con el fin de mitigar el impacto de la depresión en el ámbito académico.

Introduction

The beginning of the school year for JR was no different than any other fifteen-year-old in a new environment. The nervous glance scanning teachers and classmates, the shy and reserved smile, and the fidgety hands revealed his anxiety. However, a deep sadness dulled her honey-colored eyes, a lingering melancholy dwelling in her mind. This sadness was not the common sadness of someone leaving old friends to enter a new school; it was a constant shadow in his life.

In the complex world of school life, the pursuit of academic success is inextricably linked to a critical and often overlooked aspect: students' mental health. Depression, a mental health condition that affects a significant number of high school students, negatively impacts their academic performance and overall well-being. This article aims to examine the relationship between depression and academic performance in adolescents. Through a comprehensive literature review and theoretical analysis, we aim to identify factors contributing to depression in this age group, review significant studies conducted in educational settings, and provide practical recommendations for educators, school administrators and policy makers. It highlights the importance of collaboration between teachers, educational psychologists, parents and the community at large to recognize and treat depression in students, thus creating a more conducive and supportive educational environment.

Although not a new topic, talk of mental health has gained more acceptance in recent years. A growing body of research on mental health issues facing college students emphasizes the need for faculty to consider how mental health might influence students and what options are available (VanderLind, 2014). Symptoms such as hopelessness, feeling overwhelmed, loneliness, sadness, difficulty functioning due to depression, overwhelming anxiety, suicidal ideation and attempts, and self-injurious behavior will necessarily impact students' academic performance.

The lack of sufficient studies on the connection between mental health and developmental education is problematic, especially when there is evidence about the incidence of reports given by students about symptoms experienced in relation to mental illness and their connection to the learning process (Lundh et al., 2011). Consequently, these symptoms have an impact on school performance or failure, being precursors of mental illnesses such as major depressive disorder, generalized anxiety disorder, bipolar disorder, schizophrenia, and comorbid symptoms such as panic attacks and insomnia, among others (Solmi et al., 2021; VanderLind, 2014).

Method

Procedure

Given the complex relationship between depression and academic performance in adolescents, which is not complex because of a lack of empirical evidence, but because of the paucity of studies focused specifically on college students, the question arises: What influence does depression have on the academic performance of adolescents? This question leads to another: What studies are available in this area? To answer

these questions, an exhaustive review of the existing literature on depression and academic performance in adolescents was conducted to provide a solid theoretical framework to support the research. Relevant studies on the influence of depression on adolescent academic performance were also identified and analyzed. It was identified that this area has not been widely explored, so two representative studies were selected for detailed analysis: one conducted in a Western context and the other in a Latin American context.

To address the relationship between depression and academic performance in adolescents, a two-phase methodological approach was carried out. First, a comprehensive review of the existing literature was conducted to establish a solid theoretical framework. Then, specific empirical studies were investigated in two different contexts: one Western and the other Latin American.

Phase 1: Literature Review

An exhaustive search of academic databases, including Dialnet, PsycINFO, Google Scholar and theoretical material in the author's possession as part of his studies, was conducted to identify relevant theories examining the relationship between depression and academic performance in adolescents. Search terms included “depression”, “academic achievement”, “adolescents”, “mental health”, and “secondary education”. The literature review identified key factors contributing to adolescent depression and its impact on academic performance.

The literature reviewed included studies highlighting the prevalence of depression in adolescents, the biological, psychological, and social factors that contribute to depression, and how these factors affect academic performance. The findings of the literature review provided a solid theoretical basis for interpreting the results of the empirical studies investigated.

Phase 2: Research of Empirical Studies

Two representative studies were selected for detailed analysis. These studies were chosen for their relevance and methodological quality, and provided a comparative view of the relationship between depression and academic performance in different cultural contexts.

Study 1: Western context: The first study, conducted by Bansal et al. (2009), investigated the prevalence of depression in adolescent students in a public school using the Children's Depression Questionnaire (CDI). The results indicated that a significant proportion of students presented depressive symptoms, being more prevalent among female students. Factors such as poor academic performance and problems in the family environment, such as lack of support and conflicts, increased the risk of depression.

Study 2: Latin American context: The second study, conducted by Ana Icela Collado Urbina and Emelda Inés Cortez López at the Centro de Educación Integral DIANOVA Esther del Río “Las Marías” in Santa Teresa-Carazo, Nicaragua, evaluated the relationship between depression and academic performance in boarding students during the second semester of 2012. Using the Hamilton Depression Scale, it was found that 23% of the students evaluated presented symptoms of depression, most of them being females from urban areas. Despite the prevalence of depression, no significant direct relationship was found between depression and poor academic performance.

Results

Definition and Prevalence of Depression

The word depression comes from the Latin *depressus*, past participle of *deprimere* meaning "to press down." According to the Oxford English Dictionary, the earliest known use of the word *depression* is in the Middle English period, specifically around 1400 by the English poet Geoffrey Chaucer who "often depicts the emotions of his characters through the external physical signs of the body, and often does so using discourse that draws on Galenic theories" (McNamara, 2015). For example, in *The Knight's Tale* and *The Duchess Book*, Chaucer strikingly describes the suicidal impulse associated with love. Through his poems and the medicalized language Chaucer uses to depict emotional disorders, other characters and the reader are challenged to empathize, begin to understand and react to the sufferer.

The word *depression*-this concept of being pushed down-is used in this context to express both emotional disorders and a sense of suffering. In common parlance, depression refers to the state of being sad, guilty or *down*, a popular neologism that describes how someone seems lower than usual (Marietán, 2008). This author states that the word depression could refer to a syndrome, a disease or a type of mood (or state of mind).

As a mood state, depression is characterized by a persistent feeling of sadness and/or a loss of interest in previously enjoyable activities. Pessimism, dissatisfaction and negativity are common: emotional thoughts influence cognitive thinking, which is then projected into the future. This leads to a loss of purpose and desire, and an increased sense of inadequacy, especially in relation to personal performance, general well-being and interactions with others.

On the other hand, a depressive syndrome is characterized by a combination of several symptoms that significantly affect the person's quality of life. These include hypoergia, which manifests as decreased energy, boredom, listlessness and lack of interest, often expressed as "I don't feel like it" (Marietán, 2008). This leads to slowed thinking and reduced performance in daily tasks, with feelings of overexertion and clumsiness in previously automatic activities. Intellectual work is compromised and fatigue becomes constant, with a tendency to rest and difficulty getting out of bed, which may cause a feeling of guilt.

People with this syndrome also experience changes in personal interaction, becoming more introverted, intolerant of meetings and noises, and hypersensitive to dramatic events, which can result in easy crying and suffering over insignificant issues. Daily routine is altered, with variations in the rhythm of symptoms, such as greater discomfort in the morning or at night, alterations in sleep and appetite, and fluctuations in weight and sexuality. Anxiety and distress accompany these symptoms, intensifying the syndrome and further affecting the person's ability to lead a normal life.

A syndrome is defined as a series of symptoms that occur together and, by convention, acquire a nosographic identity and fall under nosology. We recognize this as a disease. Marietán (2008) argues that, in the field of mental health, where the exact causes are often unknown and only the pathogenesis is suspected, these syndromes are recognized more by agreement among experts than by definitive knowledge, leading to considerable theoretical dispersion. Thus depression, as a disease, can be classified in several ways depending on the supposed "trigger":

- Symptomatic depression: Caused by an organic factor, affecting the anatomo-physiological aspect.
- Situational depression or exhaustion: Precipitated by life situations such as retirement, a move, or a bereavement, addressing the social aspect.
- Neurotic depression: Reactivated by internal conflicts according to psychoanalytic theory.
- Endogenous depression: It arises unmotivated from within the person.
- Masked depression: A form of depression that does not manifest itself in an obvious way, playing hide-and-seek with its symptoms.

Therefore, depressive syndromes are identified and classified through conventions in the medical community, reflecting a diversity of theories and approaches that seek to understand and treat the complexity of depression and other mental disorders. Thus, mental health is an aspect that should be considered when evaluating school performance. In Ecuador, for example, one in ten adolescents suffers from some type of mental illness. Globally, one in seven young people aged 10-19 years has a mental disorder, accounting for 13% of the global burden of disease in this age group (WHO, 2021).

Depression is a common mental health concern among high school students, with data showing that a large number experience symptoms ranging from ongoing melancholy to thoughts of hopelessness. The National Institute of Mental Health (NIMH) estimates that approximately 20% of adolescents will experience at least one episode of major depression before reaching adulthood (NIMH, 2021). According to the World Health Organization, worldwide, 1.1% of adolescents aged 10 to 14 years and 2.8% of those aged 15 to 19 years suffer from depression. Of these numbers, according to the Ministry of Public Health, in Ecuador, 20% of children and adolescents in the country present symptoms of depression or anxiety and 10% have considered or attempted suicide (World Vision, 2023).

Impact of Depression on Academic Performance

Defining Academic Performance

Jiménez and López-Zafra (2009) argue that the study of academic achievement presents many difficulties because it is a multidimensional construct, determined by a diversity of variables such as intelligence, motivation and personality, and influenced by personal, family and school factors. Despite this perspective, it can be proposed that academic performance be defined as an indicator of the level of learning achieved by the student, thus making it an indicator of educational quality. Although academic achievement and school failure are studied separately, the two are correlated,

since success or failure are indicators of the academic process, which includes the cognitive, affective and volitional performance of the student.

Since student performance or failure is an indicator of academic development, it needs to be evaluated. Citing Adell (2006), Jiménez and López-Zafra (2009) add: "Although student grades are indeed the most visible or apprehensible indicator, it is necessary to emphasize that grades do not always accurately reflect the student's conceptual, procedural, and attitudinal responses to the interpellations of the subject matter, the teacher, or the dynamics of the class. Grades do not always reflect the degree of student participation and involvement, the attention paid, the predisposition to learn, the student's position in relation to the subject, the class group, the group of classmates, the center and the teaching staff, etc." De la Torre (2005) argues that "Evaluating is a process by which we collect information, compare or contrast it and make decisions about it."

Following Jiménez and López-Zafra's argument, if it is accepted that student grades should not be the only indicators of academic performance, what other factors should be considered in the evaluation of school performance or failure? In addition to cognitive processes, what role do volitional and affective factors play during the educational process?

The evaluation must consider personal factors that influence education, such as intellectual level, the student's personality (including biological and historical-cultural factors that shape it) and motivation (understood as the student's aspirations and desires). This encompasses not only the cognitive area, but also the affective and volitional areas of the personality in the internalization of knowledge. As Vygotsky pointed out, the social, cultural and historical characteristics of subjectivity are not the result of direct external influences, but rather every lived experience becomes subjective within the network of meanings that characterizes the social insertion of individuals (Gonzales, 2011, cited in Rodríguez, 2013).

This leads to consideration of the academic, institutional, and socioeconomic factors that influence the assessment of academic performance or failure. According to Vygotsky, social, cultural and historical characteristics, which in general encompass these factors, become subjective according to the subjective significance given by the person. These meanings are due to individual psychic processes, which in turn are influenced by social, cultural and historical characteristics. These perceptions will depend on and influence students' mental health, a factor that has not been sufficiently considered in the evaluation of academic performance.

Depression and Academic Performance

The encyclopedia of psychology/pedagogy defines school failure as the result of intellectual inhibition that leads students to disengage, to a greater or lesser extent, from schoolwork, resulting in underachievement. The student does not reach normal intelligence-related standards, and as a consequence, personality changes negatively affect his or her healthy adaptation to life and the surrounding environment.

This definition is important because it includes both the cognitive area of academic performance/failure, as well as the affective and volitional aspects, and its incidence

in school success or failure. In addition, it covers the evaluation of academic performance or failure from the perspective of normality, and its consequences on development and social participation. Cognitive, affective and volitional processes, which are present in the development of the personality, are affected by the mental (psychological) state of the student. This is crucial because a student's mental health directly influences his or her ability to perform academically. The symptoms of a depressive syndrome affect not only the student's cognitive capacity, but also his or her emotions and motivation, essential elements for academic success and social adaptation. The following describes how these symptoms manifest and affect students in the school setting, including hypoergia, changes in personal interaction, and pacing of symptoms.

Hypoergy: Hypoergia refers to decreased energy and ability to perform daily activities. In the school environment, this translates into:

- Lack of motivation and energy: Students may express a constant "I don't feel like it" to participate in classes or school activities.
- Reduced academic performance: Slowed thinking and decreased performance on academic tasks are common. Students may feel that everything costs them a great deal of effort and that previously easy tasks now require extreme concentration.
- Fatigue and exhaustion: Students may need frequent breaks, often reporting that they need to lie down or find it difficult to get out of bed, especially in the mornings.
- Disinterest in extracurricular activities: Unwillingness to participate in previously rewarding activities is noticeable, affecting their participation in sports, clubs and other school activities.

Change in personal interaction: Depression can significantly alter the way students interact with peers and teachers:

- Introversion and isolation: Students may become more introverted, avoiding meetings and group activities.
- Irritability and hypersensitivity: They may be intolerant of noise and waiting, and react disproportionately to minor emotional events, such as receiving grades or comments from teachers.
- Neglect of personal care: Students may neglect their personal appearance and dress, which can be noticeable in the school environment.

Symptom rhythm: Depressive symptoms may vary throughout the day, affecting school performance differently at different times:

- Diurnal variations: Some students may experience accentuated discomfort in the morning, improving towards the evening. Others may find that their symptoms are aggravated after lunch or during the afternoon.
- Sleep disturbances: Problems falling asleep, waking up early and not being able to go back to sleep, and nighttime ruminations are common. Lack of sleep directly affects their ability to concentrate and perform academically.
- Changes in appetite and weight: Variations in appetite and weight may be evident, with some students losing or gaining weight significantly due to depression.

Anxiety and distress: All of these symptoms are accompanied and exacerbated by elevated levels of anxiety and distress, which color the entire student experience. Anxiety can manifest itself in behaviors such as avoidance of

schoolwork and difficulty participating in group activities, affecting their overall performance in the school environment.

Risk Factors Contributing to Depression in College Students

Socioeconomic, cultural and racial factors influence academic development and affect the volitional area with respect to students' educational and career aspirations and desires. According to Vintimilla-Pesántez and Cárdenas (2023), “triggering” factors can be classified as biological, psychological and social.

Biological Factors

- Genetic predisposition: It is important to understand that there is a genetic component to depression. These genetic variations can be passed from parent to child, increasing the risk for first-degree relatives. However, this does not guarantee that they will develop the disease. Even so, the heritability of depression is estimated at 40-50%, indicating that this percentage of the variation in depression among individuals can be attributed to differences in their DNA. Numerous studies have sought to identify specific genes that influence the development of depression. Although this task has been difficult and the results have not always been conclusive, some genes have been identified that appear to increase the risk of developing the disease. These genes do not act in isolation; they interact with other genes and environmental factors to influence predisposition to depression. Some of these genes include:
    - **SLC6A4 (5-HTT)**: This gene encodes the serotonin transporter, which regulates the reuptake of serotonin from the synapse back to the presynaptic. Polymorphisms in this gene, such as 5-HTTLPR, are associated with susceptibility to depression and response to antidepressant treatment (Lesch et al, 1996; Hande et al, 2021).
    - **HTR2A**: It encodes serotonin receptor 2A, which is involved in postsynaptic serotonin signaling. Variants in this gene can influence the response to antidepressants and are involved in mood regulation (Hande et al, 2021).
    - **SIRT1 and LHPP**: Although less studied, these genes have been linked to the risk of developing depression. SIRT1 is involved in the regulation of longevity and stress response, whereas LHPP has recently been associated with treatment-resistant depression (Lesch et al, 1996).
- Central nervous system: Young people with depression show a decrease in the activity of certain brain regions, such as the prefrontal cortex and the hippocampus. Decreased generation of neurotransmitters such as serotonin and dopamine is related to the development of juvenile depression.
- Environmental factors and genetics: Stress early in life can activate certain genes associated with depression. Exposure to stressful situations during adolescence also contributes to the development of depression.

Psychological Factors

- Stress: Adolescents experience academic, social and family pressure, which can lead to feelings of overwhelm and lack of control, resulting in depressive symptoms.
- Low self-esteem: Adolescents with low self-esteem are more susceptible to depression due to feelings of inadequacy and worthlessness.
- Lack of coping skills: Lack of effective skills to manage stress and negative emotions increases the likelihood of developing depression.
- Anxiety disorders: Adolescents with anxiety disorders are more likely to develop depression, as anxiety symptoms can affect their mood and emotional well-being.

Social Factors

- Lack of social support: The absence of emotional support from family, friends or social environment can generate feelings of loneliness, isolation and hopelessness, increasing the risk of depression.
- *Bullying*: Being a victim of bullying increases the risk of depression, anxiety and other mental disorders due to the hostile and stressful environment.
- Social pressure and stress: Pressure to meet social expectations can cause young people to feel overwhelmed and stressed, triggering depression.
- Exposure to traumatic events: Events such as sexual abuse or domestic violence increase the risk of developing depression due to the neurobiological and emotional changes they generate.
- Precarious socioeconomic situation: Economic constraints can increase stress and anxiety in students, contributing to the development of depression.
- Consumption of psychoactive substances: The use of substances such as drugs and alcohol is associated with an increased risk of depression in adolescents.
- Conflicting family relationships: Conflicting relationships and weak family ties can generate an emotionally unstable environment, leading to depression.
- Learning difficulties and poor school performance: Academic difficulties and poor school performance can affect students' self-esteem and emotional well-being, contributing to depression.
- Discrimination: Discrimination based on sexual orientation, ethnicity or religion can lead to feelings of isolation and hopelessness, increasing the risk of depression.
- Unhealthy lifestyles: Unhealthy habits, such as poor diet, physical inactivity, tobacco use, alcohol abuse and insufficient sleep, can negatively affect mental health and contribute to depression.

Study 1: Study of Prevalence of Depression in Adolescent Students of a Public School

General Description

- **Researchers**: Vivek Bansal, Sunil Goyal, Kalpana Srivastava
- **Objective**: To investigate the prevalence of depression among adolescent students in a public school.
- **Methodology**:
    - **Sample**: Teenage students
    - **Evaluation Instrument**: Children's Depression Questionnaire (CDI)
    - **Period**: One academic year

Key Results

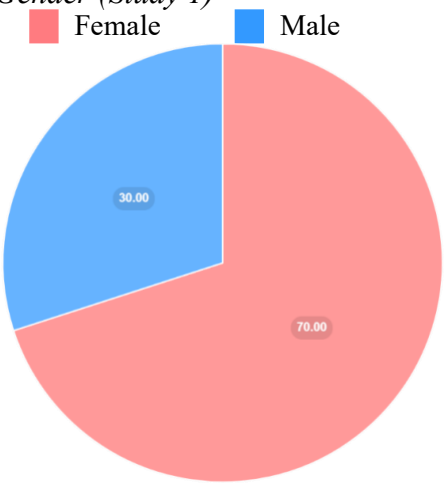
- **Prevalence of depression**: A significant percentage of adolescent students presented depressive symptoms.
- **Associated factors**:
    - **Genre**: Adolescent girls showed a higher prevalence of depression compared to their male peers.
    - **Academic Performance**: Students with low academic performance were more likely to show depressive symptoms.
    - **Family atmosphere**: Problems in the family environment, such as lack of support and the presence of conflicts, were associated with higher levels of depression.

Implications

- Need to implement psychological support programs in schools.
- Importance of involving families in these programs.

TABLE 1

Prevalence of Depression by Gender (Study 1)



This graph shows that a higher percentage of female students presented symptoms of depression compared to male students.

Study 2: Incidence of Depression in the Academic Performance of Boarding Students of the Centro de Educación Integral DIANOVA Esther del Río 'Las Marías', Santa Teresa-Carazo, in the Second Semester of the Year 2012

General Description

- **Researchers**: Ana Icela Collado Urbina, Emelda Inés Cortez López
- **Objective**: To assess the relationship between depression and academic performance in boarding students.
- **Methodology**:
    - **Sample**: 47 boarding students from 12 to 18 years old
    - **Evaluation Instrument**: Hamilton Depression Scale
    - **Academic Performance Data**: Collected from school records

Key Results

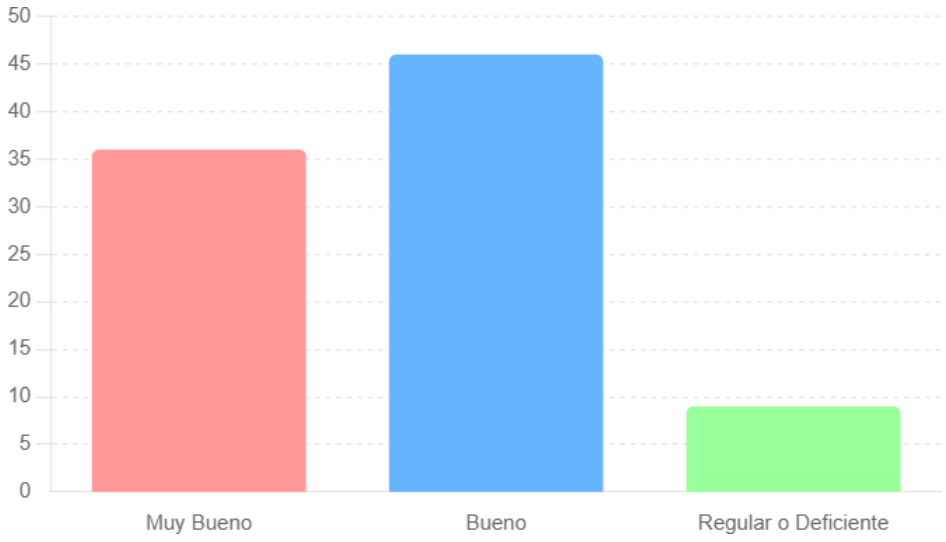
- **Prevalence of depression**: 23% of the students presented symptoms of depression.
    - **Gender Distribution**: 91% of the students with depression were female.
    - **Provenance**: 64% of the students with depression were from urban areas.
- **Academic performance**:
    - "Very Good" performance: 36%
    - "Good" performance: 46%
    - "Fair" or "Poor" performance: 9%
- **Relationship between depression and academic performance**: No significant direct relationship was found.

Implications

- Implementation of psychological support programs in educational centers to improve the quality of life and academic performance of students.

TABLE 2
Academic Performance of Students with Depression (Study 2)

x Percentage of Students and Academic Achievement



This graph illustrates the percentages of academic performance among students with depression. The majority of students with depression had "Very Good" and "Good" academic performance, while only a small percentage had "Fair" or "Poor" performance.

Discussion and Conclusions

The results of this study confirm that depression is a prevalent problem among adolescent students and that it can have a significant impact on their academic performance and overall well-being. This section will discuss the findings in relation to the existing literature and theoretical framework, highlighting implications and recommendations for educational practice and future research.

Prevalence of Depression

The studies analyzed show a high prevalence of depression among adolescents, especially among females. This is consistent with the literature that adolescent girls are more vulnerable to depression due to biological, psychological and social factors. Research by VanderLind (2014) and Solmi et al. (2021) support the idea that depressive symptoms, such as hopelessness, loneliness, and sadness, are present in a significant proportion of students and affect their ability to function adequately in an academic setting.

Factors Associated with Depression

Study 1 found that problems in the family environment and poor academic performance are strongly associated with depression in adolescents. This suggests that a supportive family environment is crucial for students' mental health. The literature reviewed by Vintimilla-Pesántez and Cárdenas (2023) emphasizes that family conflicts, lack of support and stress can trigger or exacerbate depressive symptoms, which, in turn, affect academic performance.

Academic Performance

Study 2 revealed that, despite the high prevalence of depression, many students maintained “Very Good” or “Good” academic performance. This may indicate the presence of cultural-historical factors that allow some students to manage depressive symptoms without significantly affecting their academic performance. According to Vygotsky (Gonzales, 2011 cited in Rodriguez, 2013), these factors may include strong social support, effective coping strategies, and a sense of purpose and motivation, as also mentioned in the work of Jimenez and Lopez-Zafra (2009).

Gender Differences

The higher prevalence of depression among adolescent girls suggests the need for gender-specific interventions. Adolescent girls may face different social and academic pressures than their male peers, which may explain their greater vulnerability to depression. This finding is in line with observations from previous studies that young women are more likely to experience depressive symptoms due to biological and social factors (Hande et al., 2021).

Resilience and Lack of Further Research

The lack of a significant direct relationship between depression and academic underachievement in Study 2 highlights the importance of resilience factors and school support. After analyzing other studies, Collado and Cortez (2012) reach three conclusions as to why no correlation is found between these two variables: (1) it is necessary to refine the variable assessment system, (2) childhood depression is presented as a state whose permanence is not sufficiently stable to be clearly related to academic performance, at least within the age range assessed, and (3) the findings indicate the beginning of a relationship, still incipient, but which may be definitively established in adolescence.

Conclusion

As a psychologist and college professor for six years now, I have observed diagnoses of major depressive disorder and bipolar disorder in students, and have seen how these affect their academic performance. Factors such as academic stress, social pressures, hormonal changes, family relationships and traumatic experiences contribute significantly to adolescent depression. Academic stress, stemming from the need to meet high standards and fear of failure, increases stress levels and worsens symptoms of depression. Social pressures and adolescent dynamics, including bullying and the need for acceptance, affect self-esteem and foster feelings of loneliness, contributing to depression. Hormonal changes during adolescence also influence mood and may increase susceptibility to depression. Dysfunctional family relationships and lack of emotional support are critical factors that can trigger or aggravate depression, as are past traumatic experiences. The mental health of adolescent students is a crucial aspect that must be considered when evaluating their academic performance. Depression and other mental disorders have a significant impact on their ability to learn and actively participate in school. Although studies indicate that depression does not always correlate directly with poor academic performance, it is clear that depressed

factors associated with mental health, such as academic stress, social pressures, hormonal changes, family relationships and traumatic experiences, play an important role.

Teachers, educational psychologists, parents and society in general must work together to recognize and treat depression in high school students. It is essential to establish an environment in which the mental health of students is actively promoted, recognizing the problems and underlying reasons, and applying appropriate assistance techniques for each particular case. It is essential to implement psychological support programs in schools that address both academic and emotional factors. These programs should include training for teachers and school staff on how to identify and support students who may be suffering from depression. In addition, it is crucial to foster an inclusive and supportive school environment where students feel safe to express their feelings and seek help when needed.

However, these strategies acknowledge the existence of childhood and adolescent depression, but do not focus sufficiently on the relationship between depression and academic performance, which is the focus of this article. There is a need to expand the field of research and invest in more studies that explore this influence. This research should consider depression from three perspectives: as a type of mood, as a syndrome and as a disease, and within the disease, as a nosological classification.

Likewise, it is imperative that such studies reformulate the definition of academic performance, considering all the areas that make up the student's personality: cognitive, volitional and affective. Academic performance should not be evaluated solely on the basis of grades (which mainly measure the cognitive and, to some extent, the volitional area), but should include the complex world of emotions and the psychic processes involved in the various emotional disorders. From this more holistic perspective, it will be possible to obtain more conclusive data on how depression impacts adolescent school success or failure.

This additional study will provide a solid foundation for developing appropriate academic and psychological interventions, enabling educators, mental health professionals and parents to create more effective strategies to support students and ensure their academic success. This will include appropriate trainings for both parents and teachers to truly understand what depression is from a clinical perspective, so that strategies are designed to help adolescents cope with their pathology and create accommodations necessary to meet the curriculum set by the school and district.

This combination of efforts is vital to improving the quality of life and academic success of students facing depression. By creating a supportive and understanding environment, and by investing in ongoing research, we can help adolescents navigate the challenges of depression and reach their full academic and personal potential.

References

Bansal, V., Goyal, S., & Srivastava, K. (2009). Study of Prevalence of Depression in Adolescent Students of a Public School. *Industrial Psychiatry Journal 18*(1), 43-46. DOI: https://doi.org/10.4103/0972-6748.57859

Collado A. & Cortez E. (2012) *Incidencia de la Depresión en el Rendimiento Académico de los Estudiantes Internos del Centro de Educación Integral DIANOVA, Esther del Río "Las Marías", Santa Teresa, Carazo, en el segundo semestre del año 2012.* Another Thesis, Universidad Nacional Autónoma de Nicaragua, Managua.

De la Torre, S. (2005). Teoría Interactiva y Psicosocial de la Creatividad. *Comprender y evaluar la creatividad. Un recurso para mejorar la calidad de la enseñanza*, *1*, 123-154.

Hande, S., Krishna, S., Sahote, K., Dev, N., Erl, T.P., Ramakrishna, K., Ravidhran, R., & Das, R. (2021). Population genetic variation of *SLC6A4* gene, associated with neurophysiological development. *J Genet*, *100*(16). DOI: https://doi.org/10.1007/s12041-021-01266-6

Jiménez Morales, M. I., & López-Zafra, E. (2009). Inteligencia Emocional y Rendimiento Escolar: Estado Actual de la Cuestión. *Revista Latinoamericana de Psicología*, *41*(1), 69-79.

Lesch, K., Bengel, D., Heils, A., Sabol, S., Greenberg, B., Petri, S., Benjamin, J., Müller, C., Hamer, D., & Murphy, D. (1996). Association of Anxiety-Related Traits with a Polymorphism in the Serotonin Transporter Gene Regulatory Region. *Science*, *274*, 1527-1531. DOI: 10.1126/science.274.5292.1527

Lundh, L. G., Wångby-Lundh, M., & Bjärehed, J. (2011). Deliberate Self-harm and Psychological Problems in Young Adolescents: Evidence from a Swedish Community Sample. *Journal of Adolescence*, *34*(4), 779-788. DOI: 10.1111/j.1467-9450.2011.00894.x

Marietán, H. (2008). *Curso sobre Depresión*. Retrieved July 24, 2024, from https://marietan.com/antiguo/material_depresion/01_introduccion_depresion.ht m

McNamara, R. (2015). Wearing Your Heart on Your Face: Reading Lovesickness and the Suicidal Impulse in Chaucer. *Literature and Medicine*. *33*. 258-278. DOI: http://doi.org/10.1353/lm.2015.0018

National Institute of Mental Health (NIMH). (2021). *Major Depression*. Retrieved July 24, 2024, https://www.nimh.nih.gov/health/statistics/major-depression.shtml

Rodríguez, W. (2013). El lugar de la afectividad en la psicología de Vygotski: Reflexividad histórica y reivindicación. *Propósitos y Representaciones*, *1*(2), 105-129. DOI: http://dx.doi.org/10.20511/pyr2013.v1n2.35

Solmi, M., Radua, J., Olivola, M., Croce, E., Soardo, L., Salazar de Pablo, G., & Fusar-Poli, P. (2021). Age at Onset of Mental Disorders Worldwide: Large-scale Meta-analysis of 192 Epidemiological Studies. *Molecular Psychiatry*, *26*(4), 512-523. DOI: https://doi.org/10.1038/s41380-021-01161-7

VanderLind, R. (2014). Effects of Mental Health on Student Learning. *The Learning Assistance Review*, *22*(2), 39-57.

Vintimilla-Pesántez, S. & Cárdenas, J. (2023). Depresión Juvenil en el Ámbito Educativo. *Universidad Politécnica Salesiana, Programa UPSalud*.

World Health Organization (WHO). (2021). *Mental Health of Adolescents*. Retrieved July 24, 2024, from https://www.who.int/news-room/fact-sheets/detail/adolescent-mental-health

World Vision Ecuador. (2023). *Salud mental en niños, niñas y adolescentes en Ecuador: 7 de cada 10 se sienten felices, pero el 20% enfrenta dificultades para identificar tristeza y estrés*. Retrieved July 21, 2024, from https://worldvisionamericalatina.org/ec/sala-de-prensa/salud-mental-en-ninos-girls-and-adolescents-in-ecuador-7-of-every-10-feel-happy-but-the-20-coping-difficulties-identifying-sadness-and-stress

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CURRICULAR ALIGNMENT FOR THE DEVELOPMENT OF ENGINEERING COMPETENCIES AT THE ISPB

Alineación curricular para el Desarrollo de Competencias en Ingeniería en el ISPB

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ABSTRACT

This study explores the alignment between learning objectives, contents, teaching activities and evaluation systems in the engineering programs of the Instituto Superior Politécnico de Benguela (ISPB). The objective of the research is to evaluate the effectiveness of the competency-based curricular design implemented at the ISPB. Through a mixed methodological approach that includes surveys, interviews and documentary analysis, data were collected from students, teachers and career coordinators. The results indicate that there are significant gaps in the alignment of its components. Furthermore, learning objectives do not always translate into teaching activities that encourage the development of the expected competencies. Assessment systems are not designed to comprehensively measure the complex competencies required by professional profiles. Among the recommendations, the need to strengthen teacher training in the design of learning activities based on problems and projects, as well as the development of more precise evaluation instruments, stands out. It is also suggested to periodically review and update study plans to ensure their relevance in a constantly evolving work context.

Palabras clave:
Alineación curricular, Competencias Profesionales, ingeniería, ISPB, Evaluación, Diseño Curricular, educación superior.

RESUMEN

Este estudio explora la alineación entre los objetivos de aprendizaje, contenidos, actividades de enseñanza y sistemas de evaluación en los programas de ingeniería del Instituto Superior Politécnico de Benguela (ISPB). El objetivo de la investigación es evaluar la efectividad del diseño curricular basado en competencias implementado en el ISPB. Mediante un enfoque metodológico mixto que incluye encuestas, entrevistas y análisis documental, se recolectaron datos de estudiantes, docentes y coordinadores de carrera. Los resultados indican que, existen brechas significativas en la alineación de sus componentes. Ademas, los objetivos

	de aprendizaje no siempre se traducen en actividades de enseñanza que fomenten el desarrollo de las competencias esperadas. Los sistemas de evaluación no están diseñados para medir de manera integral las competencias complejas requeridas por los perfiles profesionales. Entre las recomendaciones, se destaca la necesidad de fortalecer la formación docente en el diseño de actividades de aprendizaje basadas en problemas y proyectos, así como en la elaboración de instrumentos de evaluación más precisas. También se sugiere revisar y actualizar periódicamente los planes de estudio para garantizar su pertinencia en un contexto laboral en constante evolución.

Introduction

In a globalized and highly technological world, higher education faces the challenge of training professionals capable of adapting to a constantly changing work environment. Traditional curricula, focused on the transmission of theoretical knowledge, have proven to be insufficient to respond to current demands (López, et al., 2023). In this context, the competency-based approach has emerged as an innovative alternative to guarantee the relevance and pertinence of academic training.

Internationally, numerous studies have shown that curriculum alignment, i.e., coherence between learning objectives, content, teaching methodologies and assessment systems, is a key factor in the development of professional competencies (Álvarez, et al., 2023). However, the implementation of competency-based curricula in different educational systems presents particular challenges related to cultural, socioeconomic and political factors (Santander, S. C. 2024).

In Angola, the education sector has experienced significant growth in recent decades, driven by the country's development policies. However, engineering programs, like other disciplines, face the challenge of adapting their curricula to the new demands of the labor market (Acosta, R. C., & Chana Cassungo Cruz, R. B. 2024). In this regard, the Instituto Superior Politécnico de Benguela (ISPB) has set itself the goal of improving the quality of its academic offerings through the implementation of a competency-based curriculum design (Acosta, R. C., & Chana Cassungo Cruz, R. B. 2024).

The competency-based approach is a pedagogical strategy that seeks to develop professionals capable of applying their knowledge effectively in real contexts (Melillán & Cravero, 2022). The synergy between theory and practice is fundamental to achieve this objective, as it allows students to develop the skills and attitudes necessary to perform successfully in their future careers (Flórez Torres & J. L. 2022). Development of transferable skills; competencies go beyond specific knowledge; they include skills such as problem solving, effective communication, teamwork and adaptation to new contexts. These skills are highly valued in the labor market and allow professionals to perform effectively in different situations (Acosta, R. C., & Chana Cassungo Cruz, R. B. 2024).

The findings presented by Lic. Nelson Giraul Pio Salazar (2019) in his analysis of the curriculum of the Bachelor of Science in Education, specialization in physics, at the Higher Pedagogical School of Namibe, Angola, offer significant coincidences with the approaches being explored in the present research (Martin, et al., 2024). First, the relevance of the link between theory and practice in the teaching-learning process is aligned with the need for a curriculum that not only transmits knowledge, but also fosters practical skills in real contexts.

Almeida Leyva and Rodriguez Alfonso (2023) provide a revealing comparative analysis of English teaching programs in Angolan universities. Their findings, when contrasting public and private institutions, show a marked tendency toward differentiated pedagogical approaches. Private universities prioritize professional practice and the development of communication skills, while public universities focus on theory (Buanga, P. M. S. S. 2014). This dichotomy aligns with current discussions on the relevance of practical training in higher education (Martínez, et al., 2023).

Buangaprimer et al.'s (2014) study on teacher training for environmental education in Angola reveals a significant gap between theory and practice, highlighting that, despite the importance of articulating the local and the global in environmental education, ISCED-Cabinda teachers do not implement this connection in their classrooms. Research emphasizes the importance of designing curricula that effectively integrate

theoretical knowledge with practical experiences, promoting critical reflection and the development of competencies for action (Yap Hilario & L. O. 2022).

From the perspective of curricular work, this need to link theory and practice is fundamental for meaningful learning (Álvarez, et al., 2023). The mere transmission of theoretical knowledge without its corresponding practical application can result in a superficial training, where educators fail to connect what they learn with real situations. (Martínez, et al., 2023). This reflection also applies to our research, where it becomes evident that curriculum alignment should include an approach that combines theory and practice (López, et al., 2023).

Curriculum alignment in the field of engineering has become an increasingly relevant issue, given the dynamic and changing context of the labor market (Álvarez, et al., 2023). At the Higher Polytechnic Institute of Benguela (ISPB), a competency-based curriculum design has been implemented, with the objective of preparing students not only in theoretical knowledge, but also in practical skills that will enable them to face the challenges of a constantly evolving professional environment (Martinez, et al., 2023).

The present research focuses on analyzing the curricular alignment in the engineering programs of the ISPB, with the objective of identifying the strengths and weaknesses of the current curricular model and proposing strategies to improve the training of future Angolan engineers (Briones, et al., 2023). Through a mixed methodological approach, we seek to understand how the competency-based approach has been implemented in the ISPB, what are the main challenges faced and what actions can be taken to strengthen curricular alignment (Acosta, R. C., & Chana Cassungo Cruz, R. B. 2024).

Method

The study focuses on evaluating the effectiveness of competency-based curriculum design at the Instituto Superior Politecnico de Benguela (ISPB), Angola, specifically in the Computer Engineering course. For this purpose, a mixed methodology combining quantitative and qualitative approaches was used, allowing a deeper understanding of the educational reality in this institution.

Methodological Design

1. Quantitative Approach

- Objective: Evaluate the perception of students and teachers on the curricular design and its effectiveness in the development of competencies.
- Instruments used: Survey: A structured questionnaire was designed that included dichotomous and Likert-type questions. This questionnaire was administered to a representative sample of students (456) and teachers (40).

Table 1.
Analysis of Collected Data

Method of Analysis	Description	Result	Interpretation
Software Used	Analysis of collected data.	SPSS	Statistical tool used for the analysis.

Method of Analysis	Description	Result	Interpretation
Factor Analysis	Evaluation of the structure of correlations between variables.	-	It allows the identification of patterns and relationships between variables.
Bartlett's test	Sphericity test to verify the adequacy of the factor analysis.	0.00	Significant ($p < 0.05$); indicates correlation between variables.
Kaiser-Meyer-Olkin (KMO)	Measure of sample adequacy for factor analysis.	0.546	Considered good; acceptable value (greater than 0.5).

Source: Own elaboration.

The analysis of the data collected was carried out using SPSS software, a tool recognized in the statistical field for its capacity to perform complex analyses. In this context, fundamental statistical tests were applied to assess the adequacy of the data for factor analysis.

The Kaiser-Meyer-Olkin (KMO), which reached a value of 0.546, is considered an acceptable indicator to determine the adequacy of the data in the factor analysis. This value, which exceeds the minimum threshold of 0.5, suggests that the sample is adequate and that the correlations between the variables are sufficiently strong to justify the application of this type of analysis. A KMO in this range indicates that there is an interrelationship between the variables that can be effectively explored.

On the other hand, Bartlett's test, which yielded a value of 0.00, is a test of sphericity that evaluates whether variables are correlated in a correlation matrix. A significant result, with a p-value of less than 0.05, indicates that the variables are not independent of each other, which reinforces the hypothesis that there is a relationship between them. This is an essential criterion for proceeding with factor analysis, since it suggests that the variables share variance and, therefore, can be grouped into common factors.

Overall, the results of the KMO and Bartlett's test provide strong support for performing the factor analysis, indicating that the data are adequate and that the selected variables have significant correlations. This allows inferring that factor analysis can reveal underlying structures in the data, facilitating the identification of patterns and relationships that may be fundamental for the development of competencies in the investigated context.

2. Qualitative Approach:

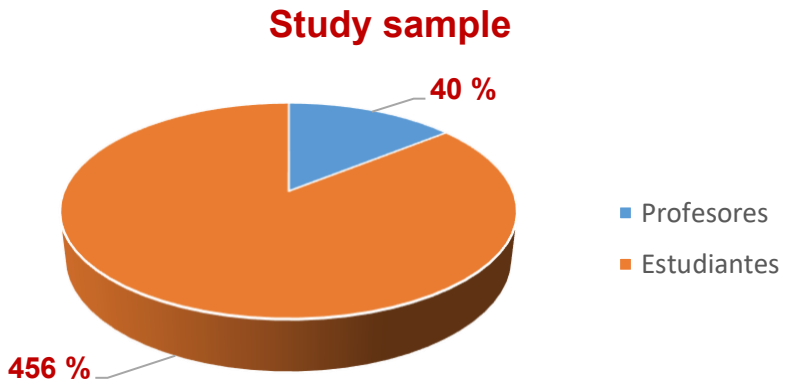
- Objective: To deepen participants' perceptions and experiences regarding the curriculum and its implementation.
- Instruments used:
- Semi-structured interviews: Interviews were conducted with teachers and career coordinators, allowing for an in-depth exploration of their opinions on the curricular design and its impact on the development of competencies.

- Documentary analysis: Institutional documents, study plans and evaluation reports were reviewed to obtain a comprehensive view of the curriculum and its alignment with the competencies required in the labor market.

Sample

The total population of the study consisted of 596 subjects, including students, teachers, managers and representatives of companies linked to the ISPB. A representative sample was selected from this population:

Figure 1. Sample of study.



Source: Own elaboration.

Table 2.
Data Analysis

Evaluation Method	Description	Result
Internal Consistency	Internal consistency analysis using the Kuder-Richardson test 20.	0.896
Analysis of Two Halves	Evaluation of internal consistency using the Spearman-Brown test.	0.693
Cronbach's alpha	Evaluation of homogeneity in dichotomous responses; interpreted through Kuder-Richardson.	High homogeneity

Source: Own elaboration.

The results obtained from the internal consistency analysis of the survey reveal a high level of reliability. The Kuder-Richardson 20 coefficient, which reached a value of 0.896, indicates a robust internal consistency among the dichotomous variables evaluated. This finding suggests that the survey items are well aligned and consistently measure the same underlying construct, which is critical to the validity of the results. The high homogeneity in the responses implies that the participants shared similar perceptions regarding the items presented, which reinforces the credibility of the data collected.

On the other hand, the analysis of two halves, with a Spearman-Brown coefficient of 0.693, suggests moderate to high consistency in responses when splitting the survey. This result,

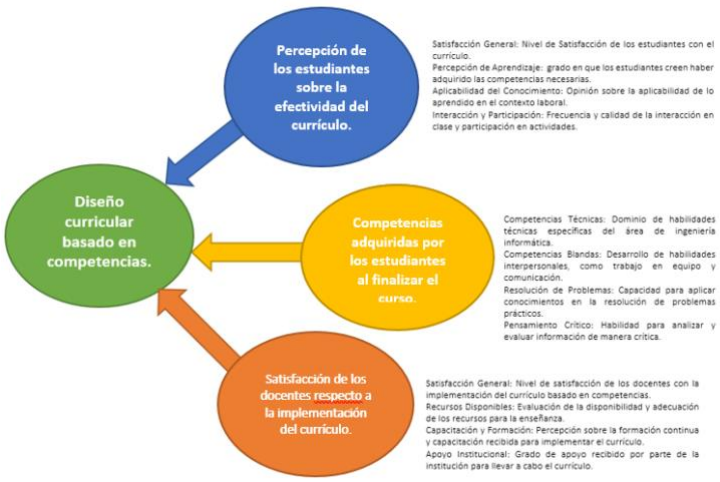
although lower than the Kuder-Richardson result, is still acceptable and points to a reasonable stability in the responses throughout the different sections of the survey. The variability observed could indicate differences in the interpretation of certain items, which deserves attention in future research to improve the clarity and precision of the questions asked.

The use of Cronbach's alpha, although no specific value was presented, in conjunction with the Kuder-Richardson, reinforces the conclusion that the items are consistent and reflect a high degree of agreement among participants. This is crucial to ensure that the results obtained are reliable and allow valid inferences about the population studied.

The survey demonstrates high reliability, which supports the validity of the results and suggests that they can be used to inform informed decisions in academic or research contexts. The quality of the data is essential to ensure the integrity of the analysis and the conclusions derived, underscoring the importance of continuing to evaluate and refine the measurement instruments used in future studies.

In the quantitative phase of the research, a non-probabilistic purposive sampling was used in order to obtain primary information from the various actors involved in the educational process of the ISPB. The total population consisted of 596 individuals, including students as well as teachers and members of the administration. From this population, a representative sample was selected consisting of 456 students, representing 76.51% of the total, and 40 teachers and managers, equivalent to 6.71%. This sampling approach ensured that the information collected adequately reflected the perceptions and experiences of the different groups within the educational community, thus guaranteeing the validity and relevance of the results obtained for the analysis of the competency-based curriculum design.

The study variables and their dimensions were structured according to the theoretical framework. It is described below in **Figure 2**:



Source: Own elaboration.

Study Variables

X_1=Independent Variable: Competency-based curriculum design.

Y_1= Dependent Variables: Student perceptions of curriculum effectiveness.

Y_2= Dependent Variables: Competencies acquired by students at the end of the course.

$Y_{3=}$ Dependent Variables: Teachers' satisfaction with the implementation of the curriculum.

The questionnaires were administered face-to-face to the sample participants in their respective work and academic environments, which allowed for the collection of significant opinions and perceptions. The choice of a non-probabilistic purposive sampling facilitated the identification of relevant cases, allowing an in-depth analysis of the subject under study.

In addition, semi-structured qualitative interviews were conducted with experts in educational management from various universities in Benguela. This complementary approach enriched the findings, providing valuable perspectives based on experience and knowledge of the local context.

To guarantee the content validity of the data collection instrument, the “expert judgment” technique was applied. Based on the evaluators' recommendations, adjustments were made to the wording and style of the items, as well as the elimination of some of them, thus strengthening the quality of the questionnaire.

Data analysis was performed by factor analysis, using Bartlett's test and the Kaiser-Meyer-Olkin index (KMO) to assess the feasibility of factor clustering. A significance threshold of $p > 0.05$ was established for Bartlett's test, and 20% was considered a minimum value for the observation of factorial weights. The KMO statistic yielded a value of 0.546, which indicates acceptable adequacy, given that values above 0.5 are considered satisfactory. Likewise, Bartlett's test resulted in a value of 0.00, which confirms its significance as it is lower than 0.05.

Subsequently, students were surveyed and a reliability analysis was performed using the Internal Consistency technique, together with the Kuder-Richardson 20 test. The results indicated high internal consistency, with a coefficient of 0.894 for dichotomous variables and a result of 0.693 in the analysis of two halves according to the Spearman-Brown test. The Internal Consistency analysis was performed with SPSS v.21.0 statistical software, applying Cronbach's Alpha. Since the responses were dichotomous, interpretation was carried out using the Kuder-Richardson test 20.

The results obtained show a high degree of homogeneity in the responses to each of the items by all the participants in the study. Based on the validity and reliability findings, it is concluded that the questionnaire is valid and reliable. Reforms were made to the wording of the items and categories to improve their reliability, and one item was deleted and replaced by another with similar characteristics, thus optimizing the data collection instrument.

The mixed methodology applied in this study allowed for a comprehensive evaluation of the effectiveness of competency-based curriculum design in the ISPB. The results obtained through the surveys, interviews and documentary analysis provide a solid basis for future improvements in the training of engineering professionals, contributing to educational and professional development in Angola.

Results

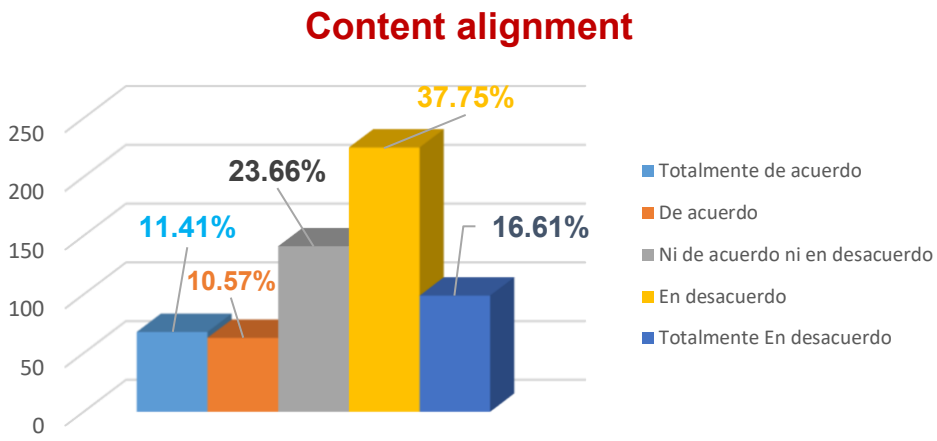
This section presents the findings obtained from a rigorous research process that includes questionnaires and interviews with teachers and students, as well as a detailed analysis of curricular documents. Key aspects of curriculum alignment and the development of engineering competencies in the context of the Instituto Superior Politecnico de Benguela (ISPB) will be addressed. These results offer a critical and informed perspective on the quality and

effectiveness of competency-based curriculum design, thus contributing to a deeper understanding of its impact on students' academic and professional development.

Figure. 3

Content Alignment

On a scale of Strongly Agree; Agree; Neither Agree nor Disagree; Disagree; Strongly Disagree. How much do you agree that the contents of the subjects are related to the competencies that a computer engineer is expected to develop?



Source: Own elaboration.

When analyzing the students' perception of the curricular alignment, it was found that 37.75% do not agree that the contents of the subjects are related to the competencies required for a computer engineer. This finding suggests a gap between what is taught and what students are expected to be able to do.

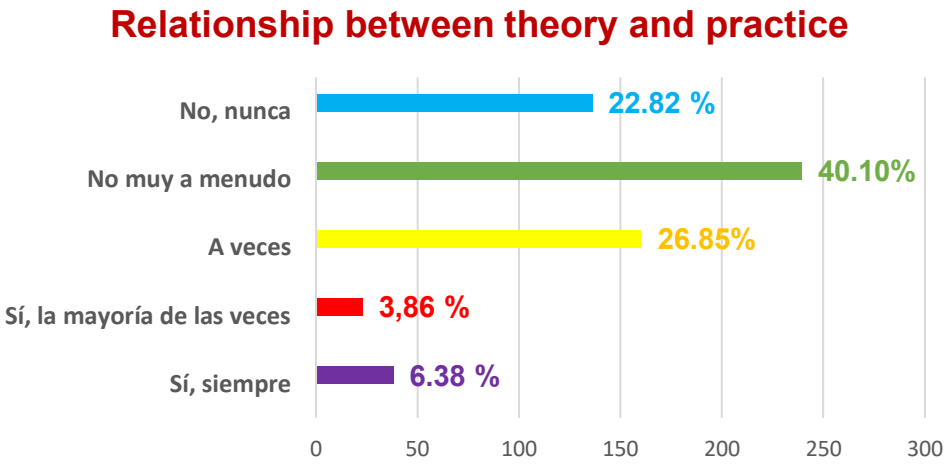
The results of the semi-structured interviews conducted with teachers corroborate this perception. Some teachers pointed out that 'there is a disconnect between theory and practice', while others mentioned that 'the assessments do not really evaluate the competencies they seek to develop'.

These results could indicate a need to revise the curriculum to ensure greater coherence between learning objectives, content and assessments. In addition, it would be convenient to implement pedagogical strategies that promote a more active learning focused on problem solving.

Figure. 4

Relationship between Theory and Practice

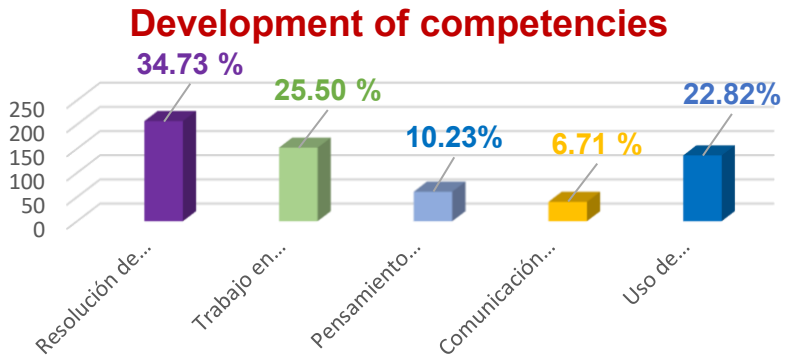
Do you consider that there is an adequate relationship between the theoretical knowledge acquired in the classes and the practical activities carried out?



Source: Own elaboration.

The survey results reveal a troubling disconnect between students' perceptions of curricular alignment and the relationship between theory and practice. A 40.10% of respondents expressed disagreement with both statements, suggesting a significant gap between what is taught and what students are expected to be able to do in their future professional practice. These findings could indicate an urgent need to revise the curriculum and pedagogical strategies to ensure greater coherence between learning objectives, content and assessments.

Figure. 5
Competency development: To what extent do you consider that the curriculum has enabled you to develop the following competencies?



Source: Own elaboration.

1. Problem Solving (34.73%)
The relatively high percentage of agreement on this competency suggests that students recognize the value of activities designed to promote problem-solving skills. However, the

existence of room for improvement indicates that the curriculum could benefit from the inclusion of more complex and authentic problems that simulate real-world scenarios. Educational literature supports the idea that problem solving is essential in engineering education, as it fosters critical thinking and creativity (Jonassen, 2000).

2. Teamwork (25.50%)

The moderate percentage in the perception of teamwork suggests that, although group activities exist, they may not be sufficient to develop critical interpersonal competencies. Training in leadership, negotiation and conflict management skills is essential in the professional environment (Clemente-Ricolfe, et al., 2013). It is recommended that the curriculum incorporate more structured collaborative projects that allow students to practice and reflect on these skills.

3. Critical Thinking (10.23%)

The low percentage in the perception of the development of critical thinking is alarming. This finding suggests that the current curriculum does not sufficiently emphasize the importance of critical analysis and evaluation of evidence. Engineering education should include teaching methods that stimulate critical thinking, such as problem-based learning (PBL) and critical discussion (Facione, 2011). Without adequate training in this area, students may be ill-prepared to face the complex challenges they will encounter in their professional careers.

4. Effective Communication (6.71%)

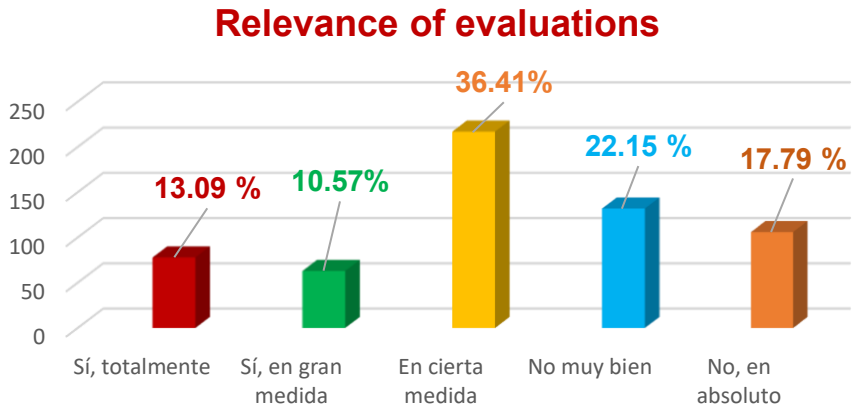
The extremely low percentage in the perception of communication skills development is a clear indicator of deficiencies in the curriculum. Effective communication is essential for professional success, as engineers must be able to convey complex ideas clearly and persuasively (Romero, et al.,2014). It is imperative that written and oral communication components be integrated into various subjects to address this gap.

5. Use of Computer Tools (22.82%)

Although the percentage is relatively low, it suggests that students perceive limited opportunities to develop competencies in the use of computer tools. In an increasingly digital world, it is crucial that the curriculum not only includes technical training, but also integrates digital competencies as a cross-cutting element in all subjects (Bawden, 2008). This could significantly improve students' perception of their preparedness in this area.

Figure. 6

Relevance of the evaluations: Do you consider that the evaluations carried out in the subjects adequately assess the development of the competencies established in the curriculum?



Source: Own elaboration.

The data reveal heterogeneity in students' perceptions of the adequacy of the assessments. Yes, totally (13.09%) and Yes, to a great extent (10.57%): A relatively low percentage of students consider that the evaluations adequately assess the development of competencies. This suggests that there is significant room for improvement in the design and implementation of evaluations. To some extent (36.41%): A considerable percentage of students consider that the evaluations assess competencies to some extent, indicating an ambivalent perception. Not very well (22.15%) and Not at all (17.79%): A considerable percentage of students consider that the evaluations do not adequately assess the development of competencies. This is a red flag indicating a possible disconnect between the learning objectives and the evaluative activities.

Suggestions: What suggestions do you have for improving curricular alignment and competency development in the Computer Engineering curriculum?

Table 3.
Summarizes the results of the interviews conducted with teachers

Aspect Evaluated	Interview Results
Clarity of Curricular Objectives	Most of the teachers consider that the objectives are clear, but some mentioned the need for more detail on certain topics.
Content Relevance	Teachers highlight that the content is relevant, although they suggest the inclusion of more case studies and current market examples.
Teaching Methodologies	There is a variety in the methodologies used, but some teachers feel that there is a lack of training in active methodologies.
Learning Assessment	The teachers believe that the evaluations are adequate, but propose diversifying the methods to include more formative evaluations.
Overall Satisfaction with the Curriculum	Most are satisfied with the curriculum, although some express concern about the workload and lack of resources.
Institutional Support	There is a mixed perception of institutional support; some faculty feel that there is good support, while others feel that more logistical and administrative support is lacking.
Training and Education	Many teachers are requesting more opportunities for ongoing training to adapt to changes in the competency-based curriculum.
Interaction with Students	The importance of interaction is emphasized, and teachers believe that more dialogue and active student participation should be encouraged.

Source: Own elaboration.

Interviews with ISPB teachers have revealed a number of strengths and areas for improvement in relation to competency-based curriculum design. In terms of strengths, teachers positively value curricular alignment and content relevance. This perception suggests that the curriculum is designed in a way that matches the needs of the labor market and the competencies required in the field of engineering. However, this positive assessment may contradict the areas for

improvement identified, which include the need for more robust teacher training, diversification of teaching methodologies and greater institutional support.

Table 4.
Summarizes the results of the interviews conducted with students

Aspect Evaluated	Interview Results
Clarity of Curricular Objectives	Students consider that the curriculum objectives are mostly clear, although some mention that they could be more specific.
Content Relevance	Most students feel that the content is relevant, but some express that certain topics are too theoretical and not applicable.
Teaching Methodologies	Students value the active methodologies positively, but criticize the lack of variety in the practical activities.
Learning Assessment	Many students consider the evaluations to be fair, although they suggest that they should include more hands-on and collaborative projects.
Overall Satisfaction with the Curriculum	Overall satisfaction is moderate; some students feel prepared, while others feel there is a lack of depth in certain topics.
Interaction with Teachers	Students value the interaction with teachers, but some feel that they do not receive sufficient feedback on their performance.
Applicability of Knowledge	There is a perception that, although knowledge is acquired, it is not always easily applicable in real or work situations.
Peer Support	Students stress the importance of peer support, but mention that sometimes there is competition rather than collaboration.

Source: Own elaboration.

Interviews conducted with ISPB students have provided valuable information on their perception of competency-based curriculum design. In terms of strengths, students recognize the clarity of objectives and relevance of content, suggesting good curricular alignment. This clarity can facilitate learning, as students better understand what is expected of them and how it relates to their future professional roles. However, this positive perception may contrast with the identified areas for improvement, which include the need for diversification in teaching methodologies, greater practical application of content and more effective feedback from teachers.

Analysis of Curricular Documents.

The findings from the analysis of curricular documents reveal a number of critical areas that require attention to improve curricular alignment and competency development in the context of the Computer Engineering program of the ISPB Engineering Department. First, it was identified that, although the curricular objectives are defined, their clarity and coherence are not always consistent (Santana, et al., 2021) (Santana, et al., 2021). Many documents lack an

explicit articulation between the expected competencies and the contents taught, which makes it difficult to understand how these are integrated into the students' training (Luis Julião, A. 2021).

The review of curricula and subject guides showed that, although key competencies such as critical thinking and problem solving are mentioned, their implementation in educational practices is insufficient (Flórez Torres & J. L. 2022). This suggests that the curriculum does not adequately respond to the demands of the labor market, where practical skills and the ability to work in teams are increasingly valued (Briones, et al., 2023). The lack of practical experiences that allow students to apply their knowledge in real situations is a significant gap that needs to be addressed.

In terms of teaching methodologies, there was a trend towards traditional approaches that limit meaningful learning (Yap Hilario & L. O. 2022). Although some documents propose active methodologies, their application in the classroom is scarce. This highlights the need to integrate innovative practices, such as project-based learning and the use of educational technologies, which could enrich the formative experience and foster the development of essential transversal competencies in the professional sphere (Melillán & Cravero, 2022).

The evaluation mechanisms were also deficient. The alignment between assessment methods and learning objectives was inconsistent, which compromises the effectiveness of the curriculum design (Wchima, et al., 2022). The evaluations, for the most part, focused on the acquisition of theoretical knowledge, leaving aside the practical application of competencies. The lack of formative assessments and continuous feedback limits the integral development of the students (Buanga, P. M. S. 2014).

Finally, feedback from teachers and students revealed a lack of effective mechanisms for reviewing and updating the curriculum. The need for a dynamic process that considers the opinions of the stakeholders involved is essential to ensure that the curriculum adapts to the changing demands of the professional environment (Acosta, R. C., & Chana Cassungo Cruz, R. B. 2024). This commitment to continuous improvement is essential to ensure that curriculum documents are not only relevant, but also responsive to the current and future needs of students (Cedeño, et al., 2015).

Discussion and Conclusions

The analysis of the students' perception of the curricular alignment in the ISPB Computer Engineering program has revealed significant findings that indicate a disconnection between the current curriculum and the competencies expected in the professional environment. 37.75% of the respondents do not consider that the contents of the subjects are aligned with the required competencies, which suggests the need for a thorough review of the curriculum to ensure its relevance and applicability in the work environment.

The discrepancy is even more evident in critical areas such as teamwork (25.50%), critical thinking (10.23%) and effective communication (6.71%). These percentages indicate that, although there are activities designed to promote specific skills, their implementation is not sufficient to develop interpersonal and analytical competencies that are essential in the training of a computer engineer. The low perception of the development of critical thinking and effective communication is especially alarming, as these skills are critical to professional success in an increasingly complex and collaborative world (de Almeida Leyva, et al., 2023).

Interviews with teachers have highlighted strengths in curricular alignment and content relevance, suggesting that, despite shortcomings, there is recognition of the need to prepare students for the labor market (Salazar, N. G. P. 2019). However, areas for improvement were also identified, such as the need for more robust teacher training and the diversification of

teaching methodologies (Martín, et al., 2024). This indicates that, although teachers value the curriculum positively, they are aware of the limitations in its implementation and interaction with students.

On the other hand, students' perceptions of the clarity of the objectives and relevance of the content contrast with the areas for improvement noted, such as the lack of practical application and feedback (Santander, S. C. 2024). This suggests that, although students understand what is expected of them, the lack of practical experiences and effective feedback may limit their ability to apply what they have learned in real contexts (Clemente-Ricolfe, et al., 2013).

The analysis of curricular documents has evidenced that, although the objectives are defined, their clarity and coherence are not consistent (Murillo Moreno, W. G. 2018). The lack of articulation between competencies and contents makes it difficult to understand how they are integrated in the training of students (Bawden, D. 2008). In addition, the tendency towards traditional pedagogical approaches limits meaningful learning, which highlights the need to incorporate active methodologies and educational technologies that promote more dynamic and practical learning (Romero, et al.,2014).

Practical implications:

Research has revealed a significant gap between theoretical training and professional practice in the field of engineering.

Key Implications Derived from the Research

- Align training with the demands of the labor market: Curricula must be constantly adapted to the needs and trends of the productive sector.
- Encourage problem-based learning: Students must face real challenges and apply their knowledge in practical contexts.
- Promote the development of transversal competencies: In addition to technical knowledge, it is essential to develop skills such as teamwork, effective communication and problem solving.
- Establish close links with the productive sector: Collaborate with companies to offer internships, joint projects and employment opportunities.

Adaptations for Engineering Courses at the ISPB

Electronics, Telecommunications and Computer Courses:

- Design projects: Implement projects involving the design and construction of electronic prototypes, communication systems or software.
- Equipped laboratories: Ensure that laboratories are equipped with state-of-the-art tools and technologies for hands-on experimentation by students.
- Simulations: Use simulation software to model complex systems and analyze their behavior.
- Hackathons and competitions: Organize events that allow students to apply their knowledge in a competitive and collaborative environment.

How to Integrate this Practice into Other Areas of Engineering Education

- Development of interdisciplinary projects: Encourage collaboration between different areas of engineering (electronics, computer science, civil, etc.) to address complex problems.
- Creation of innovation centers: Establish spaces where students can develop innovative and entrepreneurial projects.

- Implementation of active methodologies: Use methodologies such as problem-based learning, collaborative learning and flipped learning.
- Formative evaluation: Implement evaluation systems to monitor student progress and adjust teaching strategies.

The present research has revealed a significant gap between the theoretical training provided at the ISPB and the practical skills demanded by the labor sector in the field of computer engineering. One of the most notable findings has been the difficulty of graduates to apply the knowledge acquired in real scenarios, suggesting a disconnection between theory and practice. This dissociation between the academic and the professional limits the ability of junior engineers to adapt to the challenges of an increasingly dynamic and demanding work environment.

To address this problem, a thorough revision of the curriculum is recommended, prioritizing the alignment between the theoretical contents and the competencies required in the industry. The incorporation of practical projects, simulations and case studies will allow students to apply the knowledge acquired in real scenarios, strengthening their problem-solving and critical thinking skills. It is also necessary to invest in continuous teacher training, providing them with the necessary tools and knowledge to implement active teaching methodologies that promote autonomous and collaborative learning.

Formative evaluation plays a crucial role in this process. By integrating competency-based assessments, a more complete picture of student performance can be obtained and teaching strategies can be adjusted as needed. In addition, it is essential to establish closer ties with the productive sector in order to learn about the real demands of the labor market and adapt curricula accordingly.

Finally, future research is suggested to deepen the relationship between the competencies developed during academic training and professional performance. It is also relevant to explore the perception of employers regarding the competencies of computer engineering graduates, which will allow for a more precise adjustment of the curricula.

The results of this research highlight the need to transform computer engineering education to ensure that graduates are prepared to face the challenges of today's world of work. The implementation of the proposed recommendations will contribute to reducing the gap between theory and practice, improving the quality of education and increasing the employability of engineers.

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Conflict of Interest

There are no conflicts of interest on the part of the authors in the writing or publication of this article.

References

Acosta, R. C., & Chana Cassungo Cruz, R. B. (2024). Medición del modelo de formación de estudiantes en el Departamento de Tecnología del Instituto Superior Politécnico Benguela. Revista Educación en Ingeniería, 19(38). DOI: https://doi.org/10.26507/rei.v19n38.1310

Álvarez, D., Melillán, A., Cravero, A., & Sepúlveda, S. (2023). Propuesta de Modelo para el Alineamiento entre el Diseño Curricular y las TI. Revista Ibérica de Sistemas e Tecnologias de Informação, (E59), 531-543. https://www.researchgate.net/profile/Mikel-Ugando-Penate-3/publication/373448165_Aplicacion_de_nuevas_tecnologias_en_as_humanidades_RISTI_NE59_544-554_httpswwwristixyzissuesristie59pdf/links/64ed0de1c4f9ac0060742b68/Aplicacion-de-nuevas-tecnologias-en-as-humanidades-RISTI-NE59-544-554-https-wwwristixyz-issues-ristie59pdf.pdf#page=546

Bawden, D. (2008). Orígenes y conceptos de la alfabetización digital. Alfabetizaciones digitales: conceptos, políticas y prácticas, 30 (2008), 17-32. https://d1wqtxts1xzle7.cloudfront.net/34874386/Lankshear_Knobel_5.28-libre.pdf?1411662307=&response-content-disposition=inline%3B+filename%3DDigital_Literacies_Concepts_Policies_and.pdf&Expires=1725631769&Signature=Md-KfdOrghb8wh250XrO5dl7x3ZpnlvOJeUXKyCAouLW7xYo1ur8MjLw6d1VyzPIBvno8983z4AsgyEzL1eP~6A4xfgJ3v5tcIO-qjA6VweFiGZhTEqGXF34ddlqFUgEwHok0i-CqWGV47VjqTjyyNFooXwOdjONLcj1M8hi1-D6oZ667Z~f-HBjw7Oqo-NxjmOtYbeD1DDaS-UPLYcZC-T1dqXzN43RxaBV5FHrhos9cgtVLyv9VSh2aFHi0XfnmNWl6hxNnovvk95gSt5L-lkWI95bxs-cPGIss1ICM-Wp90wqugUEn8JsLALnz6vM-MWOrOtaoqMinxAjrH2zZg__&Key-Pair-Id=APKAJLOHF5GGSLRBV4ZA#page=19

Briones, W. V. L., & Graus, M. E. G. (2023). Diseño curricular basado en competencias profesionales en la Licenciatura en Educación de la Universidad Estatal de Milagro, Ecuador. Didasc@ lia: Didáctica y Educación, 14(2), 385-403. https://dialnet.unirioja.es/servlet/articulo?codigo=9014408

Buanga, P. M. S. (2014). Formação do professor para educação ambiental em Angola: uma análise do currículo do curso de Ensino da Biologia do Instituto Superior de Ciências da Educação, ISCED-Cabinda da Universidade 11 de Novembro, Cabinda/Angola. http://hdl.handle.net/1843/BUBD-9NYJKG

Cedeño, R. A. P., Díaz, R. T., & Fuentes, D. R. (2015). MEJORA CONTINUA Y REDISEÑO CURRICULAR: ¿SUCESIÓN O COEXISTENCIA DE PROCESOS EN EL TIEMPO?. Revista Órbita Pedagógica. ISSN 2409-0131, 2(1), 73-86. https://core.ac.uk/download/pdf/268043967.pdf

Clemente-Ricolfe, J. S., & Escribá-Pérez, C. (2013). Análisis de la percepción de las competencias genéricas adquiridas en la Universidad. https://hdl.handle.net/20.500.12799/2437

de Almeida Leyva, C., & Rodríguez Alfonso, E. (2023). Estudio comparado sobre programas de enseñanza del inglés en universidades públicas y privadas, Luanda, Angola. Varona. Revista Científico Metodológica, (78). http://scielo.sld.cu/scielo.php?pid=S1992-82382023000300023&script=sci_arttext&tlng=en

Facione, PA (2011). Pensamiento crítico: qué es y por qué es importante. Insight Assessment , 1 (1), 1-23. https://d1wqtxts1xzle7.cloudfront.net/71022740/what_why98-libre.pdf?1633192859=&response-content-disposition=inline%3B+filename%3DCritical_Thinking_What_It_Is_and_Why_It.pdf&Expires=1725620857&Signature=gMf6QXoAfk6pY45IA1rJAejG~XT~nj1CNst9ZXBFPWEEJw~

mRoq1WTTcBjZxKV4Xh194wbsF6SZwqufTjjyA47gqlTowy6uEmxpqIgtlTZjLIlYploj2TH
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lWbNurMFT0GiCeji778MXXBdpQVn1ZdWdnKPzgA__&Key-Pair-
Id=APKAJLOHF5GGSLRBV4ZA

Flórez Torres, J. L. (2022). Apoyo a la gestión académica en el Departamento de Ciencias Sociales y actividades de análisis para el programa de Lic. en Informática. https://repositorio.unicordoba.edu.co/server/api/core/bitstreams/aaa20680-1528-46ea-a20c-0f52f80e5d5d/content

Jonassen, DH (2000). Revisitando la teoría de la actividad como marco para diseñar ambientes de aprendizaje centrados en el estudiante. Fundamentos teóricos de los ambientes de aprendizaje , 89 (121), 9781410603203-10. https://books.google.com.br/books?hl=pt-BR&lr=lang_de|lang_zh-CN|lang_zh-TW|lang_ko|lang_es|lang_fr|lang_nl|lang_en|lang_it|lang_ja|lang_pl|lang_pt|lang_tr&id=QcmQAgAAQBAJ&oi=fnd&pg=PA89&dq=Jonassen,+2000&ots=UP6qo16fDB&sig=tFoMG-7YiWaa8S37LN8_so3TO3Q#v=onepage&q=Jonassen%2C%202000&f=false

López, T. M., Medina, M. N. E., Rivera, L. S., & González, M. C. C. (2023). El alineamiento curricular como un reto de técnica para la calidad educativa. Revista de Educación Superior del Sur Global-RESUR, (16), e2023n16a9-e2023n16a9. DOI: https://doi.org/10.25087/resur16a9

Luis Julião, A. (2021). CURRÍCULO E MOBILIDADE SOCIAL EM ANGOLA: pontes e vazios na relação. Revista Espaço do Currículo, 14(2). https://openurl.ebsco.com/EPDB%3Agcd%3A12%3A26050780/detailv2?sid=ebsco%3Aplink%3Ascholar&id=ebsco%3Agcd%3A152299090&crl=c

Martín, C. S., Nataly, V., Guzmán, E. N., & Pérez, R. (2024). Evaluación curricular de programas de diplomado: propuesta de un modelo de diseño curricular por competencias basado en diseño inverso. Formación universitaria, 17(1), 69-80. http://dx.doi.org/10.4067/S0718-50062024000100069

Martínez, M. C., Toscano, J. A., Blanco, E. E. E., & Serna, C. N. (2023). Alineación constructiva para la evaluación de resultados de aprendizaje y su mejoramiento en el desempeño académico en el área de ciencias básicas del programa de ingeniería mecánica de la UFPS seccional Ocaña. Encuentro Internacional de Educación en Ingeniería. DOI: https://doi.org/10.26507/paper.3194

Melillán, A., & Cravero, A. (2022). Ingeniería de Software en el desarrollo de tecnologías para el apoyo al diseño curricular: Un mapeo sistemático. Revista Ibérica de Sistemas e Tecnologias de Informação, (E50), 322-334. https://www.proquest.com/docview/2725645574?pq-origsite=gscholar&fromopenview=true&sourcetype=Scholarly%20Journals

Murillo Moreno, W. G. (2018). Propuesta de modelo de alineación curricular entre núcleos en la educación media. Diseño curricular y transformación de contextos educativos desde experiencias concretas. https://repository.usergioarboleda.edu.co/bitstream/handle/11232/1543/Propuesta%20de%20modelo%20de%20alineacion%20curricular.pdf?sequence=1&isAllowed=y

Romero, Y. M. Q., Monzan, F. M. M., & Hernández, Y. D. C. T. (2014). Comunicación efectiva y desempeño laboral en Educación Básica. Negotium, 9(27), 22-33. https://www.redalyc.org/pdf/782/78230409001.pdf

Salazar, N. G. P. ANÁLISIS DEL CURRÍCULO DE LA CARRERA LICENCIATURA EN CIENCIAS DE EDUCACIÓN, ESPECIALIDAD FÍSICA EN LA

ESCUELA SUPERIOR PEDAGÓGICA DE NAMIBE EN ANGOLA. http://monografias.umcc.cu/monos/2019/DICT/mo19281.pdf

Santana, E. L., Castellanos, F. R., Rubiano, D. A., Torres, L. M. G., Castillo, J. L. R., & Vargas, L. H. P. (2021). REFLEXIONES SOBRE LA OPERACIONALIZACIÓN DEL DISEÑO CURRICULAR DE LA INGENIERÍA INDUSTRIAL CASO BOGOTÁ. Encuentro Internacional de Educación en Ingeniería.DOI: https://doi.org/10.26507/ponencia.1705

Santander, S. C. (2024). Análisis de la Alineación de los Documentos Curriculares para Ciencias Sociales: Estándares Básicos de Competencia y Lineamientos Generales de la Pruebas Saber 11°. Ciencia Latina Revista Científica Multidisciplinar, 8(2), 2219-2233. DOI: https://doi.org/10.37811/cl_rcm.v8i2.10666

Wchima, X. C., Medina, B. V., Zapata, J. G. C., & Echeverry, L. M. J. (2022). Mecanismos e instrumentos de evaluación de los resultados de aprendizaje en el desarrollo curricular de los programas de ingeniería de la Universidad La Gran Colombia Armenia. Encuentro Internacional De Educación En Ingeniería. DOI: https://doi.org/10.26507/paper.2337

Yap Hilario, L. O. (2022). Guía metodológica para mejorar el alineamiento curricular de un programa de estudios de ingeniería según el modelo de acreditación de Icacit en una universidad privada de Lima. https://hdl.handle.net/20.500.14005/12684

MLS – PEDAGOGY, CULTURE AND INNOVATION (MLSPCI)
http://mlsjournals.com/pedagogy-culture-innovation

(2025) MLS-Pedagogy, Culture and Innovation, 2 (2), 185-200

EDUCATIONAL EXPERIENCE OF ARCHITECTURE STUDENTS IN A MARGINALIZED SETTLEMENT

EXPERIENCIA EDUCATIVA DE ESTUDIANTES DE ARQUITECTURA EN UN CAMPAMENTO MARGINAL

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ABSTRACT

The knowledge gap regarding informal settlements (campamentos) in Chile has remained an elusive topic in architectural education at the university level. For this reason, it was highly relevant for both students and faculty of an architectural research studio to focus on this subject. Consequently, lectures, fieldwork in a settlement, design processes, academic writing, and presentations were all centered around a semester-long project developed both in the classroom and on-site.

In collaboration and mutual learning with the residents of the "Campamento La Cancha" in Lo Barnechea, students engaged in designing a set of project-based hypotheses for interventions that addressed various local challenges. Ethnographic methodologies were used to access the settlement, which facilitated relationships and the gathering of information about the area and its people. These actions enabled students to understand realities previously unknown to most of them.

Moreover, the experiences helped strengthen the co-creation process between residents and students, resulting in nine distinct intervention proposals based on project hypotheses. Additionally, students were able to explore different

professional perspectives and their future implications. Finally, the professors had the opportunity to lead a research studio in an innovative way, incorporating situated learning, flexible methodologies, and new questions that challenge and enrich architectural education.

RESUMEN

Palabras clave:
Campamento, aprendizaje, etnografía, investigación, proyecto.

La brecha de conocimiento acerca de los campamentos en Chile ha sido un tema elusivo en la enseñanza de la arquitectura en la Universidad. Por eso fue de suma relevancia para los estudiantes y docentes de un Taller de investigación en arquitectura, enfocarse en esta materia. Por consiguiente, las clases lectivas, el trabajo de campo en un campamento, el diseño, la escritura académica y las presentaciones, se centraron en un encargo semestral que fue desarrollado en aula y en terreno. Allí, en colaboración y aprendizaje con los pobladores del Campamento la Cancha de lo Barnechea, se dieron a la tarea de trabajar en el diseño de un conjunto de hipótesis proyectuales de intervenciones, en respuesta a diversos problemas del lugar. Para acceder al campamento se empleó metodologías etnográficas, lo que favoreció los contactos y el levantamiento de información del lugar y su gente. Estas acciones, hicieron posible leer en contexto realidades desconocidas para la mayoría de los estudiantes. Asimismo, las experiencias construidas robustecieron las operaciones de co-creación (pobladores y estudiantes), que dieron origen a 9 propuestas de hipótesis proyectuales de intervenciones de diverso tipo. Además, los estudiantes también pudieron analizar otros ángulos profesionales y sus proyecciones. Finalmente, los profesores tuvieron la oportunidad de impartir un taller de investigación de manera novedosa, con aprendizajes situados en otros enfoques, metodologías flexibles y nuevas preguntas para repensar la enseñanza de la diciplina.

Introduction

The Architectural Research Workshop establishes an unprecedented bridge between the university classroom and the work in the La Cancha de Lo Barnechea Camp, to address directly from the field, the needs of the inhabitants of the place. That is, a form of situated learning in which architects in training come into contact with a different space and people to learn and collaborate in solving real problems through the co-creation of project hypotheses in response to various needs of the context. In this way, collaborative design becomes an essential tool for addressing challenges, allowing students to apply their theoretical knowledge to real situations, self-critique their results, and reflect on their design decisions and their impact. Therefore, architectural research not only seeks to answer the question: What are the perceptions of 24 students about living, teaching and learning with a group of residents of the La Cancha de Lo Barnechea Camp, in the context of a university research workshop on architecture, as a way of accessing new knowledge, but also promotes a more conscious and collaborative practice with people who are not peers, but who together make possible the production of hypothetical solutions to make the camp a more livable place. In other words, when the research workshop comes into contact with the camp, it articulates a new relationship in which three very favorable and unprecedented situations arise in teaching: taking the classroom to the territory for the development of research, learning and collaborating with the inhabitants, and determining the level of knowledge built at the university by contrasting it with the reality of the solutions required in the context of a camp. The novelty of the study lies in the fact that teaching practices in a research workshop do not end with the final evaluation, but transcend and become the object and subject of a transformative academic work for students, who discover a new space to revisit their learning experiences and the knowledge they have built. Moreover, for teachers, it is an opportunity to review new technical, disciplinary and content positions.

Conceptual Framework

The Case

The scarcity of knowledge about camping has been a topic poorly addressed in the teaching of architecture at the University, as it is not part of the formal curriculum. Therefore, it is not a novelty that students have precarious or almost non-existent notions on the subject, and concomitantly, biased, criminalized visions sustained by imaginaries of marginality and danger.

For this reason, developing a research workshop in the context of Camp La Cancha de Lo Barnechea, different, challenging in content and methodology, was of great motivation for teachers and of certain resistance for students. Therefore, to face the challenge of initiating a transition from the university to the camp, it was first done vicariously and then physically through ethnography, a methodology that favored concrete interactions

with the villagers, enabling students to make real contextual readings. The work in the camp is aligned with a growing motivation and quality interaction time, which strains the cultural and social imaginaries of students, teachers and settlers regarding the right to their own home (Fuster-Farfán et al., 2023). It was also a valuable opportunity to learn how problems are constructed and solved through shared practicality.

The Camp as a Place to Learn

In Chile, the camps have arisen from the need to have a home of their own. As such, they respond to the critical situation of not having a place to live. Therefore, precariousness, informality, lack of adequate infrastructure and basic services are some of the characteristics of this sector (Imilan et al., 2020). Based on various studies, the definition of these spaces shows the absence of favorable public policies, specifically in terms of urban planning studies. Consequently, they do not consider the people who inhabit them, being, therefore, spaces where resilience, abandonment and lack of integration, constantly dominate (Zenteno et al., 2020). Therefore, a camp is a complex structure, where organization, solidarity, self-management and the permanent struggle against adverse and threatening conditions are the daily bread (Fernandez, 2023).

According to Matus et al. (2019), affection, attachment, sense of belonging and the generation of social integration are factors that allow us to understand the key elements of the cohesion of people in a camp. It is therefore woven with a strong sense of community, where shared experience and resilience in the face of adversity are key factors (Castañeda and Hernández, 2021). Thus, the construction of social belonging in these contexts is inscribed in the development of collective practices, as a result of which the symbolic and precarious spaces are transformed to give rise to the place of all and to which all belong and are worthy.

The Camp from the Inside

As mentioned above, camps are places where the forms of organization and social relations that take place there allow individuals to cohere and survive (Vergara and Reyes, 2021). Therefore, entering these communities is not social tourism; on the contrary, it means understanding the mechanisms of communication and applying forms of access based on ethnography. Thus, it was possible to understand the relationships and survival strategies that take place there, and to explore categories such as identity, power, support networks, access to basic services and interaction with the authorities. It is also possible to learn the perspectives of the participants themselves (students and villagers), which provides a deeper insight into these realities (Balbi, 2012; Guber, 2005).

Collaborative Work and Design

In the architecture curriculum, the subject of camps and their social reality is often elusive. This entails a professional training perspective that, a priori, leaves such sensitive and immediate issues as this one in opacity. However, the diverse urban realities, their settlements, their culture and people's life experiences allow students to live the transformative experience of creating and solving immediate problems with others for the community (Terán and Araujo, 2016). This view stimulates the search for architectural solutions that respond, at the appropriate scale, to the demands of the context. They also promote collaboration between architecture students and camp

residents. Research on situated learning (Piñero, 2012), emphasize the empirical value of active pedagogies, since they are much more than a simulacrum (Baudrillard, 1978) (Baudrillard, 1978), as they give practical meaning to the purpose of teaching, challenging traditional ideas about how future architects should be trained.

On the other hand, when students come into contact with vulnerable communities, they not only acquire technical knowledge on how to build solutions, but they can also directly experience and value the knowledge that is rooted in the history of these places. In addition, it is also possible to develop skills such as empathy and collaboration (Vivero et al., 2005) (Vivero et al., 2020). This scenario allows understanding that situated learning and teamwork are fundamental to form committed and responsible professionals, also generating other understandings of the social realities (Cleveland, 2013).

Self-Criticism as an Attitude of Constant Improvement

The university is a space where students face new academic challenges and build their own. In this type of scenario, self-criticism helps young people to adapt to these new demands, allowing them to evaluate their performance in different contexts and make the necessary adjustments to identify areas for improvement in their academic and personal skills (Ibarrola, 2020) (Ibarrola, 2020). For a student of architecture, this can help them in the qualification of their study methods and in the organization and quality of their work, since by constantly comparing their processes with others, they can activate mechanisms of improvement and qualification in the technical, conceptual and procedural aspects. Therefore, self-criticism fosters the ability to self-evaluate and recognize achievements and limitations, making students more autonomous in their learning process by not relying only on external evaluation to know where they are failing or what they are doing well, but also from co-evaluation. In addition, constructive self-criticism helps to transform failure and difficulties as opportunities to improve and learn.

Research and Disciplinary Knowledge

Research in architecture is an interdisciplinary field that seeks to generate knowledge to improve the design, construction and use of spaces, focusing on the analysis of aspects such as aesthetics, functionality, materials, construction techniques, sustainability, urban planning, and the relationship between architecture and people, among others (Ander Egg, 2011)**.** Through qualitative and quantitative methods, it studies both the historical and cultural contexts of the buildings and their impact on the quality of life of the users (Daza, 2009). In addition, it can also address social issues, such as accessibility, housing, urbanization and inclusive design, integrating interdisciplinary approaches such as urban planning and social science (Moisset et al., 2012).

Methodology

Type of research:

This research is qualitative, with an action research design (Hernández et al., 2010), (Medina, 2001). The solutions required came from collaborative work between villagers

and students in response to the needs of the scenario (Guba and Lincoln, 1994). On the other hand, ethnography was used as a method of approaching the camp.

Study subjects:

24 students from the Architecture Research Workshop (ETI), 14 women and 10 men. For a better ordering of the information, the participants were identified as ETI (Architecture Research Workshop student).

Collaborating subjects:

2 leaders and 10 residents of La Cancha de Lo Barnechea Camp.

Object of study:

The teaching and learning of 24 students in an Architectural Research Workshop, focused on collaborative, situated and active work with the inhabitants of a camp.

Scenario / context:

La Cancha de Lo Barnechea Camp.

Information gathering instruments:

Semi-structured interview of 12 questions in Google format, self-administered and returned within two weeks. The instrument was duly validated by peer reviewers from two universities.

Information analysis:

The information was analyzed based on open, axial and selective matrices, grouping the questions and their answers based on the structuring categories: social housing and camps as teaching subjects, architecture and learning in the camp, proposals of project hypotheses designed between students and settlers, students' self-criticism about the developed project hypotheses, and research as a way to access disciplinary knowledge.

Techniques and Technologies to Gather Information

The use of digital tools such as Google Earth (KMZ) facilitated the understanding of the scale and globality of the context. Likewise, the review of the photographic record allowed us to obtain information on atmospheres, spaces and housing solution typologies, among others.

Results

The Camp as a Place to Learn

The camps are characterized by housing built with precarious materials (Palma and Pérez, 2020) (Palma and Pérez, 2020), without adequate planning and basic services. In short, of great social and economic vulnerability economic (López-Morales et al., 2018), (Magliano and Perissinotti, 2020).

On the other hand, addressing these issues is of real importance, since it confronts us with the Chilean reality and the problem of social housing and its deficit (ETI-9). It can be inferred that architecture, from its multiple topics, seeks to build by and for the person, so that proposing these topics to architecture students contributes to professional and personal training (ETI-9). That is, future architects recognize and value the importance of addressing them academically, as part of a cultural and technical asset, capable of

nurturing the broad, inclusive and heterogeneous training that young architects need to look at these realities of Chile in a different way (Brain et al., 2010) (Brain et al., 2010). Others add that looking and looking at these issues is very useful because it allows to get out of the bubble (ETI-7) and brings us closer to the reality of the country, showing that, through architecture, with small interventions, big changes can be made for others (ETI-12). The recognition of living in a bubble puts in tension the beliefs and worlds constructed inside and outside that environment. Opening up to other realities not only expands the physical and cultural space (Quinteros, 2016), but it is also an opportunity for contact, knowledge, and perhaps, the transformation of the thinking of architects in training.

Similarly, other young people interviewed corroborated, from different perspectives, the value of the experience of context, attributing to it a profoundly transformative character. This, thanks to the fact that the Architecture Research Workshop opened a door for them to enter the reality in which people live in these settlements, since many students do not know what the camp means, not knowing what happens, and how they face the day to day life in these places of precariousness (ETI-18), but which, however, cohesively unite their inhabitants with a great sense of community and solidarity. However, for others, it strains the aims of the profession, pushing them to think about other practical approaches to their practice, since, as ETI-21 states, "this experience was a shock to my perception of what architecture is and what I should seek with it". This reality check puts young trainees in front of the opportunity to manage and activate revolutionary changes, playing a fundamental role in improving living conditions in camps (Brain et al., 2010).

The Camp from the Inside

To enter into contact with others and their territories implied actions and acts of trust, prudence and respect. Ethnography was the tool that allowed the approach to people and their worlds, paving the way for deeper interactions about how people live and dream in those environments... (Aedo, 2020) (Aedo, 2020). Ethnography made it possible to make observations and stays in the field, which allowed us to feel the pulse of daily life, that is, the collection of qualitative information on the use that people make of the spaces and how the symbolic and identity elements of the community and its culture make sense there.

The ethnographic approach helped students to get to know the scenarios and their users, making possible the joint search for viable and functional solutions to their problems (Ruiz, 2022). According to one of the students interviewed, going to the camp was to encounter a different reality, very hard, but at the same time extremely hopeful (...) to see how the hope of people with scarce means rises, it is hopeful (ETI-16). In other words, having an entry to the field allowed for greater knowledge and management of the data collected, so it is now considered a primary factor to be taken into consideration (ETI-22). According to Castillo et al., (2022), the community of these places is configured by diverse requirements in scale and urgency, however, they all converge in a common attitude; the capacity and resilience to face the challenges that each day brings. The reading of these needs put the students in front of a shocking, extreme and real reality

(ETI-19) but that, to the future architects, motivates them to rethink the career from a new perspective where not everything is design (ETI-7).

Collaborative Work and Design

The development of collaborative proposals between students and villagers was a way to integrate the community into the students' ideas and the students into the development of these ideas with the community (Zapata and Vidal, 2016). Clearly, this way of working led to grounded results, directly related to people's wishes and expectations (Cortés, 2020) (Cortés, 2020). Likewise, both students and inhabitants shared valuable knowledge that enriched each other's learning in context (Tapia, 2001) (Tapia, 2001). Likewise, the students came into contact with a modality of design correction foreign to the usual university classroom, since it was the inhabitants who, on more than one occasion, adjusted them, thus contrasting the idealization of certain project solutions, versus the common sense and practicality coined in their innumerable experiences of self-construction (Castillo, 2014). This exercise gave rise to several solutions: circuits and routes, construction systems to reinforce housing, shade-generating fabrics, gardens and vegetation to generate collective identity, the safeguarding of routes, among others, were transcendent achievements of residents and students, goals that for some meant opening their minds beyond the immediate.

The encounter between the theoretical knowledge of the students and the empirical knowledge of the villagers was much more than a teaching opportunity. There, the visions of the academy and the real world, not regulated by the ordinance or technical abstractions, were harmoniously and generously woven together (Gómez et al., 2017). In Eti-8's words, “I felt like another teacher was correcting me. After all, they have built everything they have themselves, and we haven't even put a nail in it yet.”

Self-Criticism as an Attitude of Constant Improvement

Students reflected constructively and specifically, not only to improve the quality of work, but also to foster personal and professional growth. This action was of great relevance, since it was based on the work developed with others without academic training. Consequently, the construction of knowledge influenced both actors by improving expectations about the built environment, and enriching the empirical and technical training of architecture.

The perceptions of the participating students show that, together with the extraordinary value of the collective work converging towards relevant project hypotheses, the creative result achieved was also recognized and positively valued. ETI-22, says that “it was a very good proposal and I was satisfied with my work, which I would not have been able to develop in this way if we had not had the opinions of the inhabitants of the camp”. However, the evidence collected also mentions areas for improvement. Such is the case of those who, having achieved good project hypotheses, were not satisfied, expressing that it is possible to improve them for the benefit of the inhabitants and of learning itself. ETI-14, said that “our project hypothesis responded very well to the

problems and the context of the camp, perhaps with more time it could have been developed better, because it fulfilled very well what the inhabitants wanted in that sector". This speaks very well of the students and implies short-term improvement challenges.

Research and Disciplinary Knowledge

In university academia, research in architecture has been a formal path towards the acquisition of new disciplinary knowledge generating strategies (Martínez, 2013). In the case of the camp, the students, accompanied by their teachers, went through a systematic process of exploration that helped them to enrich various aspects of the discipline. As such, it became a relevant experience by providing various critical and technical elements, with which young people could and will be able to face the demanding present and future fields of the discipline. It also educated the intellect, sensitivity and nourished the eye with new visions that illuminated the path towards innovation, strengthening the appreciation of the discipline as a means to propose systematic and creative responses to the changing social, political and economic scenarios of a country like Chile (Correal, 2007) (Correal, 2007). Consequently, the work methodologies of the Architectural Research Workshop also stand out: flexibility, emergence in adherence to scientific rigor, which, added to the field work, provided a real and situated learning exercise. Key to these achievements is the attitude and willingness of the young people (Chávez, 2015).

In summary, it can be said that the Workshop focused on solving problems that few had taken into account, because as ETI-23 said, "the result was gratifying for me as a student and for the people we helped". Consequently, for several of the students it proved to be a key experience in their training, and a way to become familiar with the real world, since, as ETI-2 recounted, "it is the first time they have made us do something in relation to reality". It can be inferred that these transformational experiences are not only valued as facts of a research course. ETI-24, said they are "relevant in the learning and training of an architect, because I was able to discover what I want to do when I become an architect".

¶ (12 points)

Figure 1: General view of la cancha camp. Own source

Figure 2: Digital representation of a collective intervention proposal. Own source

Figure 3: Digital representation of a collective intervention proposal. Own source

Figure 4: Digital representation of a collective intervention proposal. Own source

Discussion and Conclusions

Discussion:

The ideas of Fuster-Farfán et al., (2023), regarding the pedagogical value of learning in a camp, are widely corroborated by the students' experience, since making the space a place to learn and learn also meant the opportunity to rethink their imaginaries and contrast their negative perceptions of the place.

Therefore, incorporating the study of camps in the training of architects is not only a matter of disciplinary relevance, but also of ethical commitment. Future professionals should be trained to face the multiple realities of urban living, which implies understanding the structural causes of housing informality, including urban segregation and inequity in the distribution of resources. Therefore, the critical view becomes a pedagogical tool by allowing the tension of hegemonic narratives about the urban, focused on formality, planning and normative design, with respect to the opposite.

This approach motivated architects in training to engage in more inclusive processes, understanding encampments as legitimate expressions of the right to housing. According to Imilan et al. (2020), encampments emerge as a direct response to the impossibility of accessing formal housing. Therefore, it was key for the students to see how perceptions dialogue with theories, since these respond to an academic vision of the subject that, at the same time, has a correlation in reality. The generation of informal territories perpetuates social exclusion by not recognizing the community dynamics that are generated in these spaces, which the students were able to corroborate directly. As pointed out by Zenteno et al. (2020), the lack of studies that consider the inhabitant as an active subject and not as a passive recipient of solutions, produces a distant, decontextualized and, in many cases, ineffective knowledge. It is at this point where students connect with the context through the execution of intervention proposals elaborated jointly and in response to real needs.

The purely technical or legal approach to the camp makes its socio-affective complexity invisible. The contributions of Matus et al., (2019), as well as those of Castañeda and Hernández (2021), underline that the camp is not only a set of informal dwellings, but a web of relationships, affects and resistances. This community fabric sustains daily life in precarious conditions and helps build a deep sense of belonging. Fernandez (2023), reinforces this idea by showing how the precarious space can be symbolically transformed into a place for everyone, where students and teachers were also welcomed and accepted.

On the other hand, Vergara and Reyes (2009), Guber (2005), Balbi (2012), in summary, refer to the camp as a place where relationships are generated and built that allow cohesive respect for the place and the points of view of the settlers. It would not have been possible to know such dimensions and their depth if not from the inside. Access through ethnographic methodology allowed this to happen, benefiting the students with experiences that, with the passage of time, would change their imaginaries and enrich the experience of working and creating with others.

Working collaboratively and learning from others, even being guided by people who were not their teachers, not only allowed the generation of design solutions, but also implied valuing the knowledge of others in an unthinkable context. Likewise, these experiences strengthened their training and multiplied the possibilities of projecting it in

their professional practice as architects. This issue is supported by Terán and Araujo (2016), Piñero (2012), Vivero et al., (2020) and Cleveland (2013).

The development of the field work in a real context provided the students with an unbeatable perspective of investigative learning. Consequently, the possibility of generating scientific knowledge through interaction was opened up, since the academic knowledge carried by the young people was put in tension with the empirical dimension of the local inhabitants. These experiences are congruent with what Ander Egg, (2011), Daza, (2009) and Moisset et al., (2012) propose, when addressing the relationship between architecture and people, based on scientific research methods in which the historical and cultural contexts of the buildings are present, as well as their impact on the quality of life of the users.

Conclusions:

Working academically from and in the camps implies opening up to a situated architecture that understands the logics of informal habitation. Therefore, including its study in the curricula not only enriches professional training, but also enables a thinking more committed to spatial-social justice and a breadth of vision that strengthens the training of students.

The access to the space of the camp and its inhabitants was woven by a series of relational codes impossible to understand if not from the inside. Therefore, the use of ethnographic methodology allowed us to understand the needs and aspirations of the communities from the inside. It was also a deeply phenomenological way of access and encounter, which gave more solidity to the students' initial perceptions.

The development of collaborative designs of project hypotheses had interaction as the main dynamic, an action that was highly valued by both parties. In this sense, the approach of co-creation processes, nurtured by the knowledge of both actors, resulted in pertinent solutions adjusted to the local reality, promoting mutual learning and generating in the students the certainty that architecture (design) can be done beyond the fiction of the university classroom.

The design process motivated the students to do their best. However, in this process, self-criticism was a constant driving force for improvement that pushed the demands and capabilities towards a new culture, which could be extrapolated to a responsible, rigorous and quality professional practice.

The research in architecture, thanks to the case study and its methodology, provided a transformative tool, connecting the world of the university classroom with the real world, where the theories and simulation exercises of university teaching, took shape in the consensual resolution of viable architectural proposals to solve contingent problems.

The architecture workshop and its theme was one of the most highly valued aspects, as it articulated the classroom and the territory, favoring direct contact with reality. Therefore, having developed a field work in a camp, meant for all participating students, an invaluable and transformative experience that broadened perceptions about the functions and roles of architecture and architects.

Finally, the research work experience provided the professors with the opportunity to try out new topics and analyze the feasibility of incorporating them into the architectural research curriculum, as well as their methodologies.

References

Aedo, A. (2020). Vidas en los bordes: una etnografía de la condición fronteriza. *Disparidades. Revista De Antropología*, *75*(1), e003. https://doi.org/10.3989/dra.2020.003

Ander Egg, E. (2011). *Aprender a investigar. Nociones básicas para la investigación social*. Editorial Brujas. https://archive.org/details/AprenderAInvestigarNocionesBasicasAnderEggEzequiel2011.pdf/page/n3/mode/2up

Balbi, F. (2012). La integración dinámica de las perspectivas nativas en la investigación etnográfica. *Intersecciones en Antropología, 13*(2), 485-499. https://www.scielo.org.ar/pdf/iant/v13n2/v13n2a13.pdf

Baudrillard, J. (1978). *Cultura y simulacro*. Editorial Kairós.

Brain, I., Prieto, J., and Sabatini, F. (2010). Vivir en Campamentos: ¿Camino hacia la vivienda formal o estrategia de localización para enfrentar la vulnerabilidad? *Revista EURE - Revista De Estudios Urbano Regionales*, *36*(109), 111-141. https://doi.org/10.4067/S0250-71612010000300005

Castañeda-Pérez, Y., and Hernández-Ramírez, A. C. (2021). Ciudad informal, territorialidades de producción social del espacio urbano en asentamientos humanos (Armenia - Quindío (Colombia). *Ciudad Y Territorio Estudios Territoriales*, *53*(207), 141–152. https://doi.org/10.37230/CyTET.2021.207.08

Castillo Couve, M. J. (2014). Competencias de los pobladores en vivienda y barrio: trayectoria y experiencias recientes en Chile. *América Latina Hoy, 68*, 17–37. https://doi.org/10.14201/alh2014681737

Castillo, M., Sanhueza, C., Rosales-Salas, J., and Sandoval, D. (2022). Pobreza de tiempo, género y vivienda social en Santiago de Chile. Un análisis cualitativo. *EURE*, *48*(143) https://dx.doi.org/10.7764/eure.48.143.05

Chávez, J. D. (2015). *La investigación en los campos de la arquitectura: reflexiones metodológicas y procedimentales*. https://repositorio.unal.edu.co/handle/unal/79559

Cleveland, M. (2013). *Aprendizaje servicio desde el enfoque comunitario*. Tesis de magister. Universidad de Chile. https://repositorio.uchile.cl/handle/2250/117384

Correal, G. (2007). El proyecto de arquitectura como forma de producción de conocimiento: Hacia la investigación proyectual. *Revista de Arquitectura.* 48-58 https://dialnet.unirioja.es/servlet/articulo?codigo=4070876

Cortés Mancilla, R. (2020). Una práctica-teórica rizomática des/territorializada. Intervención en co-labor con el campamento Felipe Camiroaga. *TS Cuadernos De Trabajo Social*, (20), 78 - 101. https://tscuadernosdetrabajosocial.cl/index.php/TS/article/view/175

Daza, S. (2014). Investigación - creación un acercamiento a la investigación en las artes. *Horizontes pedagógicos*, *11*(1). https://horizontespedagogicos.ibero.edu.co/article/view/339

Fernández Labbé, J. (2023). Estigma y resistencia: acción institucional y autogestión comunitaria en Alto Hospicio, Chile. *Convergencia*, *30*, e20354. https://doi.org/10.29101/crcs.v30i0.20354

Fuster-Farfán, X., Ruiz, J. I., and Henry, L. (2023). Las periferias de la periferia: producción de ciudad y política habitacional en Chile. Territorios, (49), 1-27. https://doi.org/10.12804/revistas.urosario.edu. co/territorios/a.12404

Ibarrola, M. (2023). Capacidad crítica del estudiante universitario. La importancia de la formación en la académica, de Raquel Glazman Nowalski. *Revista mexicana de investigación educativa*, *28*(96), 333-338. Epub May 05, 2023. http://www.scielo.org.mx/scielo.php?script=sci_arttext&pid=S1405-66662023000100333&lng=es&tlng=es.

Gómez, A., Gonnet, A. and Lema, R. (2017). Fundamentos de los campamentos educativos: análisis de la primer Consulta sobre Campamentos realizada por la Federación Sudamericana de Asociaciones Cristianas de Jóvenes (1961). *Revista Universitaria de la Educación Física y el Deporte.* http://dx.doi.org/10.28997/ruefd.v0i10.109

Guba, E. G. and Lincoln, Y. S. (1994). Competing paradigms in qualitative research. In: N. K. Denzin and Y. S. Lincoln (Eds.), *Handbook of Qualitative Research* (pp. 105-117). Sage.

Guber, R. (2005). *La etnografía, método, campo y reflexividad.* Grupo editorial Norma.

Hernández, R., Fernández, C., & Baptista, P. (2010). *Metodología de la investigación*. Editorial Mc Graw Hill.

Imilán, W., Osterling, E. Mansilla, P. and Jirón, P. (2020). El campamento en relación con la ciudad: informalidad y movilidades residenciales de habitantes de Alto Hospicio. *Revista INVI*, *35*(99), 57-80. https://dx.doi.org/10.4067/S0718-83582020000200057

López-Morales, E., Flores Pineda, P. and Orozco Ramos, H. (2018). Inmigrantes en campamentos en Chile: ¿mecanismo de integración o efecto de exclusión? *Revista INVI*, *33*(94), 161-187. https://dx.doi.org/10.4067/S0718-83582018000300161

Magliano, M. J., and Perissinotti, M. V. (2020). La periferia autoconstruida: migraciones, informalidad y segregación urbana en Argentina. *EURE (Santiago)*, *46*(138), 5-23. https://dx.doi.org/10.4067/S0250-71612020000200005

Martínez Osorio, P. A. (2013). El proyecto arquitectónico como un problema de investigación. *Revista de Arquitectura (Bogotá)*, *15*(1), 54–61. https://doi.org/10.14718/RevArq.2013.15.1.6

Matus M., Christian P., Ramoneda, A., & Valenzuela, F. (2019). La integración social como desafío: análisis del programa de campamentos en Chile (2011-2018). *Revista INVI*, *34*(97), 49-78. https://dx.doi.org/10.4067/S0718-83582019000300049

Medina Bermúdez, C. I. (2001). Paradigmas de la investigación sobre lo cuantitativo y lo cualitativo. *Ciencia e Ingeniería Neogranadina,* (10), 79-84.

Moisset, I., Naselli, C., Paris, L., and Pedrazzani, M. J. (2012). *La ciudad en transformación, Investigar y proyectar: Fronteras híbridas.* I+p editorial. Universidad Católica de Córdoba. https://inesmoisset.com/wp-content/uploads/2016/03/fu2_la-ciudad-en-transformacion_moisset_ctapa.pdf

Palma, C., and Perez, M. (2020). Migrantes en campamentos: autoconstrucción, aspiraciones de permanencia e integración en Santiago de Chile. *Antropologías Del Sur*, *7*(14), 15-33. https://doi.org/10.25074/rantros.v7i14.1608

Piñero, I. (2012). Identidad y aprendizaje personal del estudiante universitario en el cumplimiento del servicio comunitario. *REDHECS Revista Electrónica de humanidades y comunicación social,* *7*(12). https://biblat.unam.mx/hevila/Revistaelectronicadehumanidadeseducacionycomunicacionsocial/2012/no12/8.pdf

Quinteros, C. (2016). Construyendo territorios: Una nueva mirada a los procesos de convivencia comunitaria en los campamentos de Chile. *Revista CIS.* https://dialnet.unirioja.es/servlet/articulo?codigo=6310248

Ruiz, S. (2022). Estrategias de enfrentamiento de la estigmatización territorial. Etnografía en una población de Santiago de Chile. *Revista de Ciencias Sociales*, *35*(51), 171-189. https://doi.org/10.26489/rvs.v35i51.8

Tapia, M. (2001). *La solidaridad como pedagogía: El aprendizaje servicio en la escuela*. Editorial Ciudad Nueva.

Terán González, C. del C., and Araujo, W. J. (2016). El Servicio Comunitario, Una Mirada Teórica. *Revista Scientific*, *1*(2), 54–74. https://doi.org/10.29394/scientific.issn.2542-2987.2016.1.2.4.54-74

Vergara, F., Reyes, M. (Coords). (2021). *Catastro Nacional de Campamentos 2020 – 2021. Informe Ejecutivo.* TECHO, Fundación Vivienda, CES.

Vivero Arriagada, L., Molina Chávez, W., and Standen Silva, D. (2020). Un análisis crítico al modelo aprendizaje servicio: Su implementación en la Universidad Católica de Temuco. *Sophia Austral,* (25), 121-137. https://dx.doi.org/10.4067/S0719-56052020000100121

Zapata, F. and Rondán, V. (2016). *La Investigación Acción Participativa: Guía conceptual y metodológica del Instituto de Montaña*. Instituto de Montaña.

https://mountain.pe/recursos/attachments/article/168/Investigacion-Accion-Participativa-IAP-Zapata-y-Rondan.pdf

Zenteno, E., Sepúlveda, K., Ahumada, J. and Díaz, J. (2020). De ciudadanías insurgentes a planificadores, urbanos. Organización social en la urbanización del campamento Manuel Bustos de Viña del Mar. *Revista de geografía Norte Grande*, (77), 157-172. https://dx.doi.org/10.4067/S0718-34022020000300157

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Personalized feedback report for the second administration of standardized language proficiency tests at the British Council Colombia locations

Reporte de feedback personalizado para la segunda toma de pruebas de habilidades lingüísticas estandarizadas en las sedes del British Council de Colombia

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ABSTRACT

International language proficiency assessments have gained increasing importance in Colombia over the years, becoming a fundamental requirement for thousands of citizens who aspire to achieve academic goals, fulfill demanding job requirements, or manage migration processes. However, the lack of detailed reports that provide candidates with effective, constructive and timely feedback creates the need to retake the test again when results are unfavorable, which significantly hinders their overall progress, preparation and confidence with their abilities.

This proposal aims to design a feedback report specifically tailored for individuals taking the IELTS for the second time at the British Council in Colombia. The main objective is to enable them to fully understand their strengths and recognize specific areas that require improvement while also providing practical strategies to reinforce the aspects that pose difficulties. Through a professionalizing approach and based on responses to a carefully designed questionnaire containing dichotomous and Likert-scale questions, some of them justified, this study highlights the essential role that meaningful, personalized feedback plays in optimizing learning outcomes. Additionally, this proposal underscores the relevance of considering the candidates' prior knowledge and how it evolves after receiving constructive and timely feedback. It also acknowledges the influence of emotions and both internal and external factors in the evaluation process, positioning these reports as key tools to transform traditional assessment methods into a more human-centered and effective approach.

Palabras clave:
Feedback, Aprendizaje significativo y generativo; Habilidades

RESUMEN

Las evaluaciones internacionales de competencia lingüística han cobrado una importancia creciente en Colombia a lo largo de los años, convirtiéndose en un requisito fundamental para miles de ciudadanos que aspiran a alcanzar metas académicas, cumplir exigentes requisitos laborales o gestionar procesos migratorios. Sin embargo, la falta de

lingüísticas; Exámenes de estandarización; IELTS	informes detallados que proporcionen a los candidatos una retroalimentación efectiva, constructiva y oportuna genera la necesidad de repetir la prueba nuevamente cuando los resultados son desfavorables, lo que dificulta significativamente su progreso, preparación y confianza en sus habilidades. Esta propuesta tiene como objetivo diseñar un informe de retroalimentación específicamente adaptado para las personas que presentan el IELTS por segunda vez en el British Council de Colombia. Su propósito principal es permitirles comprender completamente sus fortalezas y reconocer áreas específicas que requieren mejora, además de proporcionar estrategias prácticas para reforzar los aspectos que representan dificultades. A través de un enfoque profesionalizador y basado en respuestas a un cuestionario cuidadosamente diseñado con preguntas dicotómicas y de escala Likert, algunas de ellas justificadas, este estudio resalta el papel esencial que desempeña una retroalimentación significativa y personalizada en la optimización del aprendizaje. Además, esta propuesta destaca la relevancia de considerar el conocimiento previo del candidato y cómo evoluciona al recibir una retroalimentación constructiva y oportuna. También reconoce la influencia de las emociones y de factores internos y externos en el proceso de evaluación, posicionando estos informes como herramientas clave para transformar los métodos tradicionales de evaluación en un enfoque más humano y efectivo.

Introduction

The Colombian educational system has evolved significantly over the years. While education was based on memorization in the colonial period, and students were measured by the results achieved; today the evaluation process is based on three important stages: diagnostic evaluation, formative evaluation and summative evaluation.

While the first determines the student's initial knowledge, the second focuses on the progress of the process, and the third measures the achievements attained by the learner.

Although the act of evaluating is the same, each approach provides a perspective to better understand the educational process, ultimately, evaluation should be understood as a practice that transcends the simple calculation of results, and that not only values the achievements obtained, but also examines and reflects on the processes that generate them, identifying for this purpose the factors that positively or negatively influence such processes, thus developing tactics to optimize them (Mato and Vizuete, 2019).

To speak of evaluation without *feedback* is meaningless. Through *feedback,* the learner identifies his or her strengths and areas for improvement, allowing him or her to make effective adjustments to enhance his or her learning and academic growth.

Moreno and Ramírez (2022) correctly refer to it when they state that a good feedback process allows students to understand where they are in relation to their learning, and also guides them on the steps to follow, thus favoring their understanding. With clarity about what to do and why to do it, it is common for them to develop greater confidence in their ability to learn independently. Such autonomy is now a key skill valued in education systems around the world.

Despite educational advances in Colombia, foreign entities evaluate the linguistic competence of thousands of Colombians through international standardized tests. The lack of meaningful feedback, however, prevents candidates from understanding the source of their score. This disconnection with the progress of the Colombian education system is a challenge, as it does not reflect the advances achieved in the last five decades.

The question may arise at this point as to what internationally standardized tests are. These are essentially instruments developed by global entities with the purpose of homogeneously and comparatively measuring the performance of students in different countries or educational systems (Ferrer and Arregui, 2003; Olmeda, 2016, cited in Demarchi, 2020). A person's linguistic performance is evaluated through tests that cover *oral* and *written expression*, *listening* and *reading comprehension*, depending on the nature of the language and the test. In Colombia there is a wide offer of these *tests,* some of them are: dELF (French), TestDaf (German), CELI (Italian), IELTS (English), among others.

Standardized tests place candidates (test takers) in language levels according to the Common European Framework of Reference for Languages (CEFR), from basic level (A1-A2) to advanced level (C1-C2). However, the results lack customized reports that explain the ranking and provide information on strengths and areas for improvement. This lack of feedback makes it difficult for candidates to identify areas to work on, limiting their progress and affecting their chances of achieving their objectives.

For Zeller (2024), meaningful feedback goes beyond applying rubrics or grading students in an analogous way. It consists of offering personalized feedback that recognizes the strengths, weaknesses and particularities of each person, taking into account not only the cognitive and motivational aspects, but also the impact of the emotional component in the learning process.

On this basis, it is worth mentioning meaningful learning, a concept linked to evaluation and *feedback*, which has played a predominant role for decades. Proposed by psychologist and educator David Paul Ausubel, this approach places the learner at the center of his learning, making him responsible for his knowledge and encouraging reflection on what he has learned and what he has yet to integrate.

Hence, Ausubel has alluded that students' prior knowledge represents a determining element in their learning process (Ausubel, 1983).

When someone recognizes what they have learned, what they are incorporating, and what they need to improve, a learning triad is generated that re-signifies knowledge and allows for a 100% real educational process. However, this is not what is always observed in reality. There remains the feeling that, in some educational spaces, the idea of training students to correctly respond to local and international standardized tests prevails, and that the most successful institutions are those with the highest number of students passing such tests (Moreira, 2017).

When language tests are aligned with standardization systems, they prioritize training on specific question types, promoting mechanized learning. The absence of meaningful feedback makes it difficult for candidates to identify their strengths and areas for improvement, affecting their academic, employment or immigration progress.

Hence, any learning process should focus on what, how and for what is learned, allowing learning to be genuine and transcend the classroom and the digital. Feedback is key to student development, considering that learning involves emotions, mind and body.

Consequently, if any of the parts that make up the human being are altered or modified, the system is totally affected, provoking a response that takes it back to the point where the transformation began (Zeller, 2024).

A person's emotional state during an assessment can influence their results, affecting their mental, emotional and physical well-being. Therefore, the educational and evaluation system must be based on a systemic approach, where each element is interconnected, since a correct articulation generates a positive impact, while its fragmentation may affect its overall functioning.

According to Herrscher (2003), the system character of an institution does not come from its material structure, but from the way it is perceived. For those who see the school as a coherent interaction among its elements oriented to the formation of the student, they understand it as a system. On the other hand, if there is no perceived connection between what is happening, teachers seem to work in isolation and there is no shared goal, what is observed is simply a set of material and human resources without any integration.

Talking about evaluation from a systems thinking perspective implies understanding education from a generative learning perspective. This approach allows the learner to integrate previous knowledge with new knowledge, transforming his or her thinking (*Metanoia*) and interpretation of acquired knowledge.

When the results do not match what was expected, feelings of failure may arise. However, by assuming the obstacles as learning opportunities, thinking and learning are re-signified and transformed, transcending the conventional and expanding the consciousness of the student/candidate.

Zeller (2024) posits that the authentic educational process occurs when the learner is challenged to go beyond his or her own limiting beliefs and perceptions. In this process, he is recognized as an active agent of change, capable of integrating his previous knowledge, what he did not know and the learning recently acquired as a result of a new reality promoted from the educational environment.

Assessment, meaningful and generative learning, along with systems thinking, only make sense if it is recognized that each person learns in a unique way. Your individuality determines your skills and opportunities for improvement, completely differentiating you from others.

As each person is unique and unrepeatable, learning styles are key in assessment, especially when it comes to international language testing. Not everyone learns in the same way, which makes it impossible to equate their skills or difficulties in language skills, for example.

As each person learns differently, some excel in kinesthetic learning, physically interacting with the environment; others prefer visual learning, based on images and texts; some favor auditory learning, processing information better through sounds. There are also those who learn in a theoretical way, while others require experimentation for a more experiential learning.

This demonstrates the uniqueness of each human being in learning. Equalizing performance ignores diversity, limiting individual potential and reducing the infinite possibilities that exist.

The theoretical constructs elucidated demonstrate that feedback is not equivalent to categorizing or standardizing a learner, ignoring his individuality and his way of approaching knowledge.

In the Colombian education system, learning English has been a priority. The international English tests most chosen by Colombians are the TOEFL *(Test of English as a Foreign Language)* and the IELTS *(English Language Testing System)*, the latter being the focus of this article.

If you are going to talk about IELTS, it is essential to start by knowing what it is. This is a standardized test that aims to measure the level of English proficiency of non-native English speakers. It is an internationally recognized test, used in multiple areas such as admission to educational institutions abroad, immigration or labor processes, and validation of language skills in front of different entities (IELTS Official Test Centre, n.d.).

IELTS has two modes: **General** and **Academic**. Those who opt for the former are those who wish to reside in a foreign country, while the latter allows the candidate to access higher education abroad (IELTS Official Test Centre, n.d.).

Both types of tests evaluate the 4 linguistic components of English: *oral* and *written expression*, *oral comprehension* and *reading comprehension*.

A comparison of the two types of tests shows that the *listening comprehension* and *speaking* components have similarities.

In the *listening comprehension* test, main ideas and specific information are identified in both types of IELTS. This component consists of 40 questions to be solved in 30 minutes, plus an extra 10 minutes for the answers to be transferred to the designated answer sheet. The number of correct answers obtained gives your grade.

The *speaking* test lasts approximately 14 minutes. It evaluates the ability to maintain a conversation in which the candidate provides opinions and arguments that justify his ideas. Grammar, pronunciation and consistency are key when rating this component.

Additionally, both types of tests share some similarities in *reading comprehension* skills such as: identifying specific information, both consist of 40 questions, both are designed to be answered in 60 minutes, and their score is based on the number of correct answers achieved. On the other hand, there are marked differences between the two. While the IELTS Academic has longer paragraphs, academic topics and not much variety

in the style of questions, the IELTS General is less long, its topics are about everyday life, and there is more variety in the type of questions asked.

Finally, in the *written expression* skill, both types of IELTS share some similarities: they both consist of two tasks. The first one corresponds to a 150-word paper to be completed in 20 minutes, and the second one is based on a 250-word paper to be written in 40 minutes. The total time for the two tests is 1 hour.

Aspects that differentiate the two tests in this skill are: while in IELTS General, the candidate must write a semi-formal letter for Task 1, in Task 2, the candidate must write an essay on a requested topic and whose writing style is personal. For IELTS Academic, the candidate must describe or explain a graph or table for the completion of Task 1. For assignment 2, you must write an essay that states your point of view on a topic that requires formality in writing style.

As noted earlier in this article, the CEFR standardizes candidates for international language tests at specific levels: A1, A2, B1, B2, C1, and C2. Although the IELTS lacks pass/fail labels, its score is decisive for a candidate to crystallize his or her goal.

Candidates are evaluated on a scale of 0 to 9, where 0 indicates no response and 9 reflects a high command of the language. To classify your proficiency level, scores are assigned in full bands or half-stripe scores (4.0, 5.0, 7.0 / 4.5). 5.5, 7.5: follows in successive order according to the type of band) (British Council Colombia, n.d.). Table 1 shows the word equivalent of each of the IELTS scores from 0 to 9.

The website of the British Council of Colombia explains how these bands are interpreted according to the number of correct answers in the *listening* and *reading comprehension* tests. This information is available at the link: https://www.britishcouncil.co/examen-ingles/ielts/puntaje

For *oral* and *written expression* skills, the candidate is evaluated by means of criteria that standardize him/her on a level from 0 to 9 (full ranges).

In the oral component, the IDP IELTS Colombia website (https://ielts.idp.com/colombia/results/scores/speaking/es-419) presents the evaluation criteria according to the classification bands (from 0 to 9). Fluency and coherence, lexical resources, grammatical range and accuracy, and pronunciation are assessed. These criteria can be consulted in the oral production band scores section in the link above.

Table 1

What does the IELTS test score mean?

IELTS score	Description
9	**Expert user:** He has a complete operational command of the language. His use of English is appropriate, accurate and fluent, and he demonstrates a thorough understanding.
8	**Very good user:** He has a fully operational command of the language with occasional unsystematic inaccuracies and inappropriate usage. You may misunderstand some things in unfamiliar situations. You handle complex and detailed argumentation well.
7	**Good user:** He has a working command of the language, albeit with occasional inaccuracies, inappropriate usage and misunderstandings in some situations. Generally handles complex language well and understands detailed reasoning.

6	**Competent user:** Generally has an effective command of the language despite some inaccuracies, misuse and misunderstandings. Can use and understand fairly complex language, especially in familiar situations.
5	**Modest user:** He has a partial command of the language and handles the general meaning in most situations, although he is likely to make many mistakes. You should be able to handle basic communication in your own field.
4	**Limited user:** Its basic competence is limited to family situations. Frequently shows comprehension and expression problems. Cannot use complex language.
3	**Very limited user:** You convey and understand only the general meaning in very familiar situations. There are frequent interruptions in communication.
2	**Intermittent user:** He has great difficulty understanding spoken and written English.
1	**No user:** He has no ability to use the language, except for a few isolated words.
0	**He did not attempt to perform the test:** He did not answer questions.

Note: British Council Colombia, (n.d.). *¿Qué significa mi puntaje IELTS?* https://www.britishcouncil.co/examen-ingles/ielts/puntaje

The IDP IELTS website (https://ielts.idp.com/results/scores/writing) specifies the assessment criteria for written tasks 1 and 2. In both cases, the achievement of the task, coherence and cohesion, lexical resource, and finally, grammatical range and accuracy are evaluated, considering the bands indicated. This information can be verified in the referred hyperlink.

Having outlined the general aspects of scoring in the IELTS, it is necessary to compare the CEFR levels with their equivalents in the IELTS. Table 2 shows this.

Table 2

Equivalences between CEFR and IELTS scores

Common European Framework	Score
A1 - Basic User	
Ability to communicate in a simple manner and understand everyday phrases.	**IELTS:** N/A
A2 - Basic User	
Ability to make simple and direct exchanges on familiar topics.	**IELTS:** N/A
B1- Independent User	
Proficiency in handling most travel situations and expressing opinions	**IELTS:** 4.0-5.0
B2- Independent User	
Ability to interact fluently and discuss a variety of topics.	**IELTS:** 5.5 - 6.5
C1- Competent User	
Ability to use the language effectively and flexibly in social and professional life.	**IELTS:** 7.0 - 8.0

C2- Competent User Language proficiency that allows spontaneous and precise communication in any context.	**IELTS:** 8.5-9.0

Note: British Council Colombia, (n.d.). ¿Qué significa mi puntaje IELTS? Guía de interpretación. https://www.britishcouncil.co/examen-ingles/ielts/blog/como-califica-ielts

Note: The original table on the referenced web page shows the equivalences between the Common European Framework of Reference for Languages (CEFR) and the international TOEFL and IELTS tests (both tests that assess English language skills). The table has been adapted to focus on the IELTS, which is what this article is really about.

Based on the above, it is relevant to review the report that candidates receive after taking the IELTS. This does not define whether or not they passed the *test,* but shows their level of language proficiency, aligned with the candidate's objectives. The test can be submitted without limit, although the certificate expires every 2 years. It is essential to consider that resubmission carries a significant cost.

It should be noted that, from 2023, Australia offers the option of repeating a section of the IELTS again to improve the score in a specific component. This alternative is known as *IELTS One Skill Retake.* The option has been extended to other regions and is only available to those who have taken the computer-based exam within 60 days. It does not apply to paper tests, and its cost in Colombian pesos is also considerable. *(This aspect was not included in the final work on which this article is based).*

Figure 1 exemplifies the report of a candidate who took the *Academic IELTS in 2012*. At the top you will find your personal data, the date of the exam and the codes of the venue and the candidate. The range of results in each linguistic component is also illustrated, the sum of which defines the final score and the level of proficiency.

At the bottom are the examiners' comments on oral and written expression, their codes, the administrator's signature and the date the report was issued. Figure 2, on the other hand, shows the back of the report with the description of the band scale from 0 to 9, which classifies the candidate according to the CEFR.

Compared to the CEFR, the IELTS report is much more specific in the Band 2 descriptor if the translation of this is reviewed:

> **BAND 2: INTERMITTENT USER**
>
> Real communication is not possible, except for the most basic information, using isolated words or short formulas in familiar situations and to satisfy immediate needs. Has great difficulty understanding spoken and written language. (IELTS Test Report Form, 2012)

It is relevant to note that this report lacks personalized feedback for each candidate. The space devoted to comments is minimal, which limits the possibility for the candidate to receive *feedback* on his or her strengths, areas for improvement and strategies for perfecting the required skills.

Figure 3 illustrates the report of a candidate who took the *Academic IELTS in 2014*. When contrasting this report with the one shown in Figure 1, it can be seen that both maintain the same structure and information, with no improvement in the form of feedback. The only difference lies in the candidate data and the scores obtained in each skill.

The final paper on which this article is based presents a third report, which evidences that, by 2022, the report communicated *feedback* in the same way. *(See Figure 4 of the final work)*.

When observing the scores that each of the candidates obtained in the examples of the two illustrated reports (Figures 1 and 3), it can be seen that, despite the fact that both candidates were standardized at level **B2**, their scores in the linguistic components were different. This raises the question of whether both made the same hits and misses in each skill. While the test standardized them according to their scores and the CEFR bands, each person has unique skills and opportunities for improvement, highlighting the importance of considering each person beyond a simple code or number (See *Table 3*).

Table 3

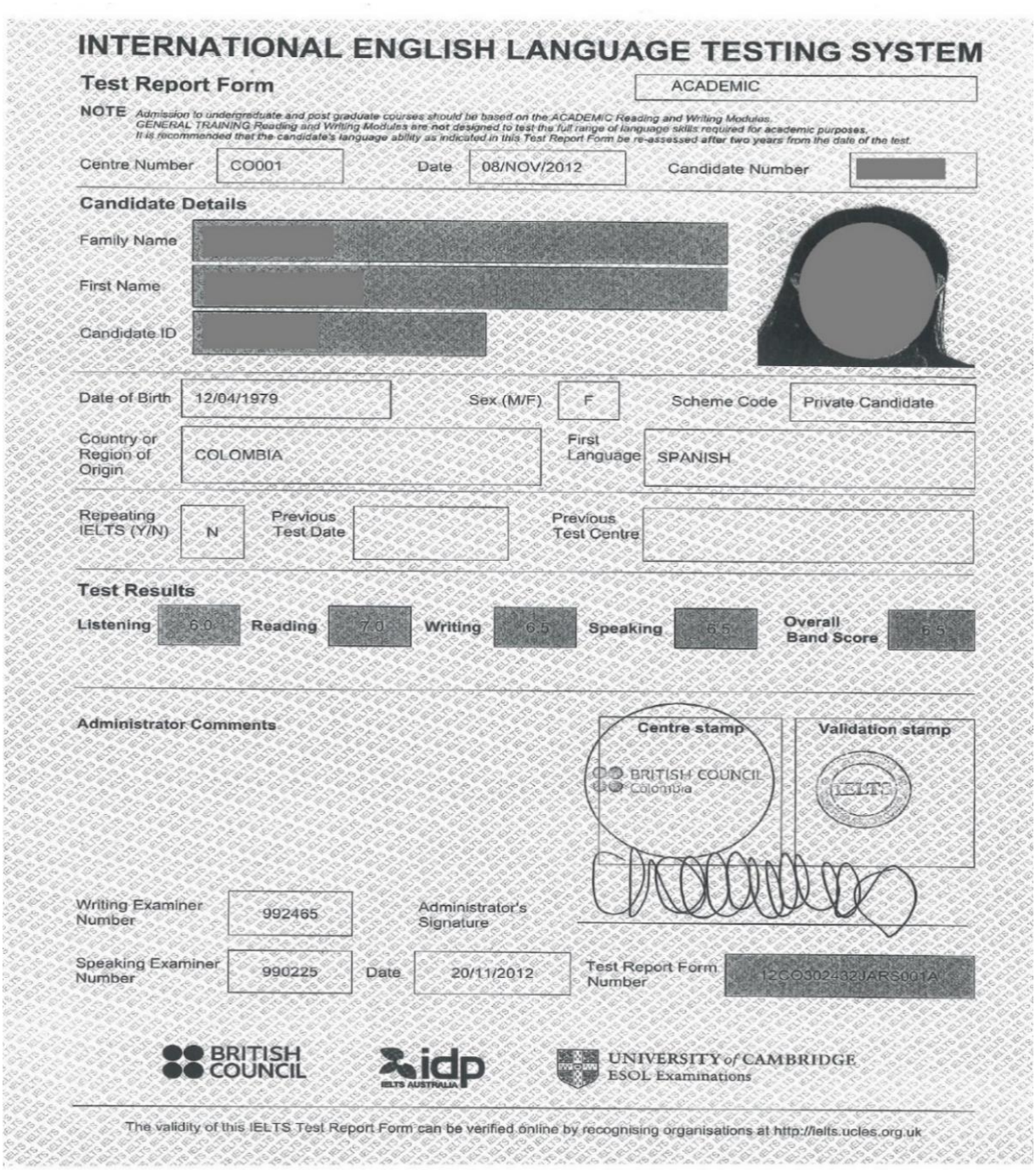
Results of 2 different candidates in each of the language skills in the IELTS Academic test, years 2012 and 2014

Month/Year test	Listen to	Reading	Writing	Oral	Score	CEFR
November 2012	6.0	7.0	6.5	6.5	**6.5**	**B2**
March 2014	5.0	5.5	6.0	7.0	**6.0**	**B2**

Note: British Council, idp IELTS Australia, and University of Cambridge ESOL Examinations, (2012). *International English Language Testing System, Test Report Form* vs. British Council, idp IELTS Australia, and Cambridge English Language Assessment, (2014). *International English Language Testing System, Test Report Form*.

Figure 1

Sample score report for a candidate who took the IELTS Academic in November 2012

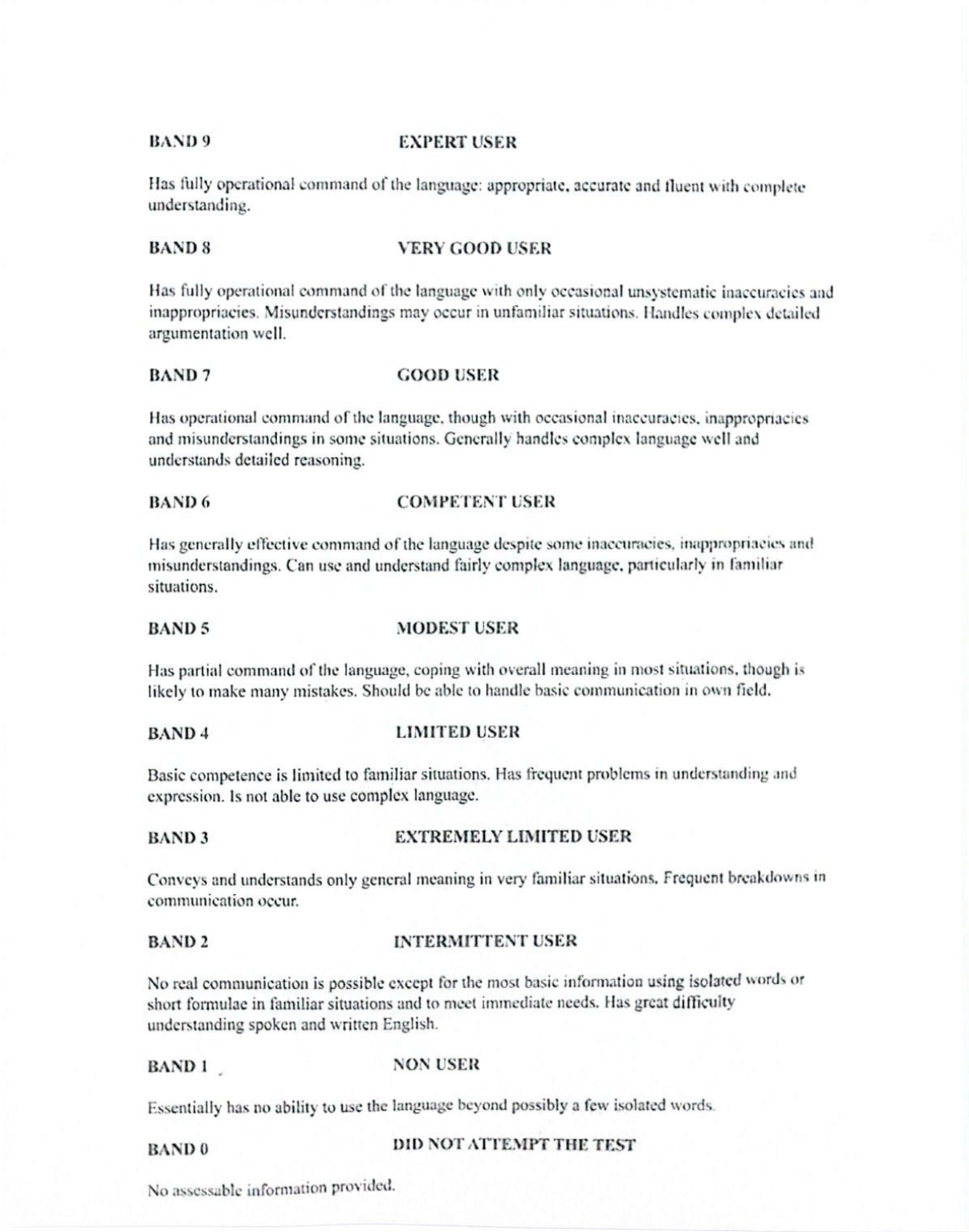


Note. Both the candidate's face and personal data were concealed in order to safeguard the candidate's identity and integrity.

Note. British Council, idp IELTS Australia, and University of Cambridge ESOL Examinations, (2012). *International English Language Testing System, Test Report Form*.

Figure 2

Example of the back sheet of the results report of the candidate who took the Academic IELTS in November 2012



BAND 9 **EXPERT USER**

Has fully operational command of the language: appropriate, accurate and fluent with complete understanding.

BAND 8 **VERY GOOD USER**

Has fully operational command of the language with only occasional unsystematic inaccuracies and inappropriacies. Misunderstandings may occur in unfamiliar situations. Handles complex detailed argumentation well.

BAND 7 **GOOD USER**

Has operational command of the language, though with occasional inaccuracies, inappropriacies and misunderstandings in some situations. Generally handles complex language well and understands detailed reasoning.

BAND 6 **COMPETENT USER**

Has generally effective command of the language despite some inaccuracies, inappropriacies and misunderstandings. Can use and understand fairly complex language, particularly in familiar situations.

BAND 5 **MODEST USER**

Has partial command of the language, coping with overall meaning in most situations, though is likely to make many mistakes. Should be able to handle basic communication in own field.

BAND 4 **LIMITED USER**

Basic competence is limited to familiar situations. Has frequent problems in understanding and expression. Is not able to use complex language.

BAND 3 **EXTREMELY LIMITED USER**

Conveys and understands only general meaning in very familiar situations. Frequent breakdowns in communication occur.

BAND 2 **INTERMITTENT USER**

No real communication is possible except for the most basic information using isolated words or short formulae in familiar situations and to meet immediate needs. Has great difficulty understanding spoken and written English.

BAND 1 **NON USER**

Essentially has no ability to use the language beyond possibly a few isolated words.

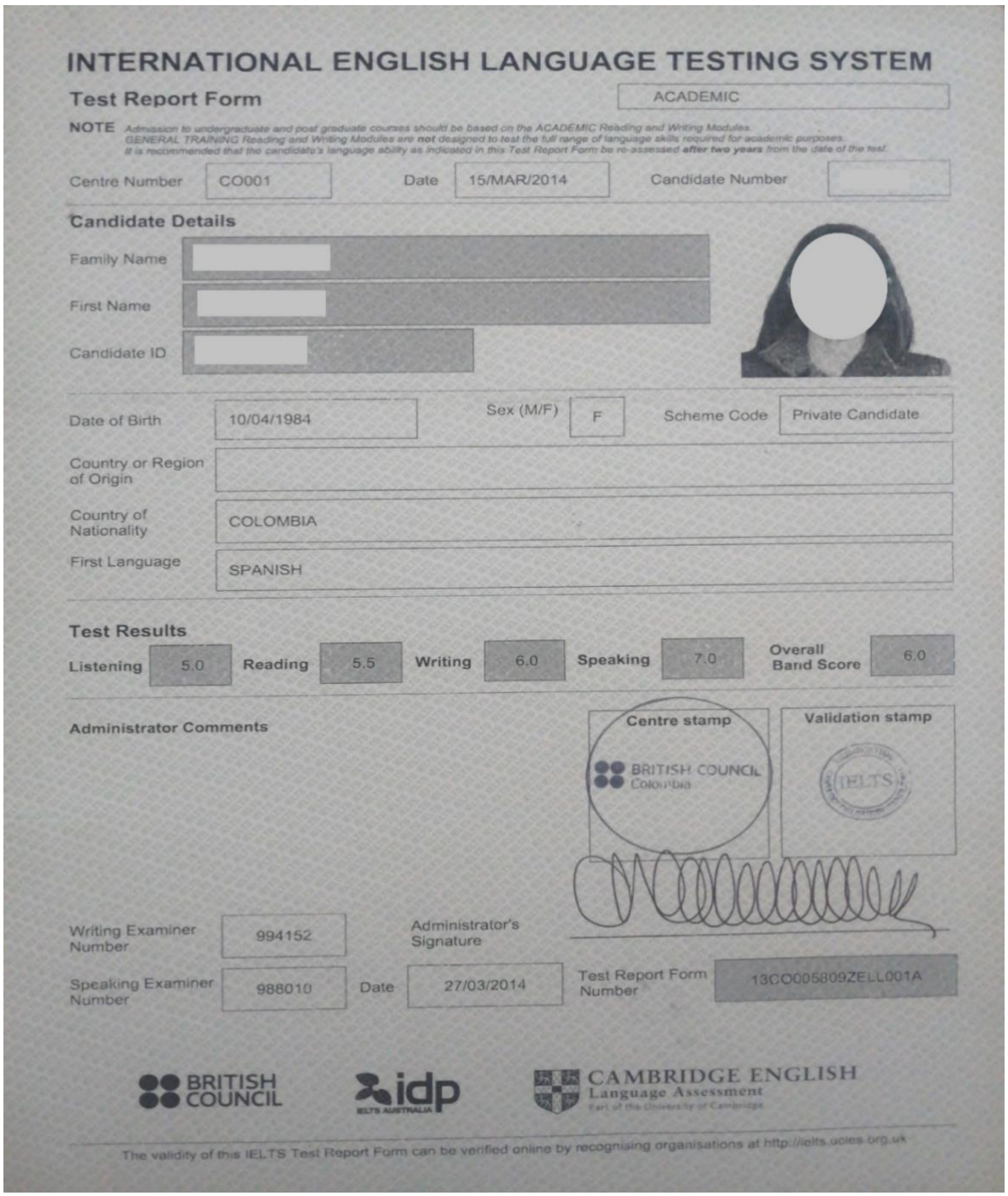
BAND 0 **DID NOT ATTEMPT THE TEST**

No assessable information provided.

Note. British Council, idp IELTS Australia, and University of Cambridge ESOL Examinations, (2012). *International English Language Testing System, Test Report Form*.

Figure 3

Sample score report for a candidate who took the Academic IELTS in March 2014



INTERNATIONAL ENGLISH LANGUAGE TESTING SYSTEM

Test Report Form — ACADEMIC

NOTE Admission to undergraduate and post graduate courses should be based on the ACADEMIC Reading and Writing Modules. GENERAL TRAINING Reading and Writing Modules are **not** designed to test the full range of language skills required for academic purposes. It is recommended that the candidate's language ability as indicated in this Test Report Form be re-assessed **after two years** from the date of the test.

Centre Number: CO001 | Date: 15/MAR/2014 | Candidate Number:

Candidate Details

Family Name: [redacted]
First Name: [redacted]
Candidate ID: [redacted]

Date of Birth: 10/04/1984 | Sex (M/F): F | Scheme Code: Private Candidate
Country or Region of Origin:
Country of Nationality: COLOMBIA
First Language: SPANISH

Test Results

Listening	Reading	Writing	Speaking	Overall Band Score
5.0	5.5	6.0	7.0	6.0

Administrator Comments

Centre stamp: BRITISH COUNCIL Colombia
Validation stamp: IELTS

Writing Examiner Number: 994152
Speaking Examiner Number: 988010
Administrator's Signature
Date: 27/03/2014
Test Report Form Number: 13CO005809ZELL001A

BRITISH COUNCIL · idp IELTS AUSTRALIA · CAMBRIDGE ENGLISH Language Assessment

The validity of this IELTS Test Report Form can be verified online by recognising organisations at http://ielts.ucles.org.uk

Note. Both the candidate's face and personal data were concealed in order to safeguard the candidate's identity and integrity.
Note. Given that the sheet on the back of the results report of the candidate who submitted the Academic IELTS in November 2014 is exactly the same as the one in Figure 2, it was decided not to include the image.
Note. British Council, idp IELTS Australia, and Cambridge English Language Assessment, (2014). *International English Language Testing System, Test Report Form*.

Method

This article arose from a project of a professionalizing nature, focused on filling the lack of a personalized *feedback* report to accompany the current IELTS English test

certificates. The methodology focused on designing rubrics to complement the candidates' results, providing them with meaningful feedback on their skills and areas for improvement, thus fostering linguistic development from an individual perspective. (*Tables 20-24, included in annexes 11-15 of the final paper, contain these rubrics. They were not included in this article due to their length*).

The research was based on a questionnaire with dichotomous and Likert-type questions, some of which required justification (see *Annex 4* of the final work). This was applied to 18 Colombians (inside and outside the country) who had taken the IELTS for academic, employment or immigration purposes.

Google Forms was used as a tool to record the data, due to its speed and efficiency in obtaining results. A timetable was also established outlining the steps to be followed to meet the objectives within the planned timeframe. Among the activities planned were the review of the bibliography for the theoretical framework, the selection of the population, the elaboration and application of the questionnaire, the description and analysis of the reports issued by the British Council, idp IELTS Australia, and University of Cambridge ESOL Examinations/Cambridge English Language Assessment, as well as the analysis of the data, obtaining the results and final conclusions.

Results

Google Forms was used to analyze the data. Tables designed for this purpose were used to code and classify the open-ended responses that justified some closed responses.

The results obtained led to the following findings:

All 18 participants took the IELTS test. *See figure 4*.

33.3% of the candidates took the IELTS to migrate to another country, a second 33.3% to access higher education, and the remaining 33.3% for employment purposes. *See figure 5*.

According to the number of times candidates had taken the test by that time, 55.6% took it once, 33.3% twice, and 11.1% three times. *See figure 6*.

Figure 4

Number of participants who have taken the IELTS test

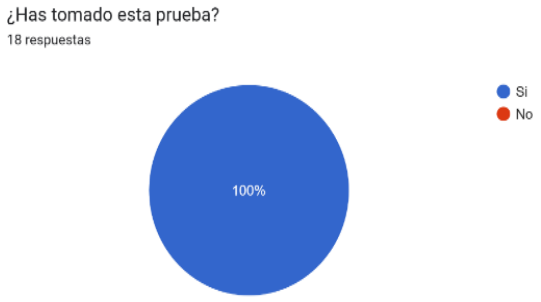
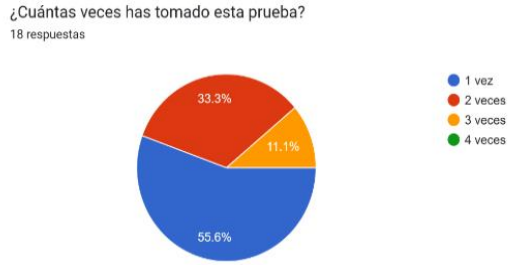


Figure 5

Reasons to take the IELTS

Figure 6
Number of times the test has been taken



When participants were asked about the skills assessed in each component of the IELTS (*speaking*, *writing, reading* and *listening*), 77.8% claimed to know them, while 22.2% had no information about them. *See figure 7.*

When asked if they were aware of the way in which the results would be reported, 66.7% answered yes, while 33.3% said no. *See figure 8.*

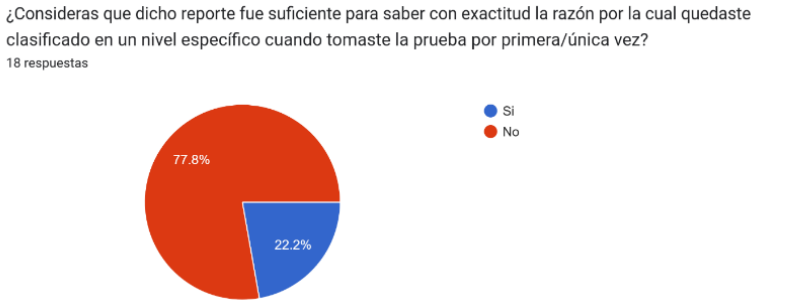
When evaluating the effectiveness of the report on the standardization of the candidate's language level, 77.8% of the participants considered it insufficient, while 22.2% were of the opposite opinion. *See figure 9. (The analysis of the answers in this section of the final paper contains errors and should be omitted when referring to it)*.

Figure 7
Advance knowledge of specific skills to be assessed in each of the components

Figure 8
Prior knowledge about certificate of results

Figure 9

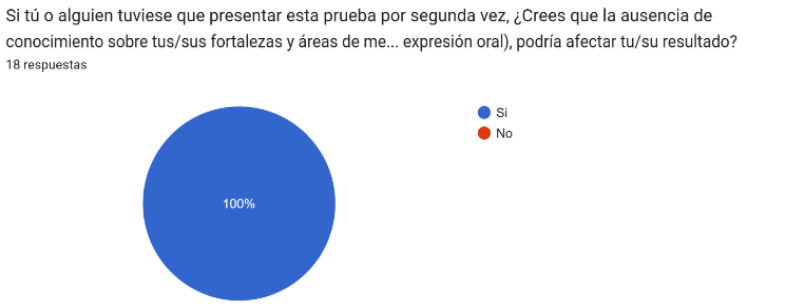
Relevance of the report given to know level of standardization



All participants agreed that not knowing the skills and areas for improvement can negatively affect the outcome of the exam if taken a second time. *See figure 10.*

Figure 10

Impact on results due to lack of knowledge of strengths and areas for improvement



When participants were asked to justify their responses, 17% (3 of 18) indicated that their performance depended on the format and method of the exam. Another participant mentioned that he focused on his areas of improvement based on his scores. The rest agreed that the evaluation classifies the language level, but does not identify the errors to be corrected. Although Figure 10 shows that 100% responded affirmatively, the justifications of three participants contradict their initial response. The responses recorded can be consulted in Table 14 (Annex 5) of the final work.

Figure 11 reveals that 72.2% of the participants feel frustration at not achieving the expected results due to a lack of knowledge of their areas for improvement. 16.7% experience insufficiency, and 11.1.% incapacity.

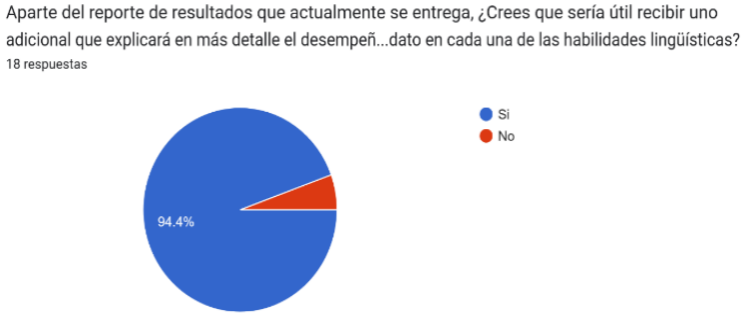
Figure 11

Feelings produced by not obtaining expected results due to lack of knowledge of what should be improved

The majority of participants (94.4%) considered it useful to have an additional report detailing their performance in the skills. Only one person expressed the opposite opinion, but when asked about the impact of the lack of information on strengths and areas for improvement, he agreed that this lack of knowledge could affect *test* results. *See figure 12*.

Figure 12

Utility of receiving a report in addition to the one issued to date



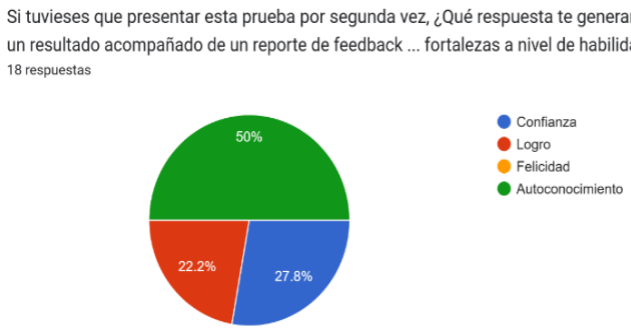
In justifying their responses, 94.4% of the participants (17 out of 18) considered it useful to receive a detailed report on their performance in each skill. Most agreed that more accurate feedback would facilitate the development of a study plan focused on areas for improvement, strengthening skills and increasing confidence for future test presentations, which would positively impact their results.

A total of 5.6% of the participants highlighted the need for such a report, noting its absence at present. One expressed frustration at not being able to identify his errors in the oral test due to the lack of a detailed report, while another suggested that *feedback* be provided in the lower standardization band. Only one participant (5.6%) stated that the current report was sufficient and, according to his response in Figure 12, did not consider additional reporting necessary. The answers obtained are available in Table 15 (Annex 6) of the final work.

22.2% of the participants stated that receiving a report highlighting their strengths would generate a sense of accomplishment. For 27.8% this report would increase their confidence, while for 50%, it would foster self-knowledge. These results underscore the importance of personalized feedback rather than a generalized certificate. *See figure 13.*

Figure 13

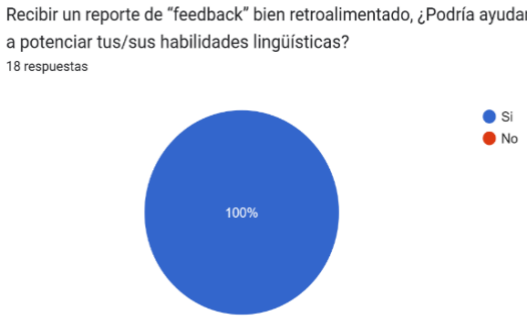
Experienced feelings about obtaining an additional report of results highlighting linguistic strengths



100% of the participants stated that receiving a detailed *feedback* report would help enhance their language skills. *See figure 14.*

Figure 14

Utility of receiving a well-feedback report to enhance language skills

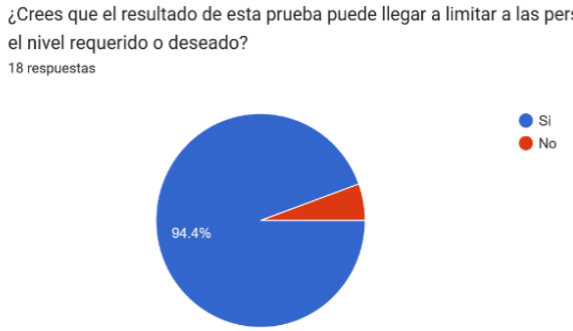


In justifying their responses, it was found that a *feedback* report would help identify areas for improvement that need to be strengthened. One of them (5.6%) indicated that having this report would allow them to teach more effectively to those who take the test for the second time, taking advantage of the feedback to strengthen their learning. Another (5.6%) considered it more relevant to know their areas of improvement than to understand the exam itself, prioritizing skill development over results. Another (5.6%) highlighted that receiving additional feedback would help them improve their study plan and increase their confidence to take the test. Another mentioned that, although the British Council website offers material to train for the test, the question arises as to whether these strategies only mechanize the process, leaving aside what is essential: the development of language skills and learning. The answers can be found in Table 16 (Annex 7) of the final work.

94.4% of the sample agreed that not obtaining the desired language level can limit people. Only one person disagreed with the rest. *See figure 15.*

Figure 15

Confirmation of whether obtaining unfavorable results affects the candidate in the future



When participants were asked to justify their answers, 88.9% stated that the *test* results may limit their goals, mentioning factors such as demotivation after several unsuccessful attempts, negative emotions that affect performance, and possible repercussions on job, academic or immigration applications. In addition, the high cost of the exam was pointed out as an obstacle for those who need to repeat it in the short term.

33.3% indicated that frustration and denial can limit performance, and that lack of clarity about what to improve can lead to focusing on the wrong skills. It was also pointed out that the result does not always reflect a limitation, since universities require minimum language levels. Another felt that additional reporting would help optimize their results in future presentations. The responses recorded can be consulted in Table 17 (Annex 8) of the final work.

To conclude, 55.6% of the participants felt that the test does not accurately reflect their skills and abilities, while 44.4% felt the opposite. *See figure 16. (The analysis of the answers in this section of the final paper contains errors and should be omitted when referring to it)*.

Figure 16

Perception of whether IELTS demonstrates a candidate's skills and abilities

In justifying their answers, 44.4% of the participants argued that the test can assess the candidate's language level, competence and skills if it is well designed. However, although three of them answered in the affirmative, their explanations suggest otherwise, as they mentioned that factors such as nervousness and mood can affect performance.

The remaining 55.6% (8 out of 10, *corrected for final work*) responded negatively, indicating that emotional factors such as anxiety, shyness and nervousness can influence

the results. 11.1% indicated that the evaluation of the oral component can be subjective, depending on the evaluator and the context of the exam. On the other hand, 27.8% stressed that the test does not always measure actual abilities, but rather preparation for its format, and that stress and pressure can affect performance, in addition to the fact that a standardized test does not fully adjust to individual needs. The answers can be found in Table 18 (Annex 9) of the final work.

Discussion and Conclusions

The analysis of the data obtained through the questionnaires confirmed the need for a personalized *feedback* report that promotes meaningful and generative learning in second-time IELTS test takers at British Council sites in Colombia. For its design, the linguistic descriptors for each skill were taken into account (Oral production: fluency and coherence, lexical resource, grammatical range and accuracy, and pronunciation; Written production: task achievement, coherence and cohesion, lexical resource, grammatical range and accuracy; and reading comprehension and listening comprehension), which can be consulted in the IELTS web portal in the links already indicated in this article, in order to let the candidate know what he/she is being evaluated on.

Each rubric has a space for the evaluator to record the candidate's strengths, with the objective of enhancing them.

A section was designated to indicate areas that require further work, facilitating the planning of studies aimed at their improvement. In addition, the evaluator could suggest strategies and advice in the space provided for this purpose, offering tools to optimize the candidate's preparation for a second presentation of the exam.

In relation to the conceptual constructs, it was ratified that meaningful learning plays an essential role in the evaluation processes. The articulation between the what (linguistic descriptors of the rubric created), the how (strategies suggested by the evaluator) and the for what (identified strengths and opportunities for improvement) contributes to a genuine and effective learning experience. This approach allows a systemic interconnection in which individual aspects impact positively or negatively the collective development (Systemic Thinking). In this sense, redefining prior knowledge as strengths and addressing areas of challenge facilitates the construction of new learning. This promotes meaningful and generative learning, principles that are reflected in the rubrics designed based on each person's individuality and learning styles. A rubric was also designed with indicators to evaluate the effectiveness of the reports prepared, based on the concepts covered throughout the final work and this article. *See table 19, annex 10 in the final work.*

Ignoring the fact that history is reconfigured on the basis of past events and actions is a mistake if it does not make room for the new. Therefore, it is essential to give a voice to those who suffer the consequences of a system where a simple number can limit their growth and make them feel that they do not deserve to advance. Maintaining these methods means continuing to condemn thousands of Colombians and people around the world who take the IELTS for the second time to a constant uncertainty that deprives them of the knowledge they need to progress.

Regarding the limitations in the implementation of the proposal, when trying to contact the person in charge of managing the evaluation area of the international exams at the British Council - Colombia offices, the response from the Customer Service team was that the qualification processes are managed by global evaluators and, due to the high level of confidentiality with which they operate, these professionals do not establish

communication or provide direct feedback to those evaluated, which prevented any connection with the person responsible for managing the evaluation system.

Upon completion of the work and identification of the need to design a complementary report to the one currently provided to communicate IELTS results to candidates, contact was made with the head of Testing Operations of the Andes Group to present the proposal. This project, conceived as a pioneering breakthrough worldwide in standardization test feedback and with the potential to encourage other entities to adopt its model, was discussed with the corresponding team. However, the response given was that its implementation was not feasible, as the British Council was already developing initiatives aligned with the proposal: *IELTS Test Ready*, the *IELTS Counseling Service*, and the *One Skill Retake.*

As a last attempt, the Customer Service team in England was contacted, but a refusal to have a conversation about the proposal was obtained. Instead, a request was made to send the findings of the work to be evaluated internally, which was decided not to be carried out.

This reflection leads us to question an obvious reality: there is not always the willingness to face new challenges with an open mind. Growth and transformation require an outlook that transcends mental barriers. Providing meaningful feedback is not just a technical act, but a deep commitment that demands genuine reflection and a total commitment to education. Its impact becomes meaningful when it is exercised with conviction, for only then does it become a powerful tool that challenges those who seek to move forward.

References

Ausubel, D., Novak, J, D., and Hanesian, H. (1983*). Psicología educativa: un punto de vista cognoscitivo.* México: Trillas.

British Council Colombia. (n.d). what does my IELTS score mean? https://www.britishcouncil.co/examen-ingles/ielts/puntaje

British Council, idp IELTS Australia, and University of Cambridge ESOL Examinations. (2012). *International English Language Testing System, Test Report Form*

British Council, idp IELTS Australia, and Cambridge English Language Assessment. (2014). *International English Language Testing System, Test Report Form*

Demarchi Sánchez, G. D. (2020). La evaluación desde las pruebas estandarizadas en la educación en Latinoamérica. *Revista En-Contexto*, 8(13), 107-133. https://doi.org/10.53995/23463279.716

Herrscher, E. (2003). ¿Qué es esto de "sistemas"? In *Pensamiento Sistémico. Caminar el cambio o cambiar el camino*. (pp.35-52). Argentina: Granica.

IELTS Official Test Centre. (n.d.). *Conoce el examen IELTS*. https://ielts.com.co/?utm_campaign&utm_term=ielts&utm_source=adwords&utm_medium=ppc&ctf_src=g&ctf_net=adwords&ctf_mt=b&ctf_grp=150168115186&ctf_ver=1&ctf_cam=20310892201&ctf_kw=ielts&ctf_acc=7896381614&ctf_ad=663620229839&ctf_tgt=kwd-12754176&gad_source=1&gclid=EAIaIQobChMI38eklarvhQMV3YVaBR1D7QY-EAAYASAAEgIGsvD_BwE

Mato Tamayo, J., & Vizuete Toapanta, J. C. (2019). La evaluación formativa: interpretación y experiencias. Mikarimin. *Revista Científica Multidisciplinaria*, *5*(1), 01–08.

Moreira, M. A. (2017). Aprendizaje significativo como un referente para la organización de la enseñanza. *Archivos de Ciencias de la Educación, 11*(12), e29. https://doi.org/10.24215/23468866e029

Moreno, T and Ramírez, A. (2022). Evaluación formativa y retroalimentación del aprendizaje En *Evaluación y aprendizaje en educación universitaria: estrategias e instrumentos*.
(pp.65-79). Universidad Nacional Autónoma de México

Zeller, L. (2024). *Reporte de feedback personalizado para la segunda toma de pruebas de habilidades lingüísticas estandarizadas en las sedes del British Council de Colombia* [Unpublished Master's thesis] Universidad Internacional Iberoamericana de México, Universidad Europea del Atlántico **(WAITING FOR URL SUBMISSION)**

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Pedagogical leadership approach in the direction, administration and management of public secondary schools in the Bata School District, for the improvement of student learning

Enfoque de liderazgo pedagógico en la dirección, administración y gestión de centros secundarios públicos del Distrito escolar de Bata, en pro de la mejora de los aprendizajes de los estudiantes

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ABSTRACT

The pedagogical leadership of managers for the improvement of student learning in public secondary schools in the Bata school district is being relegated to the background in the agenda of priorities of the educational administration of the Republic of Equatorial Guinea and some of the principals who currently exercise this responsibility. From this perspective, in order to reverse this trend, the present qualitative research study has been carried out with the general objective of: To describe the circumstances that contribute to the reinforcement of the pedagogical leadership of the directors of public secondary schools in the Bata school district, in the dimensions of direction, administration and management of these schools; in order to provide support to teachers in their classroom work, for the achievement of the improvement of student learning. The data obtained from the instruments applied (interviews, direct classroom observations, exploratory workshops) were processed using the Atlas Ti programme, version 7.5, creating three hermeneutic units: students, teachers, directors or rectors of the secondary schools in this school district. The following results were obtained: improvement of the direct and indirect pedagogical leadership competencies and practices of inspectors and principals of public secondary schools in Bata, through (implementation of the actions included in the strategy to be designed and in learning from best practices). Teachers improve their pedagogical practices in their classrooms, and reflect on their pedagogical and didactic practices.

Keywords:
Pedagogical leadership, Educational quality, School management & Organization, Transformational leadership.

Palabras clave:
Liderazgo pedagógico, Calidad educativa, Gestión escolar, Planificación, Liderazgo transformacional.

RESUMEN

El liderazgo pedagógico de los directivos para la mejora de los aprendizajes de los estudiantes de centros secundarios públicos del distrito escolar de Bata, está siendo relegado en el segundo plano en la agenda de prioridades de la Administración educativa de la República de Guinea Ecuatorial y parte de alguno/as director/as que actualmente ejercen esta responsabilidad. Desde esta perspectiva, con el fin de invertir dicha tendencia se ha llevado a cabo el presente estudio investigativo de corte cualitativo, cuyo objetivo general es: Describir las circunstancias que contribuyan al reforzamiento del liderazgo pedagógico de los directivos de centros secundarios públicos del distrito escolar de Bata, en las dimensiones de dirección, administración y gestión de dichos centros; en aras a aportar el apoyo al profesorado en su labor de aula, para la consecución de la mejora de los aprendizajes de los estudiantes. Los datos obtenidos, a partir de los instrumentos aplicados (entrevistas, observaciones directas en las aulas, talleres exploratorios) fueron procesados a través del programa Atlas Ti, versión 7.5, creando tres unidades hermenéuticas: estudiantes, docentes, directivos o rectores de centros secundarios de dicho distrito escolar. Se obtuvo como resultados: mejora de las competencias y prácticas de liderazgo pedagógico, directo e indirecto, de los inspectores y directores de los centros secundarios públicos de Bata, mediante (implementación de las acciones recogidas en la estrategia que será diseñada y en el aprendizaje desde las mejores prácticas). Los profesores mejoran sus prácticas pedagógicas en sus aulas de clase, y reflexionan sobre sus prácticas pedagógicas y didácticas.

Introduction

Recent studies on pedagogical leadership reveal that strengthening leadership in educational institutions has become a priority of educational policies in various countries around us (Pont, & Moorman, 2008), (Vaillant, 2015). Thus, studies on pedagogical leadership, both national and international, coincide in pointing out that it has an indirect effect on the improvement of educational processes and results (Hallinger, 2019), (Leithwood, & Sans, 2016), (Guardia & Triadó, 2016).

Leadership in the educational context is eminently pedagogical (Argos and Ezquerra, 2013), (Contreras and Gonzalez, 2016), (Gento and Orden, 2016), (Raelin, 2016) and, following Bolivar (2010), aims to improve the quality and effectiveness of the educational institution, expressed in student learning. Thus, pedagogical leadership influences a set of factors (resource management, setting and evaluation of educational goals, support for teaching quality, distribution of pedagogical tasks, collaboration with the environment, etc.) that, in short, improve the work of teachers in the classroom and in the center, with an indirect impact on student learning.

On the other hand, pedagogical or educational leadership plays a critical role in the success of the sustainable development of a quality education system and student learning outcomes (Bush, 2015), (Hallinger, 2019). This highlights the particularity of leadership that demonstrates the process of intentional influence to achieve the expected results by managing and inspiring others (González Fernández et al. 2016), (Hallinger, & Heck, 2010), (López-Gómez and González Fernández, 2018). Since pedagogical leadership has several formal actions (Bush, 2016), (Pont, & Hopkins, 2008) used to accomplish complex tasks (Holmes et al. 2013) that must adapt to the different needs and constraints of each school context, formal leaders (e.g., principals) cannot lead alone in an era with high levels of demand and accountability (Gunter et al., 2013), (Spillane, 2005).

It is worth highlighting recent studies on intermediate leadership (Bush, & Glover, 2014), (Harris, Jones, Ismail, & Nguyen, 2019), which are acquiring renewed interest as they are considered key figures in the formative gear of educational institutions (Hargreaves, & Shirley, 2019), (Sepúlveda & Volante, 2019). As noted by Harris et al. (2019) in a recent study, middle leaders have a prominent role in improving student learning outcomes by having a "dual track" in their leadership.

The General Education Law of the Republic of Equatorial Guinea (number 5/2007), in its articles 103.2 and 105.1, includes the competencies attributed to the management team and specifically to the director as a pedagogical leader, who is called upon to provide pedagogical support to the teaching staff. However, the actual applicability of these regulations is relegated to the background when it comes to appointing the directors of public secondary schools. This currently translates into poor teacher performance and, consequently, low student achievement. Therefore, in addition to the general objective mentioned in the summary, the following specific objectives are proposed: (1) Identify the main problems and transformational needs of the educational system in Equatorial Guinea related to basic secondary education and specifically the public secondary schools, (2) Analyze the current context of pedagogical leadership in public secondary schools in the Bata school district, to identify the profile of managers and the type of pedagogical leadership they exercise; It is expected, from the general objective, that the strategy designed will strengthen the leadership of the management team of secondary schools to improve teaching performance and improve student learning.

Method

As for the methodological design, the research work emphasizes the qualitative method, although with some quantitative implications.

The study was conducted with one hundred and fifty (150) students from the four public secondary schools in the Bata school district. One hundred (100) ESBA and high school teachers participated. Thirty (30) managers were from public secondary schools and the remaining ten (10) were from private schools. Meanwhile, at the level of inspectors, some thirty-five (35) education inspectors from the school district participated.

The students were the first group of key informants, with whom direct observation in the classrooms was applied, followed by group interviews. These are educational institutions that take in students from modest families, between 13 and 20 years of age, corresponding to the lower secondary level.

ESBA teachers, whose sample numbered one hundred (100), constitute the second stakeholder group considered key to obtaining evidence of the support they receive from their management team.

Managers participated with a sample of forty (40) managers from public secondary schools in the Bata school district, who were classified as the third group of key informants.

The sample design for the qualitative study has been intentional, non-probabilistic, where all the hermeneutic units, students, teachers and management team will participate freely in the information collection tools applied, considering their availability.

According to the methodological criterion, this research work, being qualitative in nature, has required, therefore, the establishment of categories of analysis and the definition of operational terms. Categories are understood as epistemological computers, thematic grouping fields, implicit assumptions in the problem and analytical resources as significant units that give meaning to the data and allow them to be reduced, compared and related (Taylor and Bogdan, 2000).

The main categories and subcategories identified in the study are as follows:

Pedagogical leadership, curriculum management, coexistence o School climate and student support, resources and results o School success.

For each category system mentioned above, the following subcategories emerged:

Teacher and student support, didactic planning, curricular organization, classroom teaching, learning assessment, school coexistence, human and material resources, as well as evaluation results data or figures.

The main instruments that were used for data collection in the framework of this research work were:

1.- Direct observations and interviews with key informants (students) with the development of a semi-structured classroom observation guide and the purpose of this instrument was to gather information on the type of interaction that occurs between teachers and students and the performance of both with a view to improving learning.

2.- Semi-structured interviews with key informants (teachers): the purpose of these interviews was to find out the perception that teachers have of their managers and

whether or not they feel that this perception influences their performance or professional performance.

3.- Exploratory workshops were organized by the Ministry of National Education for all managers, heads of departments and education inspectors in the Bata school district.

Results

For the development of the observation and interview activities aimed at the students, we started from the letter of collaboration that was sent to the directors of the four schools involved. In this context, the departmental directors, together with the classroom tutor teachers, carried out the planning activity to identify the different timetables, the subjects and, above all, the possible classrooms to be observed, as well as the modalities of interviews to be conducted with the students. At the end of the implementation of this research phase, the following synoptic table was drawn up:

Table 1.
Summary table of observations made at ESBA centers.

Name of center	Classrooms Observed	Subjects taught during observation	Dates	No. of students observed/ classroom
INES Ndjong Melén	1st A and 4th B	Mathematics, Spanish Language and Literature	15/11/ 2022	83
INES Nana Mangué	3º C	Descriptive geography universal	18 /11/2022	53
INES Father Sialo	2ND A	Spanish language and Literature	25/11/2022	4 6
INES Carlos Lwanga	1ºB, 3ºD and 4ºG	Physics and Chemistry, French and Biology and Geology	28/11/2022 30/12/2022	112

Note: the table reflects the plan that served as a reference to carry out direct observation as part of the instruments applied in the four public secondary schools in Bata, to obtain information and/or desired findings.

Of the two hundred and ninety-four (294) students observed in the classrooms of these centers, one hundred and fifty (150) were interviewed, which represents 100% of the students in the sample.

1.-*Description of the work-school environment:* In the eight (8) classrooms observed, there was a high degree of neatness capable of fostering a decent working environment in the classrooms.

Of the four secondary centers observed, only two, INES Ndjong Melén and Carlos Lwanga, have infrastructures in a general state of disrepair.

The visual materials on the walls referring to the subjects taught are not visible, except for the descriptive geography class, where the teacher brought the world map and used it during the lecture.

2.- Description of how students sit in the observed classrooms:

With the exception of INES Nana Mangué, which has movable tables and chairs and, therefore, suitable for organizing collaborative work among students, the rest of the classrooms in the centers visited have classic fixed desks that do not favor group work. All students are seated in rows or in rows facing the teacher.

3.-Description of the motivational level of the students in the classrooms observed:

For the analysis of the students' motivational state, attention was focused on the degree of student participation during the development of the classes. It is therefore a variable of utmost importance and even a prerequisite for any learning process, which explains the projection made on it. In this sense, the one that was generally appreciated was the low participation of students in class.

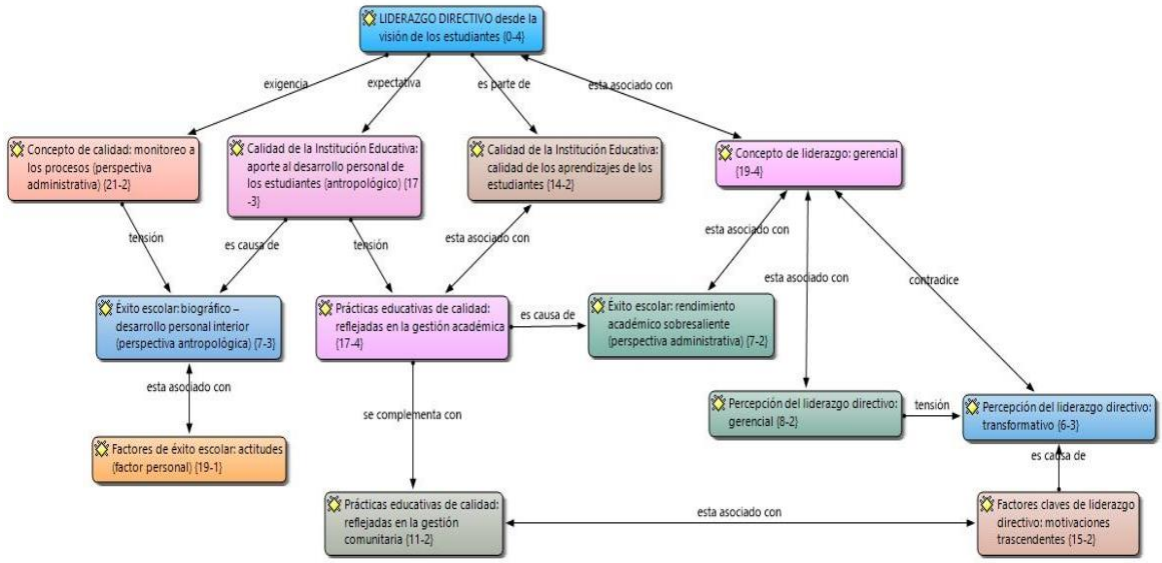
The hermeneutic analysis was based on questions 6 and 12 of the guide, which were formulated with the intention of measuring the students' level of understanding of the concept of pedagogical or managerial leadership, and to clarify the opinion of the students themselves in relation to the leadership exercised by their managers with a view to improving their learning. The different answers obtained by the students' collective through audios and videos used during the interviews made it possible to analyze them, creating a hermeneutic unit in Atlas Ti, version 7.5.8.

a) *First Hermeneutic Unit: Students*

Thus, from the question about what students understand about the direct and indirect pedagogical leadership of managers, an axial coding could be done with the Atlas Ti software, which would lead to a conclusion or brief theorization as illustrated in the figure:

Figure 1.

Axial coding and theorizing hermeneutic unit Students



Note: The figure shows the Pedagogical Leadership from the students' view (Atlas Ti) and the key elements with which they are associated to this variable, as well as those that are considered complementary, according to the hermeneutic unit, the students.

Students conceive managerial leadership from a managerial, transformational and situational perspective (Figure 1), emphasizing the managerial, transformational and interactive approaches. Insisting on the importance of administering, managing and directing quality training processes involving the main actors of the teaching-learning process.

Regarding the category of leadership perception of principals, the first unit, students perceive this group as those who lead the educational institution; to the extent that they exercise managerial leadership, representing a parent who guides learning until educational objectives are achieved (Figure 1).

It is also observed that it is related to the dimension of transformational leadership, with emphasis on the centralization of the student in his own learning process. Thus, it is inferred that all of the manager's actions tend to guide students to make decisions autonomously, making each one take the convenient path to achieve his or her goals. This is manifested in expressions such as: "I consider the director as a father who guides his children to work hard to succeed in their studies or to pass the course and be a useful person tomorrow" (interview with key informant).

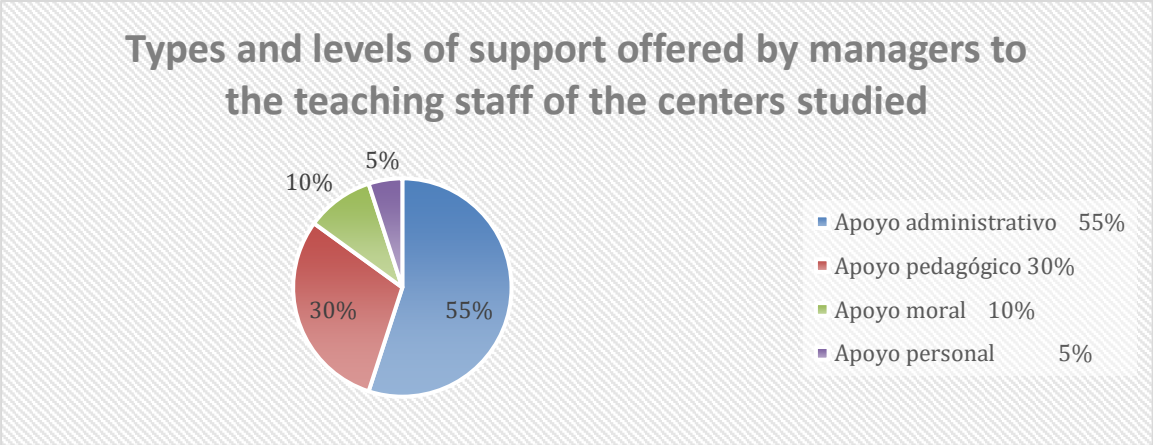
For the selection of the teachers participating in the research, the same procedure was followed for the first focus group. Thus, the selection of the twenty-five (25) teachers from each center was made randomly among the four participating centers, i.e., a total of one hundred (100) teachers in the sample.

2.-*In the interview with ESBA teachers*, a guide was elaborated and applied to the second population of the universe (students) of this research.

The main findings obtained from these semi-structured observations and the questionnaire submitted to the group of teachers in the sample were, at first, treated and quantified globally without being considered center by center, as shown in the following graph:

Figure 2.

Types and levels of support offered by managers to teaching staff in the participating centers.



Note. The table reflects the preponderance of administrative support offered by managers to teachers,

to the detriment of pedagogical and other types of support for effective leadership by the management team.

The result of the graph shows the type and levels of support offered by managers to teachers in their respective ESBA centers. It is observed that 55% of the teachers interviewed stated that they had received administrative support from their managers, essentially characterized as follows:

- Extension of the document of taking possession for new teachers who are assigned to the center.
- Distribution of the annual plan at the beginning of each course, which helps us to orient our didactic planning.
- It makes administrative arrangements to improve the school infrastructure.

With regard to pedagogical support, it should be noted that 30% of the teachers interviewed stated that they had received pedagogical support from their managers, specifically in terms of:

- Some orientations in didactic programming.
- Occasional organization of some didactic seminars for specific areas and these are usually occasions where they improve their teaching methodologies.

However, the group of teachers interviewed did not fail to express how much they expect to receive from their managers to improve their performance, and they have identified their development needs (current and future), programming learning platforms to expand their intervention scenario in the teaching-learning process and, above all, receiving regular feedback on their classroom practices.

"I believe that the more support we receive from the management team the more motivated we would be teaching our classes" (Interview excerpt)

With regard to the moral support of managers, 10% of the teachers interviewed stated that they received moral support from their managers, understood here as the armor of values that the manager-teacher should wear as a profession and vocation. In this sense, the aim is to assess the teachers' perception of the moral authority figure embodied by their principal.

"Both the teaching staff that we are and our students need the moral support of the principal; I still believe that we are the mirror of our students, unless there is someone who says otherwise" (Excerpt from the interview)

In their statements, teachers state that the responsibilities of the management team should be focused on the school's results, without neglecting the development of social skills that contribute to a good working environment, pedagogical skills in their level of training and improvement, and above all, they should have high expectations in emotional skills to interact with all members of the educational community.

Although it is still said that academic results should be the first concern of management teams, however, I personally believe that the development of the social

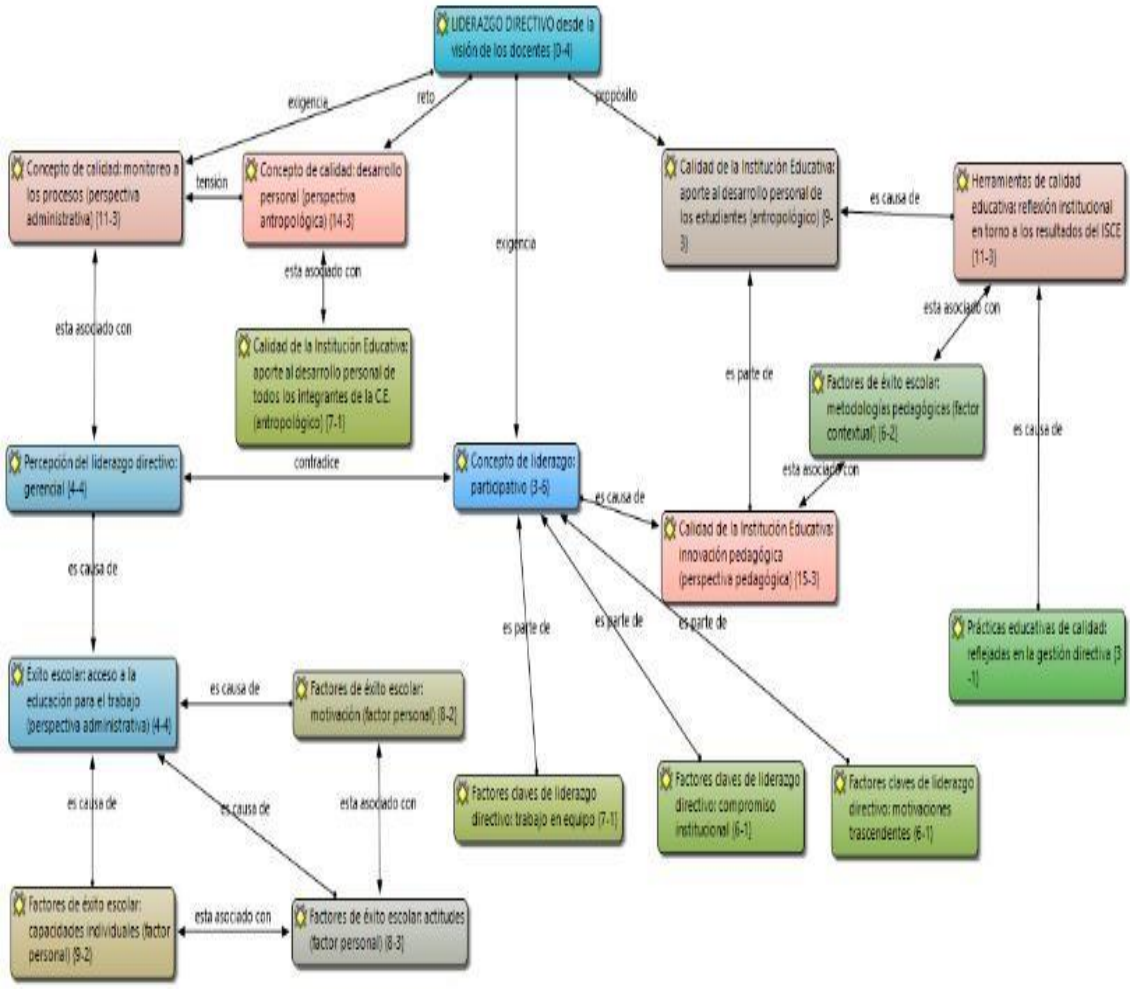
competencies of teachers and especially of students is essential to create a true educational community (Interview excerpt).

With regard to the leadership style of managers in the performance of their duties, according to the appreciation of the teachers interviewed, as one of the objectives of this research, four styles have been categorized: liberal, authoritarian, transactional and transformational.

As was done with the first student focus group, a hermeneutic unit was opened with the teachers to study the main category of pedagogical leadership and all the subcategories associated with it. This focused on obtaining information about the conception and perception that this group has about the pedagogical leadership of the management team, the factors that influence leadership, their understanding of educational quality and the factors that contribute to educational quality and school success, among others. These were the results obtained with the coding in Atlas Ti.

Figure 3

Axial coding and theorizing hermeneutic unit Teachers



Note: the figure reflects Pedagogical Leadership from the teachers' perspective, establishing the demands of pedagogical leadership: The monitoring of processes, the quality of personal

development and educational quality, institutional quality, as well as the factors associated with this variable.

In relation to the second hermeneutic unit, the majority of the teachers participating in the interview perceive the leadership of the teaching director from the perspective of the dynamizing dimension of collaborative teams (see Figure 2). This shows that the director must be aware of the existence of a team of collaborators and that it is necessary to promote teamwork. It is possible for the director to use his powers to delegate functions as proof of his leadership, as well as an exercise in empowerment. This collaborative paradigm leads to the active participation of each member of the educational community, taking advantage of the potential and strengths that each member can contribute to achieve the proposed objectives. From this point of view, the following is an excerpt from a comment made during an interview with one of the teachers:

> I am aware that listening is important and is proof that no one is indispensable and that there is a mutual dependence among all of us, in view of achieving school success, as well as improving the learning of our students. (Interview excerpt).

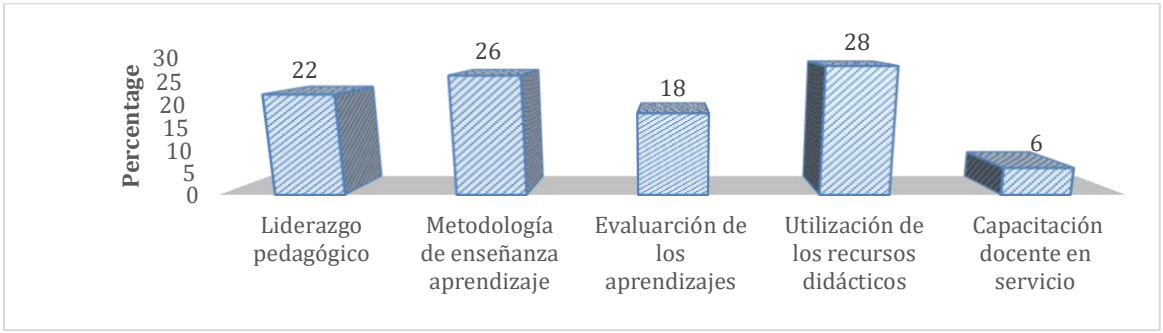
The third instrument applied was the exploratory workshop with key informants (education directors and inspectors). The Bata workshop was attended by forty (40) managers and department heads from the four (4) public and some private secondary schools with ESBA in the Bata school district and thirty-five (35) education inspectors from the same school district. During the workshop we worked with a questionnaire from the General Directorate of Educational Planning, but in our research work it was subjected to an internal consistency test by means of the Expert Consultation Method using Delphi techniques. This resulted in a final questionnaire that was agreed upon and reliable. This questionnaire focused on the profile, continuing education, access to the position of director, etc. The results of this workshop were expressed in percentages, as detailed below:

A. Pedagogical leadership dimension:

The pedagogical leadership of principals or directors as a support to ESBA teachers in their classroom work, the results of the survey were as shown in the following figure.

Figure 4

Results of the exploratory workshop with managers of centers participating in the Bata workshop.



Note. The figure describes the main variables studied in the workshop with Bata managers and inspectors: leadership, teaching methodology, type of evaluation and teaching methodology.

Pedagogical leadership, in relation to teaching methodology and the use of didactic materials, scored less than 22% (17), which attests to the deficiencies in the direct and indirect pedagogical leadership of the management teams of the centers studied. Taking into account the dimensions studied in this area, the following findings have been found:

- Although there are departments in some larger secondary centers, most of them do not function effectively. The testimony of one of Carlos Lwanga's teachers was illustrative when he expressed himself in the following terms:

"Currently I believe that all professors belong to a certain department, but, nevertheless, not all of them are participants in terms of the functioning of the same and this sincerely discourages some of us who see the importance of these spaces for reflection and exchange" (Interview excerpt).

- The deficiencies observed in the system of supervision and pedagogical follow-up by inspectors and directors of secondary schools mean that many teachers do not attend classes regularly, do not carry out regular didactic planning and do not ensure that their students learn what they are supposed to learn at this educational level.

"I don't like to be constantly supervised, although I think it's necessary for the director to do his or her job of supervision". (Excerpt from the interview).

- The basic mechanisms for monitoring and supervision are regular meetings of senates or departments, visits to classrooms, attendance control and scheduling requirements, but these are not effectively implemented, nor are they used to reflect on daily practice. From this statement we extracted the comment of a teacher interviewed who said:

"I think that the Ministry of National Education itself should collaborate in the supervision and follow-up of the management teams and of these towards the teachers by offering tools and training on a regular basis" (Excerpt from the interview).

B. About the Teaching and Learning Methodology

This section describes the actions taken by teachers in the classroom to facilitate their students' learning. Articulates the strategies used to organize their classrooms, support their students and facilitate their learning.

Regarding the teaching methodology, 26% (20) of workshop participants argue that:

- The textbook is the didactic tool most used by teachers in their programs and for the development of their classes, where dictation, the use of the explanatory method and individual work predominate.
- According to the teachers interviewed, few colleagues do daily/weekly didactic planning, nor do they know what students should learn in ESBA to develop skills.

C. On Ways to Assess Learning

Learning assessment means a variety of methods for assessing the knowledge, skills and abilities of learners before, during and after the learning process. Attributing to the evaluation a score of 18% (14) as an assessment made by the managers, is to recognize, according to them, that:

- The use of summative evaluation predominates; evaluation by processes is not appreciated. It seems that what some teachers call continuous assessment is not assessment by process, but assessment by subject.

"I personally advocate continuous evaluations, even though that is a lot of work for me." (Excerpt from the interview).

- The mechanism available to the teacher to check the learning acquired by the student is limited only to the review exercises of the topics, homework and the written and/or oral exam. Here is an excerpt from a math teacher at the Father Sialo Center:

"As a math teacher, I have no other strategies to check that my students learn other than by giving them hands-on exercises" (Interview excerpt).

- Teachers do not value the activities carried out by students in teams (presentations, problem solving, various research, etc.); they give priority to the exam grade.

"We value the students' activities, what happens is that the classrooms are saturated and correction is an ordeal" (Interview excerpt).

D. On the Use of Teaching Resources

This section explores how teachers use textbooks and other teaching resources for planning, implementing and evaluating the teaching and learning process.

28% (21) of all workshop participants expressed moderate optimism regarding the use of didactic resources, since:

- In public secondary schools, most students do not have textbooks. In some private schools, students rent/borrow textbooks during the school year.
- Teachers use textbooks to select topics by term (programming), summarize, dictate, explain and recommend assignments or exercises.
- Some teachers present deficiencies in the handling of textbooks and some content, which causes them to teach some content and not others. Causes include:
  - Inconsistency in the training specialty and the subject taught,
  - Lack of willingness to grow professionally, and
  - That the Educational Administration allocates them without taking into account the needs of the center's teaching staff.

E. On the Process of In-Service Teacher Training and Education

In-service teacher training involves the creation of systems and structures that facilitate the continuous growth of teachers didactically through collaboration, reflection and the reorientation of pedagogical practices. If we take into account that the essence of educational quality lies in teacher education and training. It is surprising that the level of support received by in-service teachers is estimated at 6%(5), since:

- Most meetings at ESBA centers focus on center operations, subject matter programming, and student performance at the end of the year. There is little support for the professional development of in-service teachers or attention to updating at the level of methodology.
- The inspectors and directors who are, by legal framework, responsible for providing pedagogical support to teachers, do not do so because many are not academically trained or do not have the experience to do so.

F. About the Self-Direction of the Focus Group of Managers of Participating Centers:

The guide proposed by Antúnez (1991) has been followed to identify the tasks involved in the performance of managerial action. The objective of this analysis was to gather from a direct source the difficulties encountered by managers in their professional activity, independently of the assessments of other members of the educational community.

The first area of this analysis is focused on Self-knowledge, which forces the manager to reflect on his own work, from a perspective of self-evaluation and heteroevaluation.

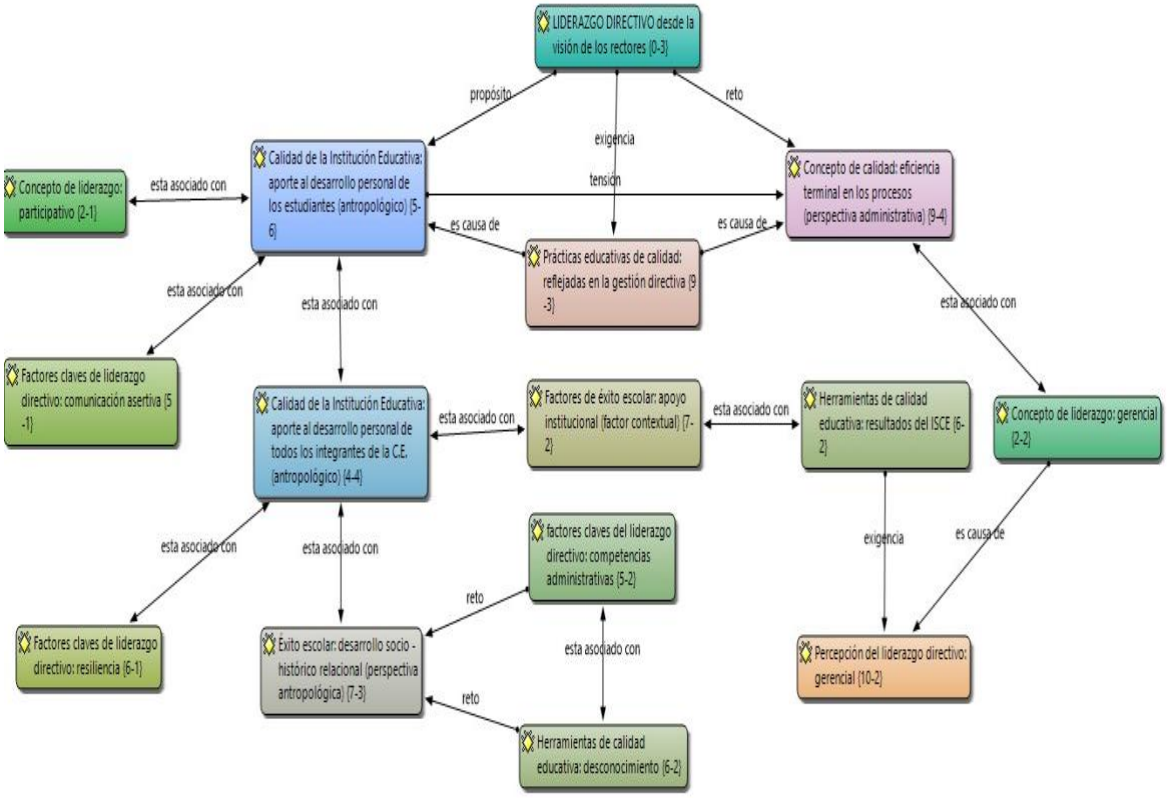
98% (74) of the managers and inspectors who responded to the questionnaire stated that they had not submitted to other colleagues the discussion and reflection on their own work and, above all, on their performance as a center director. Due to the fact that there is no culture of personnel performance evaluation in the educational centers.

With regard to stress management, 75% (57) of the managers and inspectors participating in the Bata workshop were managers of public secondary schools, who stated that the management of civil servants in the school is the main source of stress, since this group does not depend financially on the management teams, as they are paid directly by the educational administration.

C) Third Hermeneutical Unit: Directors

Regarding the hermeneutic analysis with the focus group of school principals or directors. This analysis was carried out on the basis of the guideline prepared for this purpose**,** focusing on the factors of school success as assessed by school directors or principals according to Atlas Ti. The following result was obtained, according to the statistical coding of the main and emerging categories, as illustrated below.

Figure 5.
Axial coding and theorization hermeneutic unit Rectors or directors:



Note: Pedagogical leadership from the perspective of the directors or principals themselves (Atlas Ti), prior to a codification and subsequent theorization of pedagogical leadership.

In the category of key factors for school success (see Figure 5, authors' elaboration from Atlas Ti), principals are interested in the institutional support of the educational community, considered a crucial element to achieve school success. The empowerment of the director as an institutional manager, capable of promoting teamwork, is considered. From this perspective, it works to involve all members of its community, instilling a true culture of experience sharing and joint construction of viable educational projects. In this way, all members of the educational community feel that they are part of a team that aims to synergistically achieve school success for their students.

According to the rectors, the vision of leadership is participatory, where decisions are intended to be democratized. Likewise, he is concerned with team participation in decision making, ensuring that the two overriding factors governing his leadership and linked to his role are resilience and assertive communication.

Discussion:

The qualitative analysis carried out on the three hermeneutic units of the Atlas Ti; they agree in pointing out the importance of pedagogical leadership for the improvement of student learning.

As the first and second of the hermeneutic units of this study, the importance of the support of the teaching team for the performance of the teaching professional was reflected. Thus, leadership, a managerial competence within the school organization, comprises strategies of high social impact aimed at the quality purposes of any educational institution (Figures 2 and 3).

Pedagogical and professional teacher training promotes significant changes in each of the aspects that make up the educational institution, where its intrinsic learning process is recognized as a fundamental pillar in the quality processes of the individual and the group in charge, being one of the main purposes of the educational system in Equatorial Guinea, as stated in the preamble of the General Law of Education (Decree Law No. 14/1995 dated January 9).

When approaching the vision of leadership from the managers' perception, it is shown that their concept of quality is related to the terminal efficiency of processes, which means that educational practices are reflected in managerial management. However, there is a clear intention to contribute to the personal development of students, which is consistent with the conception of school success linked to the socio-historical development of students. From this position, it was clear that for the rectors, institutional supports are factors that determine student success.

For our analysis, it is evident that pedagogical leadership with a transformational dimension makes it possible to generate environments with high expectations for all members of the educational community, who perceive greater effectiveness in the functioning of the school, as is evident from the interviews held with a group of directors of Bata's subsidized schools.

On the other hand, some of the results of this research highlight the lack of accessibility of public secondary school principals to all members of the educational community, considering that working as a team with teachers to detect needs, knowing the individual situations of students and encouraging the participation of families in school life are aspects that, if promoted by the principals, would lead to school success.

In analyzing the pedagogical leadership of current managers in Bata's public secondary schools, the lack of managerial autonomy of principals in public schools was noted in comparison to their colleagues in private schools. The transformational dimension of leadership that they are called to exercise before the rest of the members of the educational community is missing, as well as their challenging position as responsible for the institution. Many of the decisions they have to make clash with those of the macro level, erroneously subtracting the spirit of the General Education Law in force in the Republic of Equatorial Guinea in its article 105, paragraphs 4, 5 and 6.

On the other hand, from the perspective of the universal literature on educational leadership, it has been well demonstrated in this work that the best educational systems in the world have always prioritized policies focused on strengthening educational institutions within the framework of a decentralized, participatory, transparent and results-oriented management. The objectives set out in this research work have been achieved, since the problems related to public secondary education and the type of leadership of its directors were analyzed, and it became clear that the participants need

the promotion of pedagogical leadership as a primary factor to improve school quality and success. From this perspective, a transformational or contingency leadership model is proposed by the school principal and the education inspector, who are responsible for curriculum development at the micro and meso levels of the Equatorial Guinean education system.

Conclusions:

This study highlights the importance of the pedagogical leadership of managers and inspectors for the proper functioning of an ABSE secondary school, judging by the data obtained from the instruments applied. The results obtained through the hermeneutic analysis of pedagogical leadership, as the main category, and the subcategories that revolve around it, such as educational quality, school success, success factors, etc., have demonstrated the close relationship between the pedagogical leadership of the management team and school success. Thus, from the perspective of students and teachers, regarding the concepts of quality, school success and managerial leadership, it was possible to conclude:

Students have the perception of the managerial leader as a person who is in charge of all the processes that take place within the educational institution. To this end, he/she must be a manager, capable of managing academic, administrative, community and financial matters for an efficient solution to the problems presented by both students and teachers. For teachers, the pedagogical leadership of the management team as the competence of those who promote teamwork, so it is important to take into account participation and collaborative work in decision making.

The limitations of the present study include the following:

- At the methodological level, being qualitative research, the sample size was not sufficiently representative, considering the number of secondary schools and managers in the Bata school district.
- The absence of research precedents related to pedagogical leadership in the context of Equatorial Guinea.

The purpose of this work is to provide an innovative vision, consisting of establishing a coherent relationship between the pedagogical leadership of a center's directors and school success or improvement in student learning, which translates into educational quality. To this end, we emphasize the dimension of continuous improvement of institutional processes and human quality as the best strategies to achieve this educational quality.

Finally, it is recommended that the academic community in the university environment continue researching the topic of pedagogical leadership and its impact on students' academic performance. Above all, to carry out comparative studies between the pedagogical leadership of public and private school principals in order to close the existing gap in terms of teaching performance and improvement of student learning. It is necessary to create programs and strategies that favor the linkage of the school with the community and, therefore, with the family, as well as the promotion of a distributed leadership in front of the teachers' collective.

Bibliographic References

Argos, J. and Ezquerra, P. (Coords.) (2013). *Liderazgo en educación*. Santander: Universidad de Cantabria.

Bolivar, A. (2010). El liderazgo educativo y su papel en la mejora: una revisión actual de sus posibilidades y limitaciones. *Psicoperspectivas*, 9(2), 9-33. https://www.psicoperspectivas.cl/index.php/psicoperspectivas/article/view/112

Bush, T. (2015). School leadership and management in England: The paradox of simultaneous centralisation and decentralisation. *Research in Educational Administration and Leadership,* 1(1), 1-23. https://core.ac.uk/reader/42494480

Contreras, T. S. (2016). Liderazgo pedagógico, liderazgo docente y su papel en la mejora de la escuela: Una aproximación teórica. *Propósitos y Representaciones. 4(2) https://revistas.usil.edu.pe/index.php/pyr/article/view/123*

Dhuey, Elizabeth and Justin Smith (2014) How important are school principals in the production of student achievement? *Canadian Journal of Economics*, 47(2), 634-663. https://www.jstor.org/stable/43818293

Duke, D. L., Carr, M., & Sterrett, W. (2013). *The school improvement planning handbook: Getting focused for turnaround and transition*. Plymouth: Rowman & Littlefield Education.

González, F. et al (2016). Importancia de la dimensión formativa de los líderes pedagógicos. *Revista Iberoamericana de Educación*, 70, 131- 144. https://rieoei.org/historico/documentos/rie70a07.pdf

Gunter, H., Hall, D., & Bragg, J. (2013). Distributed leadership: A study in knowledge production. *Educational Management Administration & Leadership,* 41(5), 555-580. https://doi.org/10.1177/1741143213488586.

Hallinger, P. (2019). Science mapping the knowledge base on educational leadership and management from the emerging regions of Asia, Africa and Latin America, 1965-2018. *Educational Management Administration & Leadership.* https://journals.sagepub.com/doi/abs/10.1177/1741143218822772

Hallinger, P., & Heck, R. H. (2010). Collaborative leadership and school improvement: Understanding the impact on school capacity and student learning. *School Leadership & Management,* 30(2), 95-110. https://doi.org/10.1080/13632431003663214

Hargreaves, A. & Shirley, D. (2019). *The Fourth Way - The Inspiring Future for Educational Change.* Corwin Press, CA & SAGE India Pvt. Ltd., UK.

Hargreaves, A. and Shirley, D. (2019). Leading from the middle: its nature, origins and importance. *Journal of Professional Capital and Community*, 5(1), 92-114. https://www.emerald.com/insight/content/doi/10.1108/JPCC-06-2019-0013/full/html

López-Gómez, E., & González-Fernández, R. (2018). La confianza relacional y la creación de capital profesional: Claves del liderazgo en las instituciones educativas. In A. Medina & E. Pérez (Eds.), *Formación de líderes y directivos para el desarrollo sustentable de las Organizaciones e Instituciones* (pp. 39-53). Madrid: UNED-Universitas. https://dialnet.unirioja.es/servlet/articulo?codigo=6597049

Martínez, I. and Gil, J. (2018). Explicación de la satisfacción en la dirección escolar a partir del desempeño de la función directiva. *Education in the Knowledge Society* (EKS), 19(1), 77-95. https://revistas.usal.es/tres/index.php/eks/article/view/eks20181917795

Medina, A. and Gómez, R. (2014). Pedagogical leadership: competencies needed to develop an improvement program in a secondary school. *Perspectiva Educacional,* 53(1), 91-113. https://www.redalyc.org/articulo.oa?id=333329700007

Ministerio de Educación y Ciencia (2006). Ley Orgánica 2/2006, de 3 de mayo, de Educación.

Moral, C., Amores, F. J. and Ritacco, M. (2016). Liderazgo distribuido y capacidad de mejora en centros de Educación Secundaria. *Estudios sobre Educación*, 30, 115-143 https://dadun.unav.edu/handle/10171/40344

Pont, B., Nusche, D. & Moormon, H. (2008). *Improving school leadership volume 1: Policy and practice: Case studies on system leadership.* Paris: OECD publishing. https://core.ac.uk/download/pdf/83587856.pdf

Raelin, J. A. (Ed.) (2016*). Leadership-as-practice*. New York: Routledge.

República de Guinea Ecuatorial (1996). Constitución de la República de Guinea Ecuatorial, (artículo 102 de la Constitución). https://www.guineaecuatorialpress.com/pdf/Ley_Fundamental_Guinea_Ecuatorial.pdf

Sepúlveda, S. and Volante, P. (2019). Liderazgo instruccional intermedio: enfoques internacionales para el desarrollo docente en las escuelas chilenas. Profesorado. *Revista de Currículum y Formación de Profesorado,* 23(3), 341-362. https://revistaseug.ugr.es/index.php/profesorado/article/view/11231

Taylor, S. & Bogdan, R. (2000). *Inducción a los métodos cualitativos de investigación.* Barcelona, España, Paidós (3).

Vilkinas, T. (2009). Predictors of leadership Effectiveness for Chinese managers. *Leadership & Organization Development Journal,* 30(6), 577-590. https://doi.org/10.1108/01437730910981944

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Correlation between the rate of adherence to the safe surgery checklist by healthcare professionals and the appearance of surgical complications

Correlação entre o índice de adesão ao checklist da cirurgia segura pelos profissionais de saúde e a ocorrência de complicações cirúrgicas

Correlación entre la tasa de adherencia a la lista de verificación de cirugía segura por parte de los profesionales de la salud y la aparición de complicaciones quirúrgicas

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ABSTRACT

Introduction: The aim is to investigate whether there is a direct correlation between the rate at which healthcare professionals adhere to the Safe Surgery Checklist (SSC) and the occurrence of surgical complications. To examine the current rates of application of the CCS, as well as to analyze how the use of the CCS contributes to the hospital's administrative and financial management. A cross-sectional, documentary, retrospective study with a quantitative approach. Non-experimental design and descriptive statistical analysis, using information collected from sectors related to patient safety, 240 surgical records *(n=240)* and the contract signed between the research setting and the city hall. The correlation value between the use of CCS and the occurrence of surgical complications was 0.006, which is considered low as the *phi correlation* coefficient (Φ) varies between -1 and +1. The highest rate of use of the checklist was 88.2% of the operations carried out and the lowest, 58.8%. The surgical checklist makes a significant contribution to the management of the hospital in question, because the more it is used, the greater the amount of funds transferred via the Unified Health System. Although the correlation found between adherence to the CCS and the occurrence of surgical complications was low, it is possible to defend its use as a tool that provides greater safety for surgical patients, since each item on the checklist represents the chance of avoiding a harmful episode for the patient undergoing an

operation. There is a need to improve the rate of application of the CCS, which is still a challenge for hospital management.

RESUMO

Palavras chave:

Segurança do Paciente; Cirurgia Segura; Qualidade em Saúde; Complicações Cirúrgicas; Checklist

Introdução: o objetivo é investigar a existência de correlação direta entre o índice de adesão dos profissionais de saúde ao Checklist da Cirurgia Segura (CCS) e a ocorrência de complicações cirúrgicas. Examinar os índices atuais de aplicação do CCS, bem como analisar de que maneira o uso do CCS contribui com a gestão administrativa e financeira do hospital. Pesquisa transversal, documental, retrospectiva com abordagem quantitativa. Desenho não experimental e análise estatística descritiva, sendo usadas informações coletadas nos setores relacionados à segurança do paciente, nos 240 prontuários cirúrgicos *(n=240)* e no contrato firmado entre o cenário da pesquisa e a prefeitura da cidade. O valor da correlação entre o uso do CCS e a ocorrência de complicações cirúrgicas foi de 0,006, considerado baixo, pois, o coeficiente de *correlação phi (Φ)* varia entre -1 e +1. O maior índice de utilização do checklist foi 88,2% das operações realizadas e o menor, 58,8%. O checklist cirúrgico contribui sensivelmente para a gestão do hospital pesquisado, pois, quanto maior é seu uso, maior o quantitativo de recursos repassados via Sistema Único de Saúde. Apesar de a correlação encontrada entre a adesão ao CCS e a ocorrência de complicações cirúrgicas ter sido baixa, é possível defender sua utilização como uma ferramenta que proporciona maior segurança aos pacientes cirúrgicos, pois, cada item do checklist representa a chance de evitar um episódio prejudicial ao paciente submetido a uma operação. É preciso melhorar o índice de aplicação do CCS, representando ainda um desafio à gestão hospitalar.

Introduction

It cannot be said that addressing the *quality of health services* and one of its dimensions, *patient safety*, is something new. Although it is a topic that has gained relevance more recently in Brazil, historical accounts show that healthcare-related infections (HAIs) and other related (non-infectious) problems are as old as the very emergence of hospitals (325 A.D.). For many centuries, patients were treated in hospitals with precarious sanitary conditions, which aggravated their health due to the proliferation of diseases. Often, they died from an illness contracted in hospital, rather than from the one that led to their hospitalization. This situation began to worry health care workers and organizations (1).

Hippocrates (460 B.C.), considered the father of medicine, is credited with the postulate *"Primum non nocere"*, which in free translation from Latin means, "First do no harm", i.e. the concern not to cause harm to the person who needs to use the health service is already quite old, as it was also already admitted that the execution of this service could cause some kind of harm (1-2).

Following this idea of not causing harm to users in health facilities, Ernest Codman, a doctor from the United States (Massachusetts), advocated improving the conditions of health facilities in order to achieve efficient results in the treatment of patients. He created the first method for monitoring the outcome of care in order to guarantee the quality of the medical services provided. And in 1917 Codman created a set of hospital standards (minimum standards) that form the basis of the mechanisms for evaluating health services known as *Accreditation*. These minimum standards refer, for example, to the need for every hospital to have a clinical laboratory unit and an X-ray unit (3).

The work entitled "*Diseases of Medical Progress*", carried out by the Joint Commission on Accreditation of Healthcare Organizations (JCAHO) in 1918, showed the frequent occurrence of *iatrogenic* diseases in healthcare centers, which are ailments caused to patients by *poor medical practice*, not stemming from their underlying disease, and are therefore *preventable*. Given this fact, the need to incorporate a *safety culture* in care institutions that sees failures and adverse events (AEs) as the consequence of a *poorly designed system* that produces bad results, and not as the result of the actions of *bad* people, was already confirmed. Therefore, it must be considered that errors result from the interaction of various factors and the whole situation must be approached holistically (integrally). It's also important to see these mistakes as a chance to learn, to improve the whole (the system) and to avoid harm by finding ways to prevent them from happening again, for example through *safe clinical practices,* risk management and root cause analysis of adverse events. Possible damages include illness, injury, disability and death (3-4).

It is clear, therefore, that there is a need for a systematic debate to improve healthcare processes, considering the numerous and rapid changes that have taken place in procedures and equipment aimed at the care area, the awareness of users about their right to access healthcare, which is considered a "good", and also society's growing questioning of the *quality* and *safety* offered by care institutions, since cases of adverse events occurring in patients are not uncommon in the press around the world (3-5).

Among the procedures needed to prevent and reduce the occurrence of EVs are the adoption of standards and procedures aimed at user safety, through good practices, and the acceptance of a *patient safety culture* by healthcare establishments. Another action would be the compulsory inclusion of this topic in training courses for health professionals, at all levels: technical, undergraduate and postgraduate (4).

In order to build safe user care, it is necessary to understand the risks, admit that they exist, study the relationship between the health service and the occurrence of harmful incidents, and also monitor and manage episodes that could be harmful to patients (5).

At the 57th World Health Assembly in 2004, the World Health Organization (WHO) launched a program called the "Global Alliance for Patient Safety". Among the important actions of this alliance aimed at improving the care provided is the "Safe Surgery Saves Lives" campaign, the aim of which is to reduce the morbidity and mortality caused by surgical procedures, seeking to raise awareness in health units about the importance of safe surgery and the application of safe procedures in operations (6). Brazil is a member of this alliance. As a way of reducing risks and mitigating adverse events, the WHO included the use of *checklists* for *healthcare* as a whole after confirming the success of the Safe Surgery Checklist (SCC) (7).

With this in mind, the World Alliance for Patient Safety has developed the "International Safety Targets" to improve the most worrying non-conformities within healthcare institutions. Among the six goals created is *Goal 4*, which refers to ensuring that surgeries are performed on the correct site, procedure and patient (3-7).

It is in the *Surgical Center* that the most complex procedures in a health institution are carried out, because many rules must be followed. Workers are required to have up-to-date technical and scientific skills, responsibility, the ability to work as part of a team, as well as effective communication and interpersonal relationships. And the application of the checklist in surgeries in its three stages: *before induction of anesthesia; before the surgical incision; and before the patient leaves the operating room,* can help reduce surgical complications and thus contribute to patient safety (8). Complications arising from surgery can occur in the preoperative, operative and postoperative periods, and in some more critical situations, a harmful event can lead to the surgical patient's death. Considering the international context, studies show that in the United States, surgical adverse events are the third leading cause of death, surpassing even heart disease and cancer (9).

Studies on the effects of using the surgical checklist have shown that this tool prevents perioperative errors and complications, and have also found that the CCS helps to reduce the rates of complications and mortality from operations, as well as promoting greater patient safety and optimizing the work and communication of the care team (5-8).

In Brazil, the National Patient Safety Program (PNSP) was established with the publication of Ordinance No. 529 on April 1, 2013, representing recognition of the worldwide needs and the urgency that this issue requires. The PNSP includes *basic patient safety* protocols, including the *Safe Surgery Protocol*. Their aim is to *standardize* the practices carried out by care professionals in their activities, preventing and reducing the occurrence of events that result in harm to the user (10).

Given the importance that checklists have been gaining worldwide, including because they are a mechanism that measures the quality of care provided by a health organization, the aim of this research is to analyze the effectiveness of implementing the Safe Surgery Checklist, checking whether there is a relationship between its *use* and the *reduction* of postoperative complications, i.e. its objective is to investigate the existence of a direct correlation between the rate of adherence to the *Safe Surgery Checklist* and the occurrence of surgical complications in patients treated at a public teaching hospital.

Method

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Study Design

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Cross-sectional, documentary, retrospective study with a quantitative approach. Its design is non-experimental with descriptive statistical analysis. Data and information obtained from the hospital's patient safety departments, surgical records, considering surgeries performed between January/2022 and October/2022, and Contract No. 46/2021 signed by the hospital where the research was carried out and the municipality's management were used.

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Place of Research and Period of Data Collection

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The research was carried out at the University Hospital of the Federal University of Sergipe/HU/UFS, located in the city of Aracaju/SE, Brazil. This hospital is managed by the Brazilian Hospital Services Company (EBSERH). All the information was collected between June/2023 and September/2023.

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Research Focus Population

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The population consisted of the medical records of the 4297 surgeries *performed* between January/2022 and October/2022.

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Sample Selection Criteria

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The sample *included* the medical records of patients who had undergone an operative procedure and *excluded* the medical records of patients seen for outpatient consultations, examinations and hospitalization for clinical treatment.

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Sample Definition

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The sample is probabilistic, since the population (or universe) is known and has a known and finite size, and the surgical records have the same possibility of being chosen to make up the sample. The sampling strategy used to choose the members of the sample was *systematic probability,* without replacement of the elements of the population (11).

Study Variables

The following *operational* variables were analyzed: total number of surgeries performed in the period; total number of surgeries that had complications/readmissions; rate (%) of surgeries in which complications/readmissions occurred; total number of adverse events officially reported. These variables have a *discrete scale* and the *Ratio* scale is applied, as they are quantitative data with absolute zero, so there is no negative numerical value. The following *qualitative* variables were also examined: occurrence of complication/readmission; use of the checklist; checklist completely filled in. These variables have a *Nominal scale* that only recognizes equality and inequality operations between the elements, for example, A = A, A ≠ B.

Instruments Used to Collect Information

In order to collect, store, organize and analyse the information, two data collection tools were used, built by the researcher. In the first instrument, data was collected to show the current situation of the surgeries carried out within the scope of the research, and in the second, the information collected is aimed at providing data for statistical analysis. *Excel*® spreadsheet software was used to create the two instruments.

Data Collection

All the documentation provided by the hospital departments responsible for patient safety was analyzed *on site* and on working days. The first part of the data was obtained from files and spreadsheets containing the information requested, from the control and organization mechanisms and from the hospital's statistical reports. In the case of medical records, which correspond to the second part of the data, their physical version was studied, as the CCS form is also in physical format. This second piece of information was obtained through an *active search* of medical records.

To access the current monthly rates (considering the study period) of CCS utilization, the statistics report from the Health Care Related Infection Control Service (SCIRAS) was researched, considering surgeries performed between January/2022 and October/2022.

In order to understand how the application of the surgical checklist cooperates with the hospital's administrative and financial management, the clauses of the contract signed with the municipality's management were studied. The contract was made available by the Health Regulation and Evaluation Sector (SRAS). According to the contractual instrument, compliance with the *qualitative targets*, which includes the use of the CCS, totals 72 points. And according to the rate of adherence to the CCS, the hospital achieves a certain score which is distributed as follows: CCS adherence **≥** 85% = **3** points; 70% **≤** CCS adherence **<** 85% = **2** points; 60% **≤** CCS adherence **<** 70% = **1** point; CCS adherence **<** 60% = **0** point.

Thus, the score achieved through the application of the CCS contributes to the formation of the 72 points, and this score, when fully achieved, enables the hospital to receive the *total monthly* contracted amount. If it is not fully achieved in a given month, the amount received is proportional to the points achieved.

Treatment and Statistical Analysis of Data Collected from Surgical Records

To calculate the minimum necessary sample size (n) and to estimate the correlation coefficient between the variables to be correlated, a *pilot sample of 55* surgical records was used. The formula for determining the sample size in a study that correlates two nominal continuous parametric variables such as “occurrence of complication” and “use of the checklist”, for example, which can only have the results “YES” or “NO”, represented by the values 1 and 0, respectively, is shown below in figure 1:

$$nA = \frac{(1 - r^2) \times (t_{\alpha;gl})^2}{r^2}$$

Figure 1. Formula for calculating the sample size in a study relating two continuous parametric variables (12)

where gl = n_p - 2, where:

n_A = the calculated sample, i.e. the minimum sample required;
r = correlation of the pilot sample;
t = the value of the *Student's t-test* (this is a tabulated value found in the *Student's t Distribution* Table, according to the values of the parameters α and *gl*);
α = significance level (which was 0.05 or 5%, it is the maximum admissible error, so the Confidence Interval - CI is 95%);
gl = degrees of freedom, since it was necessary to calculate the sample mean (X) and the sample variance (S^2);
n_p = pilot sample size (which was 55).

The researcher must assume a specific value for the correlation, which can be obtained from the literature or through a pilot study, as was the case in this research, since information from 55 medical records was initially used. In addition, it is important to establish the *alpha* α level beforehand (12).

The value of n_A calculated using the above formula was 191.0005 ~ 191. However, it was decided to search a larger number of records, so a total of 240 records were searched, so *n = 240.*

In the statistical analysis, the frequencies of the variables "use of the checklist" (variable X) and "occurrence of complication/readmission" (variable Y) were studied. These are dichotomous variables, so they can only take on two values/results, and in this specific case, they take on the results "yes", represented by the value 1, and "no", represented by the value 0. Under these conditions, the most appropriate method for calculating the correlation between the variables studied in the statistical analysis of this research is the *PHI Correlation Coefficient (Φ)* also known as the *Matthews Cor* relation (13), and this correlation coefficient estimator is derived from the *Pearson Linear Coefficient* estimator, provided that the variable X is also dichotomous and has the following distribution, as shown in figure 2 below:

		Variable		
		X (Yes =1; No = 0)		
Variable	**Y** (Yes =1; No = 0)	a	b	a+b
		c	d	c+d
		a+c	b+d	

Figure 2. Contingency table of the frequency distribution of the variables analyzed (13)

Where a, b, c and d are the frequencies in the contingency table. By equating, we obtain the phi (Φ) equation below, according to figure 3, which calculates the correlation between the variables evaluated.

$$\phi = \frac{(ad - bc)}{\sqrt{(a+b)(a+c)(b+d)(c+d)}}$$

Figure 3. Correlation coefficient equation phi (Φ) (13)

The software used to calculate the correlation between the variables studied statistically was *R - Software , version 4.3.2,* widely used by statisticians and data analysts.

Ethical Considerations

The research was carried out in accordance with ethical precepts and the project was approved by the Research Ethics Committee of the Federal University of Sergipe/UFS, according to the *Consubstantiated Opinion of the Research Ethics Committee* No. 6.064.013 of May 17, 2023, in accordance with Resolution No. 466/2012 of the National Health Council, with the Certificate of Presentation for Ethical Appreciation (CAAE) registered under the number 68814223.5.0000.5546.

Results

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When investigating the correlation between the use of the CCS and the occurrence of surgical complications, it was hoped that the *negative correspondence* between these two variables would be confirmed, i.e. that the *greater* the adherence to the surgical checklist, the *lower* the occurrence of complications. In practice, a negative correspondence would represent a positive situation for surgical patients. This correspondence is represented by the graph below, which shows a decreasing *function*, where cases of complications and/or readmissions decrease as the application of the checklist increases (Figure 4).

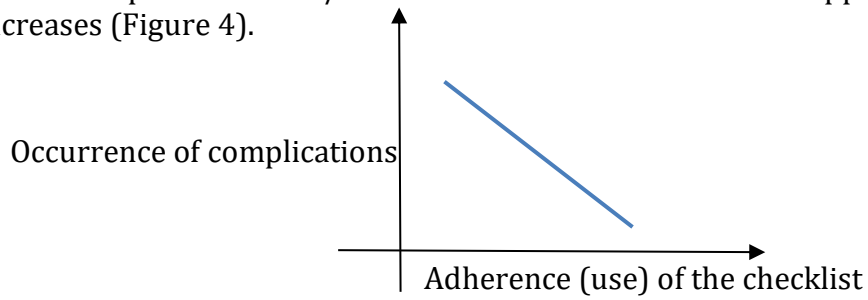

Figure 4. Graph of the relationship between the use of the checklist and the occurrence of surgical complications

With the pilot sample of 55 surgical records, the correlation value between these two variables was calculated using the PHI Correlation Coefficient (Φ), and the value was 0.08. After collecting the information from the 240 medical records, the aforementioned calculation was carried out and the result was 0.006, which shows that the correlation between the variables analyzed statistically was *low (weak)*, considering that *phi* (ϕ) varies between -1 and +1(13).

Based on the data provided by the Health Regulation and Evaluation Sector (SRAS)/HU/UFS/EBSERH, the main information on the situation of surgeries performed at the hospital, the setting for this research, is highlighted. These are: the total number of surgeries performed in the period was 4,297; the number of surgeries that resulted in

complication/readmission was 443; the rate (%) of surgeries that resulted in complication/readmission was 10.3%; and the total number of adverse events officially reported was 14.

Table 1 below shows the information found after surveying the sample's medical records.

Table 1. Results found in the active search of surgical records (*n=240*)

Variable/Information	Value/index
Total surgeries *with* complications/readmission	26
Complication/readmission rate (%)	10,83%
Total surgery *with* complications/readmission and *using* the checklist	25
Total surgeries *without* complication/readmission	214
Index (%) of surgeries *without* complication/readmission	89,16%
Total surgery *without* complication/readmission and *using* the checklist	205
Total surgeries *using* the checklist	230
Overall rate (%) of checklist *use*	95,83%
Index (%) of checklist use in surgeries *with* complications/readmission	96,15%
Index (%) of checklist use in surgeries *without* complication/readmission	95,79%
Total number of surgeries with a *fully* completed checklist	132
Index (%) of surgeries with *completely* filled cheklist	57,39%
Type of surgery with the highest complication/readmission rate (%)	Hysterectomy (19,23%)

Source: prepared by the author based on data collected from the surgical records surveyed

It is important to note that in terms of absolute values, the total number of surgeries *without complications and with the use of CCS* (205 surgeries) was much higher than the number of operations *with complications and with the use of CCS* (25 surgeries).

Analyzing the current adherence to the surgical checklist by care professionals, considering the months defined for the survey, the highest rate of application of the surgical checklist was 88.2% of the operations performed and the lowest was 58.8%.

After investigating the cases of surgical adverse events reported in an official instrument by the hospital, risk situations similar to those occurring in other parts of the world were found. Examples include: an object forgotten in the patient's body; when the patient was already anaesthetized, there was a lack of essential supplies for the operation; the surgery was suspended due to a lack of equipment and/or supplies; post-operative dehiscence (opening). These are incidents that have caused or could have caused harm to the patient in their operation, which could result in readmission, prolonged hospitalization, emotional stress and disability.

A total of 64 patients had their hospitalization extended by up to two (2) days longer than expected due to some harmful event, and in the case of readmission of patients due to some post-operative complication, the average number of days that passed between discharge and return to hospital was twelve (12) days.

With regard to the risks to which patients are exposed in the hospital studied, it was possible to see: failure to supply surgical and examination materials; failure to check

the supplies and equipment needed for the operation; failure to comply with the care practices defined by the institution; lack of training for professionals in procedures that guarantee patient safety. These are threats similar to those found in the operating rooms of hospitals in other countries.

The CCS has a positive impact on hospital management, since adherence to this patient safety tool is one of the indicators of quality of care. According to the contract signed with the city, the hospital receives a monthly amount of funds to maintain itself and invest according to the rate of adherence to the surgical checklist and other indicators. Thus, the greater the adherence to these indicators, the greater the amount of resources received via the Unified Health System (SUS), since in Brazil the health service is municipalized (14).

Evaluating the CCS currently in force at the hospital studied, it was confirmed that it is in line with the surgical checklist recommended by the National Health Surveillance Agency (ANVISA), which in turn is based on the one validated by the World Health Organization (6). As well as containing the *essential* items according to the WHO, the hospital's CCS also checks other important items such as: the removal of orthoses, prostheses and adornments before surgery; confirmation of the use of the patient's identification bracelet and that of its location; and the existence of an allergy identification bracelet.

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Discussion and Conclusions

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The main purpose of the CCS is to reduce the rates of Adverse Events (AE) in surgeries (15). Its application increased the chances of the patient receiving surgical care with adequate and safe practices by almost 50% (16).

This study showed that, although there was a correlation between the use of CCS by healthcare professionals and the occurrence of post-operative complications and/or readmission of patients, this relationship was low (0.006). It was possible to see this in the sample *(n=240)*, as it was expected that adherence to the checklist would be low among operations with complications, but adherence was high (96.15%). In surgeries without AE, the rate of SCC use was also high (95.79%), confirming what was expected for surgeries without harmful episodes.

These results lead to the fact that a harmful event that occurs in a surgical intervention is also related to factors other than the *lack of application* of the CCS, such as pre-existing diseases, the presentation of an allergic process by the patient or the poor application of the checklist due to the resistance of some professional to use it (17). It is true that the checklist alone cannot remedy all the flaws that occur in surgical procedures; all professionals need to be aware of the need to improve their work processes and follow the planning defined by the WHO and the hospital unit in order to achieve real improvements and safe processes in surgeries (18).

The hospital surveyed still has some problems with recording the information linked to the checklist because there is still no systematic monitoring of the use of the CCS in all the procedures carried out, which could provide more precise information on its use. For example, there is a lack of data on the rate of adherence to the checklist in surgeries *with complications* and in surgeries *without a harmful event.* They would be very important to compare with the results found in the sample of medical records.

The hospital's surgical complication rate was 10.3% and in the sample of surgical records this rate was 10.83%. These figures, therefore, reflect the reality of the world, as

they are within the 3% to 16% range in which the rates of complications resulting from surgical procedures occur around the world (3-19).

In the sample, in only 57.39% of the surgeries was the CCS *completely* filled in, a rate considered very low by the experiences already obtained, since the scientific literature advocates that 100% of the items on the surgical checklist should be checked because this completeness is fundamental to guarantee a high standard of safety in the interventions. Scientific writings argue that *no* item on the CCS can go unconfirmed/unverified (20).

During the period of surgery considered in this study, the lowest rate of adherence to the CCS was 58.8% and the highest was 88.2%. In the sample, the checklist was applied in 95.83% of surgeries, which is closer to the WHO recommendation of applying it in 100% of procedures, including less invasive ones (21).

During this period, 14 (fourteen) surgical adverse events were reported in an official instrument, a figure lower than the 26 found in the sample surveyed. It can be inferred that within the universe of 4297 surgeries, the number of cases of VS was much higher than reported. This underreporting is a reflection of various factors, such as the culture of fear that comes from individualizing mistakes, shame at being condemned by colleagues, fear of being penalized and loss of professional credibility (22).

In addition to causing physical and psychological harm to patients and their families, EVs can cause prolonged hospitalization and readmission to the hospital. In this study's scenario, 64 patients spent up to 2 days longer in hospital than expected, and 12 was the average number of days that passed between the patient's discharge and their readmission. These situations increase the expenditure of resources (financial, material, human), increasing the institution's costs, which is yet another negative consequence of an EA. The health sector is very complex and its resources are generally scarce, so existing resources need to be used rationally (23).

The risks to which the patients treated at the hospital are exposed are similar to those found in surgical centers in the rest of the world, although the political and economic conditions are better in the so-called developed countries. Harmful events to patients and their families are an important negative indicator of the quality of the health service because they compromise patient safety (24).

Adherence to the CCS has become so important at the hospital under study that it has become one of the elements contributing to its administrative and financial management. This contribution has become a way of encouraging their use. The points achieved with the application of the surgical checklist help to obtain the monthly amount contracted with the city council, in accordance with Contract No. 46/2021 signed by the parties.

Some studies have identified a lack of support from hospital management in implementing/applying the surgical checklist, but it is essential that managers set an example and encourage its use. In reality, all professionals in the care, administrative and leadership spheres must collaborate on initiatives that can mitigate the risks to which patients are exposed in surgery as well as in any hospital environment (25).

After analyzing the CCS currently applied in the hospital studied, it was found that it complies with WHO and ANVISA recommendations and with the current needs detected, such as *confirming the correct identification of the patient, the surgical site and the procedure*. Thus, there is no need to include other items or propose improvements. However, new situations that have not yet been dealt with may arise in the future, which makes it important to frequently monitor this security instrument in order to meet the needs of each era.

It is true that the items on a surgical safety checklist may, in some cases, fail to prevent harm to the surgical patient, as it may be linked to a factor that is difficult to predict. On the other hand, several studies have proven the benefits of this list, as it has been associated with a statistically significant reduction in mortality and length of stay. It is common to find experiences in the scientific literature which also show that the implementation of the surgical checklist promotes changes in the surgical culture (26).

A study similar to the one carried out at HU/UFS/EBSERH confirmed that the Safe Surgery Checklist is efficient in verifying the essential items of an operation, bringing a higher level of safety to the surgical patient. However, the low level of adherence to this instrument, its incomplete completion, inefficient communication between care professionals and deficiencies in team training have compromised the desired results, and the implementation of the SCC has not resulted in significant improvements in the communication and participation of surgical workers (27).

There are some limitations to this study, such as the fact that it was carried out in a single hospital, which makes it difficult to generalize its results. In many cases, the professional's handwriting was illegible, so there could be some mistake in interpreting the information accessed. Another weakness is that it is not possible to know if there is missing information or if the data is incomplete. These are inherent limitations of retrospective studies, so we are forced to rely on what was entered on the *Nursing Care Record (RAE)* title form, the CCS form, and the medical record as a whole. Omission or incompleteness of information may interfere with the results of the study.

Despite these weaknesses, the research has strengths, such as the fact that it alerts us to the importance of studying the subject of *patient safety* in health professional training courses, especially in the medical field, since the medical profession has shown greater resistance to the use of CCS in surgeries, because they don't believe in its effectiveness. In addition, the way in which adherence to the checklist contributes to the administrative and financial management of the hospital studied was analyzed in detail. This is a very important issue, since the health service is very expensive, and for a hospital to offer all the care services with the quality required and demanded by society, it needs a fairly large volume of financial resources. Another strong point was the *opportunity for improvement* identified in terms of the need for the hospital to carry out more direct, detailed and organized monitoring of the application of the CCS in all the surgical interventions carried out. This study may encourage more targeted tracking of the surgical checklist in order to record precise and in-depth information on its use and on the various situations linked to its use and what happens in surgeries.

In view of the information and evidence acquired through this study, it was possible to see that the importance of applying the checklist as an *error prevention* tool is clear within hospitals. Proof of this is that in the context of this research, other checklists are used in various environments and at various times during care, not just in operating rooms. It's important to note that the surgical checklist is low-cost and the average time to apply it during the three phases of surgery is three minutes.

Although the *correlation* between the use of the CCS and the occurrence of complications was weak, since the rate of its application was also high in surgeries that *resulted in a harmful event*, it must be understood that EVs, especially surgical EVs, are caused by various factors, so the use of a surgical process checklist can result in a reduction in harm to patients, but the checklist cannot yet be considered a definitive element in this reduction. However, according to all the scientific literature researched, it is possible to *defend* its application because it has been verified that each item on this list represents the chance of avoiding a harmful episode for the person being assisted, and

this tool, in addition to providing a higher level of safety for surgical patients by standardizing activities and avoiding reliance on memory, at the very least provides an opportunity to reflect on safe practices in surgeries.

It is true that the hospital studied needs to improve adherence to the CCS in order to reach 100% of procedures performed, as recommended by the WHO, but this is still a challenge for its management, as achieving this rate also depends on raising awareness among professionals and a continuing education program on the subject of patient safety and the proper application of the surgical checklist.

We hope that this research will encourage the development of new studies in other hospitals in the city, both public and private, with different realities, investigating the effect of the safe surgery checklist, because it would be very valuable for society as a whole to know in greater depth the extent to which the SCC reduces the occurrence of post-operative complications.

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Conflicts of Interest

The authors declare no conflicts of interest in relation to this scientific text.

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References

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1. Oliveira LFS, Simplício FEB, Ferreira JESM. O contexto histórico da segurança do paciente e a percepção da enfermagem sobre a cultura de segurança do paciente. Estudos Inter Cien Saúde [Internet]. 2023 [cited on January 20, 2025]; 17: 486-501. Retrieved from: https://www.periodicojs.com.br/index.php/easn/article/view/1782

2. Bispo CA, Rodrigues AJP, Saldanha RR, Santos WL. The role of the nurse in patient quality and safety. Rev JRG Estudos Acad [Internet]. 2023 [cited December 20, 2024]; 6(13): 1741-54. Retrieved from: https://www.revistajrg.com/index.php/jrg/article/view/783

3. Armond GA, organizador. Segurança do Paciente: como garantir qualidade nos serviços de saúde. Rio de Janeiro: DOC Content; 2017. 296p.

4. Couto RC, Pedrosa TMG, Amaral DB, editores. Segurança do Paciente: infecção relacionada à assistência e outros eventos adversos não infecciosos – prevenção, controle e tratamento. 5th ed. Rio de Janeiro: Medbook; 2017. 1048p.

5. Santos CV, Brito BAC, Silva DB, Xavier LES, Santos PS. Patient safety in the operating room: the role of nursing. Rev Cient Multidisciplinar. 2022; 3(11): 1-6. https://doi.org/10.47820/recima21.v3i11.2141

6. World Health Organization (WHO). Patient Safety. A world Alliance for Safer Health Care. Safe Surgery Saves Lives [Internet]. 2009 [cited October 07, 2025]. Retrieved from: https://www.who.int/docs/default-source/patient-safety/9789241598552-por.pdf

7. Faria LR, Moreira TR, Carbogim FC, Bastos RR. Effect of the Surgical Safety Checklist on the incidence of adverse events: contributions from a national study. Rev Col Bras Cir. 2022; 49:e20223286. https://doi.org/10.1590/0100-6991e-20223286

8. Borchhardt SVB, Rodrigues S, Silva SMS, Calvette AM, Rangel RF, Siqueira HCH. Care management for patient safety in the operationg room: contributions from nurses. Resea Society Develop [Internet]. 2022 [cited December 28, 2023]; 11(6): 1-13. Retrieved from: https://rsdjournal.org/index.php/rsd/article/view/29075

9. Alho GNS, Silveira TF, Ferreira BOI, Medim BLM, Bezerra LST, Brizeno LAS, et al. Avaliação do Protocolo de Checklist Para Cirurgia Segura nos Centros Cirúrgicos. Rev. Contemp [Internet]. 2024 [cited October 07, 2025]; 4(11): 1-18. Retrieved from: https://ojs.revistacontemporanea.com/ojs/index.php/home/article/view/6430

10. Portaria do Ministério da Saúde/Gabinete do Ministro, nº 529/2013, de 01 de abril, que institui o Programa Nacional de Segurança do Paciente, publicada no Diário Oficial da União (D.O.U.), nº 62, Seção 1, Pg. 43, (02/04/2013). [cited on January 03, 2024]. Retrieved from: https://bvsms.saude.gov.br/bvs/saudelegis/gm/2013/prt0529_01_04_2013.html

11. Sargi MP, Silva JRM, Carmo CRS. Sampling and data analysis: a case study on brazilian 2022 electoral surveys. Rev Gest Tec Ciência [Internet]. 2024 [cited March 23, 2024]; 14: 1-18. Retrieved from: https://revistas.fucamp.edu.br/index.php/getec/article/view/3302

12. Devore JL. Probabilidade e estatística para engenharia e ciências. 3ª ed. São Paulo: Cengage Learning; 2019. 656 p.

13. Junior GBV, Lima BN, Pereira AA, Rodrigues MF, Oliveira JRL, Silio LF, et al. Metrics used to evaluate the efficiency of classifiers in smart algorithms. Rev Centro Pesq Avan Quali Vida [Internet]. 2022 [cited November 30, 2023]; 14(2): 1-14. Retrieved from: https://revista.cpaqv.org/index.php/CPAQV/article/view/933

14. Paschoalotto MAC, Passador JL, Passador CS, Endo GY. Regionalization of health services in Brazil: an analysis of socioeconomic and health performance inequalities. Gest Regionalidade. 2022; 38(113): 313-27. https//doi.org/10.13037/gr.vol38n113.7017

15. Ribeiro CASS, Quirino GMC, Gomes JRAA, Matos RS, Corgozinho MM, Itacarambi LR, et al. Segurança do paciente cirúrgico: avaliação da implantação do checklist perioperatório. Health Resid J. 2022; 3(14): 423-43. https://doi.org/10.51723/hrj.v3i14.367

16. Coletto PMC, Quirino GMC, Itacarambi LR, Matos RS, Gomes JRAA, Melo VS, et al. Checklist de cirurgia segura: conhecimento e desafios da equipe de enfermagem. Health Resid J [Internet]. 2022 [cited December 14, 2023]; 3(14): 641-58. Retrieved from: https://hrj.emnuvens.com.br/hrj/article/view/344

17. Justino BDDS, Corgozinho MM, Gomes JRAA. Avaliação da implementação do Check-List de cirurgia segura em um hospital público do Distrito Federal. Health Resid J [Internet]. 2022 [cited December 07, 2023]; 3(14): 1170-89. Retrieved from: https://hrj.emnuvens.com.br/hrj/article/view/316

18. Andrade AA, Bastos JESR, Lima RN. Nursing performance in the safe surgery checklist. Rev Ibero-Americana Hum Ciên Educação [Internet]. 2022 [cited January 20, 2024]; 8(10): 916-25. Retrieved from: https://periodicorease.pro.br/rease/article/view/7206

19. Ribeiro B, Souza JSM. The patient safety at the surgical center: role of the nursing team. Semin Cienc Biol Saude [Internet]. 2022 [cited January 30, 2024]; 43(1): 27-38. Retrieved from: https://ojs.uel.br/revistas/uel/index.php/seminabio/article/view/42423

20. Cavalcante AAN, Jorge MSB. Nursing team perceptions about the use of a check list for counting surgical material. Resea Society Develop [Internet]. 2022 [cited February 10, 2024]; 11(6): 1-9. Retrieved from: https://rsdjournal.org/index.php/rsd/article/view/29446

21. Thomé ARCS, Bernardo THL, Sarmento PA, Coelho JAPM, Fedocci EMM. Checklist validation for use in safe heart surgery. Rev Gaúcha Enferm [Internet]. 2022 [cited December 10, 2023]; 43(spe):e20220025. Retrieved from: https://www.scielo.br/j/rgenf/a/mw3M3tmvsqVMbTLfCbcX9Vf/?lang=pt

22. Barbosa GC, Silva YCA, Silva FJA, Teixeira ALS, Lopes GS, Souza RSR, et al. Patient Safety: the nurse's role in quality control in the surgical center. Resea Society Develop [Internet]. 2022 [cited January 03, 2024]; 11(17): 1-9. Retrieved from: https://rsdjournal.org/index.php/rsd/article/view/38959

23. Pereira ACVS, Matos RS, Corgozinho MM, Quirino GMC, Gomes JRAA, Itacarambi LR, et al. Avaliação da implantação do Checklist perioperatório em um hospital público do Distrito Federal. Health Resid J [Internet]. 2022 [cited December 11, 2023]; 3(14): 589-609. Retrieved from: https://hrj.emnuvens.com.br/hrj/article/view/357

24. Silva HLJ, Perez IMP. Adhesion of the nursing team to the safe surgery checklist. Rev Ibero-Americana Hum Ciên Educação [Internet]. 2022 [cited January 06, 2024]; 8(9): 884-94. Retrieved from: https://periodicorease.pro.br/rease/article/view/6919

25. Soares SGC, Pedroza RM, Silva RR. Implementation of checklist for safe surgery in a Regional Hospital in Agreste Pernambucano. Braz J Develop [Internet]. 2022 [cited November 29, 2023]; 8(2): 13519-33. Retrieved from: https://ojs.brazilianjournals.com.br/ojs/index.php/BRJD/article/view/44377

26. Brito WSF, Lima RN. Application of the safe surgery checklist in a surgical center. Rev Ibero-Americana Hum Ciên Educação [Internet]. 2023 [cited January 24, 2024]; 9(7): 1369-83. Retrieved from: https://periodicorease.pro.br/rease/article/view/10714

27. Dantas MR, Carvalho R. Segurança e Comunicação na Aplicação do Checklist Cirúrgico. Rev. Recien [Internet]. 2025 [cited October 11, 2025]; 15(43): 377-387. Retrieved from: https://www.recien.com.br/index.php/Recien/article/view/944/1011

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Web Portals, Academic Activities and Social Relations at the University: A Literature Review

Portales web, Actividades Académicas y Relaciones Sociales en la Universidad: Una Revisión de Literatura

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ABSTRACT

This literature review article was made with a view to web portals in higher education, where it has been taking on great importance and value towards everything related to the web, because, with the rise of technology, the Internet, and digitalization, the university community is adapting to these technological evolutions and revolutions in search of modernizing their technologies, their web portals to provide access to different resources, whether information, academic activities, documentation, web links, among other things. On the other hand, to access them, it is necessary to have web devices, mobile devices or technological devices for academic and educational use at the university, in addition they are used for different situations in order to provide information to students, teachers, graduates, the community, etc. In particular, it was done with the aim of having the university community participate in these web resources so that they interact with web or virtual portals where it is intended that students learn about or relate to web or digital environments, and learn what gaps web portals have, the benefits of using them, how they are developing over the years, what the current debate about them is and finally the relevant topics.

Palabras clave:
Enseñanza superior, digitalización, educación a distancia, teleconferencia.

RESUMEN

El presente artículo de revisión de literatura se hizo con miras a los portales web, en la educación superior donde viene tomando una gran importancia y valor hacia lo relacionado con la web, debido a que, con el auge de la tecnología, el internet, la digitalización la comunidad universitaria está adaptándose a estas evoluciones y revoluciones tecnológicas en busca de la modernización de sus tecnologías, de sus portales web para brindar acceso a distintos recursos, ya sea de información, de actividades académicas, de documentación, de enlaces web, entre otras cosas. Por otra parte, para acceder a ellos, se hace necesario contar con dispositivos web, dispositivos móviles o

	dispositivos tecnológicos para uso académico y educativo en la universidad, además se usan para diferentes situaciones con el fin de proporcionar información a los estudiantes, a los docentes, a los egresados, a la comunidad, etc. En particular se hizo con la finalidad, de que la comunidad universitaria sea participe de estos recursos web para que interactúen con portales web o virtuales donde se pretende que los estudiantes conozcan o se relacionen con los entornos web o digitales, y conozcan que vacíos tienen los portales web, los beneficios de usarlos, como se están desarrollando a lo largo de los años, cual es el debate actual sobre ellos y por ultimo los temas de relevancia.

Introduction

The present review article contains a literature review on web portals, and has been divided into four categories which are as follows: academic activities web portal, distance education web portal, university community web portal, digital humanities web portal. According to professionals in the field, over the years: communication students in Santo Domingo, have mobile and technological devices that they use daily in order to get information, for academic and social networking purposes, which makes them participants in the interaction with web portals or online, and this diagnosis is a means to collect information from students of the web portals they frequent most in order to guide students to use these technological devices to their benefit in education and turn them into researchers encouraging them to have skills, knowledge, skills and experience in the proper use of these web portals and / or web environments. (Breton et al., 2021). These categories are intended to answer the following four questions: What are the gaps in the subject? How has the subject evolved over the years? What is the focus of the current discussion? What are the relevant issues in these investigations? (Anacona Ortiz et al., 2019). This is done in order to build a review article for the subject of the web portal with the objective of presenting and developing an exploratory method where a search of one hundred and eighteen scientific and review articles, books among other sources of information, through academic search engines which are: Google academic, Scielo, Redalyc with the purpose of searching for information, data, results, conclusions, summaries, discussions, etc. This was done in order to have knowledge and learn about the topic of the web portal to be able to answer the four questions above and the problem question which is: How do web portals contribute to academic activities and social relations at the University? According to experts, the quality management of university processes can be used as a classification methodology in decision making, processes, sub-processes, activities, competencies and others are indispensable for quality management in higher education universities. (Fernandez et al., 2019).

Method

The objective of this article was to review the literature on the established problem question: How web portals contribute to academic activities and social relations at the University, using an exploratory method with a descriptive approach.

Information sources such as articles and books were used. Based on the definition of four search categories: academic activities portal (ninety-eight), distance education web portal (eight), university community web portal (five), digital humanities web portal (seven). A search was conducted using the above categories, three bibliographic databases were required, and one hundred and eighteen scientific and review articles were downloaded from a time interval of five years prior to publication. Of the articles found, ninety-nine were classified from Google Scholar, thirteen from Redalyc, and six from Scielo.

Table 1
Description of number of items per year

Databases/ Year	2019	2020	2021	2022	2023	**Total**
Google Scholar	30	30	27	7	5	= 99
Scielo	0	3	2	1	0	= 6
Redalyc	5	1	3	1	3	= 13
Total	35	34	32	9	8	= 118

Note. The databases and the number of articles per year are mentioned.
Source: Own elaboration.

Four questions were used to systematize the articles found: What are the gaps in the subject? How has the subject evolved over the years? What is the focus of the current discussion? What are the relevant issues in these investigations? (Anacona Ortiz et al., 2019). Thus, four hundred and seventy-two systematized responses were obtained, of which one hundred and ninety-two responses to the four research questions posed in this statement were used for the results section results section.

Results

Academic Activities Web Portal

Firstly, the web portal does not have content platforms, it simply relies on social networks including Instagram and Twitter. Second, access to virtual content platforms is very limited for teachers and students. The third and last gap is that of being a limited portal in the processes of knowledge management, which generates almost impossible to do in this virtual modality, since, as the author refers, we are in the XXI century and a portal or a web 2.0 service that does not have educational platforms, and of obtaining knowledge is not functional. (Grimaldos Olmos & Paz Baptista, 2019).

Over the years, this issue of the role of the teacher serves as a link between knowledge and the student, online, asynchronously or virtually, and research has shown that students who have a teacher who receives them cordially, pleasantly and/or empathetically generally tend to perform better academically. Being in a suitable or pleasant environment, they show interest and when they are given feedback by the teacher, they will remember topics they have already seen. (Romero Alonso et al., 2023). Whereas, students and/or alumni who plan to drop out or drop out tend to have lower grades. In addition, it is established that the context or place where the student has studied before is not important to achieve a good academic performance. (Xavier Tigre Atienza & Vílchez, 2023). Over the years, it has been sought to enable a way to rescue academic data and information in order to translate it in a semantic way in the use of web technologies. (Coneglian et al., 2019). The objective is to have indicators of the educational process of each student belonging to this web portal that has the measurement of school commitment and the level of incomplete, successful or ongoing educational trajectory of each registered student. (Miranda-Zapata et al., 2021). The first gap found is the problem of connectivity infrastructure, in this case teachers have difficulty with the internet connection since the connection is of low quality, there are also continuous service cuts, most students do not have internet at home or cannot always connect, considering that this article was made in the Covid-19 pandemic. The second gap is due to the lack of hardware, so that there was no technological equipment such as computers, tablets, printers and cell phones, among others. The third gap is the lack of a virtual classroom at the university, and in cases where virtual classrooms were available, they were poorly designed or

incomplete (lacking information) and instructions on how to use them. As a fourth gap, the work/study overload and fatigue of teachers as well as students, since teachers had to document and do self-learning work because they had to learn to use digital tools by themselves, and to add also create schedules to teach classes virtually which led the teacher to extra work. This caused them stress, tiredness and fatigue. Fifth and last void the economic factor considering that teachers and students did not have technological equipment in their homes, this situation of isolation in the pandemic forced them to obtain an intelligent or technological equipment to be in the virtual classes, consequently they were forced to buy this technological equipment, internet expenses and software expenses to project the classes for a certain time. (Bordignon et al., 2023) As the author points out, for the post-pandemic it is very useful the information that can be collected in the pandemic and how these educational processes of teaching-learning through virtual environments are happening, to then be used for the benefit of university education. (Bordignon et al., 2023). Another gap discovered is that when entering the web portal the reading environment, in this case there are two environments the computer and mobile devices, it was obtained that readers who entered through the computer spent more time because the computer presents greater visibility or visual comfort due to the size of the screen is larger than the mobile device. (Nini Johanna, et al., 2019). There was a gap that was presented by the student since not being related to the educational portal he had to consult or browse other websites, so the student required training, and the objective sought with this portal is to help complete these gaps of the student to the extent that he can complete the task or perform the order. (Ruiz Martínez & Cuenca Arbella, 2019). This has evolved significantly over the years, taking into account that the use of audiovisual media is used with the purpose of educating young people and adolescents through audiovisual content on topics such as history, culture, science and heritage, so that they can obtain knowledge, knowledge and fostering their critical thinking. These educational web portals are also aimed at the cognitive development of the receiver. (Ruiz Martínez & Cuenca Arbella, 2019). These studies of student learning personality at the time of learning will serve for further research in the future with the purpose of analyzing and developing appropriate learning styles for college students. (Freiberg-Hoffmann et al., 2023). Next, the method used for quality management was found to be vacuous, since it arises from the variability of the criteria used to establish the consensus of specialists. (Fernandez et al., 2019.) Over the years, virtual fairs aimed at academia will be used for higher education through events in which web tools will be used to project and create websites or gather people to a conference virtually or online, for example: Google Meet, Google sites in this virtual fair, but there are also many more websites such as Microsoft Teams, Zoom, Skype, Google duo, Discord among many others. (Chanchí et al., 2020). On the other hand, when handling certain systems such as Lynux, Arm or Sarpi, these operating systems are little known or practiced by teachers, which makes the task of teaching difficult, therefore, they should be educated, trained, but this would take more time. Additionally, students living in rural areas have to walk or take long distances to reach their institutions, which takes them hours to reach their institutions. (Lancheros-González et al., 2021). Over the years the development cards will increase technological competencies in students if implemented by the country, this card will support students and teachers to create or conceive technical, logical, informational and skills with virtual spaces. (Lancheros-González et al., 2021). Certainly, the localized vacuity is that there was no analysis of new technologies which would have meant more applications of artificial

intelligence in the dynamics of instructing the student to virtual reality. (Area & Adell, 2021). Today, in the XXI century, there is a technological, socioeconomic and cultural revolution due to the impact that digital technology is making, which emphasizes on educational systems, and is in order to cause a revolution of technology in the educational sphere therefore everything tends to do through web portals, websites, social networks, digital newspapers, news in the universe of digital technologies to bring students, teachers, principals and managers to a contextual environment of a digital and information society (Area & Adell, 2021). (Area & Adell, 2021). It should be noted that certain criteria were evaluated, among them the research carried out, academic results, library services, among others. This was done with the objective of evaluating and observing if the web portals had menus that allowed teachers, students, visitors, graduates, etc. to observe, have and access the university's information. (Vasquez et al., 2019). For many years, findings have been presented on the adoption of information and communication technology in institutions of higher education from 1991 to 2021. (López-Sánchez et al., 2022). Consequently, the fabrication of contributions by young people was presented, to this extent the digital skills of students were investigated during Covid-19, where virtual education is connected to academic digital skills (Castañeda-Camey et al., 2022). Meanwhile, the lack of information and orientation of the curriculum of studies, about the academic processes, the university induction before the beginning of the university academic activities, in this part is where students are disoriented or lost in the processes to be followed in the academic field. Meanwhile, guidance from teachers is minimal, very few give guidance on how the university works academically and its system of evaluation, communication and implementation of activities, in order to achieve the adaptation of the student to the university environment causing less desertion, fewer students with poor school performance, less misinformation, less loss of courses and / or subjects. (Alcarraz-Curi & Sanchez-Huamaní, 2021). The main motive of this literature review is to put an end to misinformation in universities through a plan in which professors and teachers orient students about university activities and academic activities. (Alcarraz-Curi & Sanchez-Huamaní, 2021). Simultaneously, more gaps were discovered, first of all, low-income people do not have the technological resources and economic resources which leads to a significant loss of connection to classes and education in rural and urban areas. Secondly, although 93% of Peruvian patriots have internet, it is used for entertainment, fun or to pass the time, this means that young people and adolescents are not using these sources of information or web portals for their technological and/or digital education because the government and governmental entities have not taken action on these issues of technology in education. (Parco & Prado, 2021). This presents an approach to the implementation, use, interaction, adaptation and acquisition of new technological knowledge, in order to educate and promote digital education in Peru. (Parco & Prado, 2021). According to experts: Half of the students surveyed spent more than 1 hour on social networks, internet, web portal, audiovisual content, playing video games among other things, in this study was evaluated 6 years with the following question: How much time do you spend surfing the internet? The results showed that students tended to spend more than 9 hours a week on the internet and where the mobile device was the most used by them for their daily activities. (Olmedo et al., 2021).

Distance Education Web Portal

Lack of knowledge of teachers and students in digital skills, lack of preparation in technological skills and lack of digital literacy is very common in the 21st century. (Bossolasco et al., 2020). As the years go by, the retention and assimilation of the application of technologies in teachers and students for the new technological century is taking place, because it is necessary to have technological knowledge for a good work, academic and social performance. (Bossolasco et al., 2020). Distance education has a difficulty with those professionals who live, work and are located far or far away from urban areas, so they have difficulties or problems when connecting to the Internet and also in the economic field, living in remote areas this affects them in their area of professionalization. (Leonidovych et al., 2021). Distance education has been gaining greater recognition and indispensability in today's Internet world, considering that these online systems allow students, teachers, visitors, administrators, community, among others. A broad service through the use of web portals that universities have where society in general participates, allowing students to have access to courses, events, forums, activities, electronic library, among many other things. And these tools or web portals allow the student to obtain the learning material, and consequently they can develop more skills, more mechanisms for learning and understanding. (Leonidovych et al., 2021). The line of research is disciplinarily fixed, locally, strictly in one country, this causes that the Information and Communication Sciences are limited because this literature review has the functionality of knowing the academic community dedicated to this function and to investigate in the field of web portals focused on communication in the country of Chile. (Lazcano-Peña & Reyes-Lillo, 2020). Other responses suggest poor school leadership, Internet network failures, lack of appropriate technology. (González & Delgado, 2020). Good results were obtained, but some students are falling behind educationally. Since there is an educational gap in the most salient aspects of education due to the lack of technological tools, such as internet and computers, and the lack of digital skills of many parents, but also on the part of teachers. (González & Delgado, 2020).

University Community Web Portal

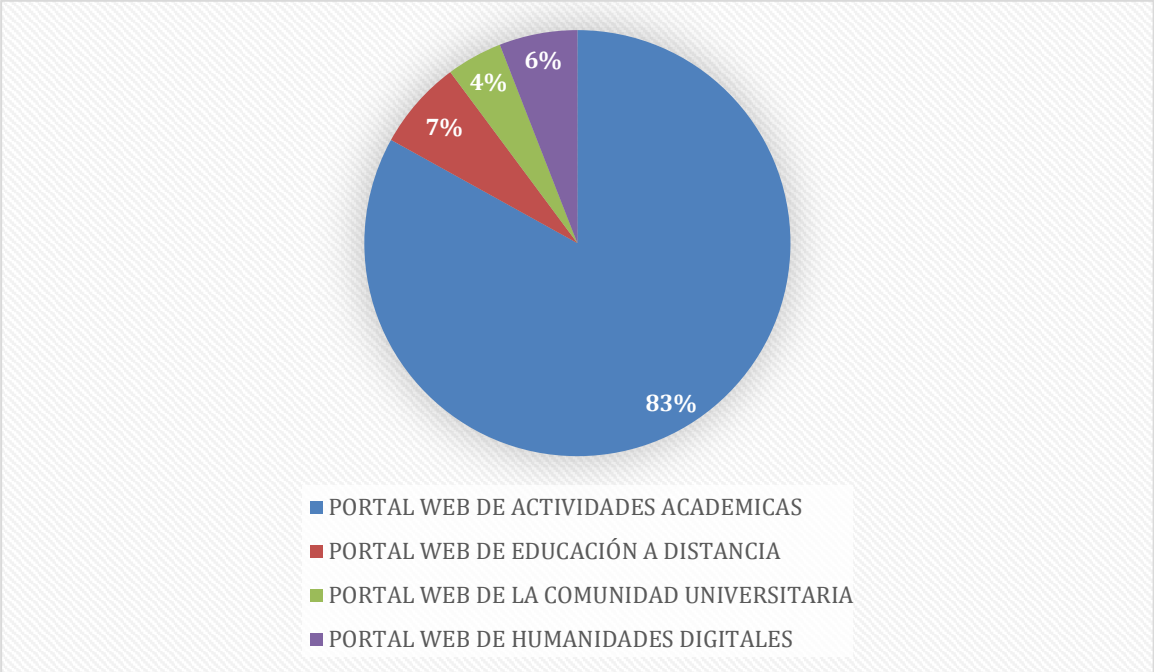
The web portals of South American universities are too many one of these portals have a bad design of HTML or XTML code throwing code errors and consequently not fulfilling the designed function which is to be a web portal that can be sustainable, accessible and that meets the requirements and criteria of Webometrics to be popular, complete, safe, and with this can have participation, positioning, security and can be trusted by its users. (Urdiales Toledo & Campoverde Molina, 2020). The absence of guidance on the essential data requirements required by higher entities (Morales Vargas, 2019). Well, over the years it has been taking adoption in Chile, although the other neighboring Latin American countries have not joined this trend, but instead Europe and North America do have complex web portals or well developed for the publication of data in free formats, which makes publishing something very difficult because of the laws, and the strict degree of compliance required. (Morales Vargas, 2019). Web portals in South America have been having inconsistency with respect to compliance with the laws of Webometrics 2.0 this non-compliance would lead to economic and legal sanctions to universities that have in their web portals: failures, lack of criteria and lack of compliance with the laws

established by Webometrics 2.0 (Urdiales Toledo & Campoverde Molina, 2020). The missing part is that of teachers over 60 years old because they have no knowledge of how to handle ICT "Information and Communication Technologies", this causes conflicts with new teachers or those who recently obtained their profession because young teachers have strong digital skills and different from those of teachers over 60 years old, this should be solved with training to teachers with little knowledge, this will help them to adapt to the new strategies with the current qualified registration of higher education programs that are set or established by the Ministry of National Education. There are gaps in the academic results, since online distance education has a lot of complexity as it is a virtual modality, and teachers when educating students may show low kindness towards the student who receives or perceives little welcome, which triggers their academic performance to decrease or drop. (Romero Alonso et al., 2023).

Digital Humanities Web Portal

A digital environment was developed for Higher Education Institutions in Villavicencio that seeks that teachers and/or professors through a digital literacy plan obtain skills such as collecting information, analyzing information, interpreting information and ordering information based on web or digital environments. In addition to the above, the curriculum of the academic program was designed to develop virtual environments according to each faculty or academic program in order to show or embody essential and dynamic content for students, and thus create teaching-learning environments for students of the XXI century. (Torres-Flórez & Pachón-Pérez, 2021). As a result, the vast majority of students are not learning adequately and do not even know what the curriculum is about. Discussions about the why? of this situation can be varied, and from one moment to the next, the entire educational community has moved to a remote model that most have never used. (González & Delgado, 2020). The digital transformation in higher education presents gaps in the organization of teachers' time, since being a virtual environment the processes multiply generating lack of time, there is a possible solution to create an endowment or organization of time, and tools through strategic plans for time management through a tutorial given to teachers on how to manage or organize time. (Romero et al., 2023). As the years go by, and by not having a portal that provides knowledge, knowledge and training in an educational and/or formative way, this will generate that students are dissatisfied and will produce that due to the lack of a teaching web portal there will be limitations for students and teachers, virtually and in person, since by not having an educational web portal, they will not be able to obtain knowledge in these virtual areas or web 2.0 services (Grimaldos Olmos & Paz Baptista, 2019). Information management, in the digital world, in a centralized website, in an information sharing system, and in online tools to collaborate and interact with users. (Grimaldos Olmos & Paz Baptista, 2019). Innovation has a fundamental role over the years, thanks to its tendency to evolve in digital environments, a privilege since it uses its knowledge to transform society. In addition to the above, we seek to incorporate, implement, develop and design new digital technologies, tools and knowledge in certain areas such as: teaching, research, knowledge transfer, among others. (Romero et al., 2023).

Figure 1
Articles by category



Note. The items collected per category and the percentage of items per category are mentioned. Source: own elaboration.

Information management, in the digital world, in a centralized website, in an information sharing system, and in online tools to collaborate and interact with users. (Grimaldos Olmos & Paz Baptista, 2019). Innovation plays a fundamental role over the years. as it tends to the evolution of digital environments, it is an organization that uses its knowledge to transform society. In addition to the above, we seek to incorporate, implement, develop or design new digital technologies, tools, and knowledge in certain media, such as teaching, research, knowledge transfer, among others. (Romero et al., 2023).

Discussion and Conclusions

Web Portal for Academic Activities

In the first place, the discussion starts with the fact that the web portal has 5 social networks, but these are only focused on the university population, which limits it and therefore strategies are sought so that the regions, communities and sectors of the city of Maracaibo and its borders have a connection so that knowledge is for everyone. They also ask for the web portal to have educational platforms, content platforms, mashup applications and information organization. (Grimaldos Olmos & Paz Baptista, 2019).

The current discussion is centered on the information already obtained, but was previously supplemented with user feedback for improvements and the completion of this web portal. (Coneglian et al., 2019). Pedagogical problems were found in the university due to the fact that they did not have their own web portal, the digital tools for virtual classes were old or obsolete, the lack of quality internet and the lack of platforms or programs to share classes asynchronously. (Bordignon et al., 2023). We can find different options of navigation or information to obtain useful information for students

these are: electronic books, web portals, educational software, television, among other audiovisual media.(Ruiz Martínez & Cuenca Arbella, 2019).Research without neglecting training and linkage, it is worth mentioning that for a university to have excellence it must take into account the process of having specialists who develop articles that encourage students by example in generating quality education through the development of articles, research projects, practices, monitoring among other things.(Fernandez et al., 2019). More than anything else, it is sought that students give them a convenient use to web portals or web tools through the devices and / or technological devices that they have, with the intention of educating them to a concept of professionalization and develop in students more than anything else a learning and management of these web environments. (Breton et al., 2021). Thus it is about technologies and the effect caused by their use in the educational field so that with the use of it a digital or technological society is born with the aim of simultaneously originating projects and methodologies based on technology for educational systems for the development of learning, knowledge creation, digital training and use of artificial intelligence, big data and many other forms of digital learning-teaching.(Area & Adell, 2021). It was based in the areas of academic search engines where these mechanisms allow teachers and students to interact with learning portals and information. (Castañeda-Camey et al., 2022). The tutorials or orientations will serve to put an end to the frustrations of the young people, the desertion, the frequent loss of subjects in the students due to the lack of an adequate induction or teaching of the methodologies or work plans of the teachers. With the intention of stimulating, encouraging and producing academic, personal, social, intellectual, integral and critical progress in young students in their university environment. (Alcarraz-Curi & Sanchez-Huamaní, 2021). It should be noted that as the years go by young people tend to seek new technologies where they spend most of their time on the internet and this makes the university institutions are put to the task of renewing their methodologies and also focus learning in a web learning environment, because as the years go by they must adapt to technological innovation.(Olmedo et al., 2021).a university has created a system in which research projects, training, induction, in which can be viewed by the public and to be a means of dissemination of journals, essays, stories, news, etc.. In addition to the above, the institute or university has its own web portal where they publish and make use of new technologies, in order to project the university to be recognized and disseminated by their research, scientific and narrative productions of teachers and researchers of this. (Castillo, 2022). The updating, revision and adequacy of web portals that present errors and inconsistencies, for not having the Webometrics 2.0 criteria, says that its criteria for web portals must be taken into account and that they must be in order to provide university excellence and an adequate web portal for the university where the web portal developers are updated with the Webometrics 2.0 policies and with the laws of the government or state.(Urdiales Toledo & Campoverde Molina, 2020). Curricula are necessary and fundamental for academic excellence and development. (Salazar Martínez & Moreno, 2021). Thanks to the cognitive development meters, which showed the importance of the family for the motivation and effort of the student in their academic performance, provides new ideas for the methodology of the University, this depends on the motivation or interest that the student has for their grades and academic performance. (Xavier Tigre Atienza & Vilchez, 2023). With these results obtained, it can be affirmed that by developing a tool to manage, analyze and evaluate the learning styles of university students. Students opted for a sensation-intuition personality. (Freiberg-Hoffmann et al., 2023). Starting with a study showing the behavior of productivity indicators of interest, impact indicators, with the purpose of inventing a scope of

information technologies in the direction of educational processes. (López-Sánchez et al., 2022). It appears the creation of a web portal that is used for an experiment in which three plans were evaluated in which the impact of the reading device, the presence of multimedia content and how much time readers spent reading each article and how much time they dedicate to the news portals were alluded to. (Nini Johanna, 2019). In the approach that technology has in the education of millions of students in Peru, so that they no longer have insufficiencies with technology in the educational system, we sought to mitigate the illiteracy rates so that in the universities higher education is provided in class where the student has and can be trained in these technological tools and can thus complement and increase their general knowledge. (Parco & Prado, 2021).

Distance Education Web Portal

The analysis of the questionnaire was reported in which two universities were studied in which assimilations in smart devices were perceived, but not in the skills and competencies before entering the university, and few students had digital competencies such as: creating a video, making a graph in Excel, writing in Word, uploading a file to the cloud, and so on. (Bossolasco et al., 2020). Distance education portals provide an interactive, dynamic, changing and creative environment that allows students to adapt to their schedules, and students have access to learning materials such as books, magazines, training, tutorials, questionnaires, quizzes, audiovisual support, etc. (Leonidovych et al., 2021). Undeniably, the program offers a wide range of resources and ways to support, however, for student learning, the proposed strategies show their weakness due to the living conditions of thousands of households without technological tools in Mexico. Technology, computers and internet, which they added there is a lack of knowledge about their use, creating a gap of misinformation and lack of knowledge on how to use these technological devices in education. (González & Delgado, 2020). In the implementation of shared networks, collaboration networks, open networks, among others. Contributing to the above, this was done in order to disseminate new knowledge, new contributions, new findings through the Internet and in the technological field, taking into account that the information will be more at hand, in other words, at the distance of a click, this will allow local researchers to have contact with other researchers from other countries, consequently, this will produce alliances or research work in company. (Lazcano-Peña & Reyes-Lillo, 2020).

A proposal that will serve as an integration plan for the most vulnerable, for various reasons including: physical, cognitive, economic, cultural, social and other disabilities. (Navarrete Cazales et al., 2021). What is missing is something from several years ago, because the teacher or professor does not have training in his profession, does not have the necessary resources to teach the class or does not have the help of the institution in which he is working, this produces that by not having experience, practice or updating of knowledge the most affected are the students because if the teacher is not trained or does not have the tools or skills the student will have insufficient learning. (Navarrete Cazales et al., 2021).

University Community Web Portal

The semantic web allows you to upload, publish and load data freely on the so-called World Wide Web with certain defined criteria of Open data, opening the way for other researchers to interact with what has been produced by other colleagues or other

universities in an asynchronous and synchronous way. (Morales Vargas, 2019). The timely response of the institution of higher education to reduce contagion by the epidemic of Covid.19, this was done through response processes where they sought to implement a strategic plan for universities and overcome the pandemic with logistical projections, organizations, among other things. (Rodríguez-Villamizar et al., 2022). Teachers are not prepared for remote education, which was a great challenge for higher education in countries such as Brazil and Portugal, as there was little personal adaptation. (Rodríguez-Villamizar et al., 2022). The universities in Latin America used a strategy that allowed them to overcome certain organizational, technological and logistical drawbacks, which made them have certain criteria that promoted higher education where the teacher and the student are in constant interaction, this gives the purpose of preventing contagion, which contributed to the reduction of contagions in the Covid-19 pandemic and causing education to be digitized (Rodriguez-Villamizar et al., 2022).

Digital Humanities Web Portal

The role of the teacher in virtual environments or online distance education in an asynchronous way shows through studies that having a cordial and friendly teacher, students take a better welcome, and consequently show very high levels of academic performance compared to a teacher who is not. (Romero Alonso et al., 2023). In the need to train teachers in digital tools, and the virtual environment on how to use these media to be ready to change to create a global, dynamic, open university that is connected with society, with the community and with other universities if possible. (Romero et al., 2023). Higher education teachers have been playing the role of promoters of digital content, promoters of knowledge and mediators for students to use or interact with various digital environments. (Torres-Flórez & Pachón-Pérez, 2021). Creating its own infrastructures of legitimization or surrendering to consolidated groups with guaranteed access to resources and hegemonic discourses, that is the dilemma currently facing Southern HD. Evidence abounds, but the question remains: Should they ally or allow absorption in other universities? (Fiormonte & Sordi, 2019). The digital humanities have a high level of hurdle, but they also spend or require a lot of money to make them work. In addition to the above, it causes many inequalities, costs a lot to maintain, provokes conflicts and violence. (Fiormonte & Sordi, 2019). Based on these results, it is clear that all professors at our university should consider the use of digital devices (phones, tablets and computers) available to students and universities to plan their teaching process, as well as the use of the Internet and Web 2.0 in general. Otherwise, following Markc Prensky's assumptions about digital natives and digital immigrants, there would be no communication between these digital native students and their teachers, digital immigrants, who would have to work hard to build the communication taught in our future universities. (Sunday, 2019).

Conclusions

From the evidence collected through the downloaded articles, it can be concluded that web portals are a web tool that gathers information through a user interface where the user can perform different actions such as accessing information of interest, accessing

other web portals, accessing digital content, accessing a menu bar, among other things. This review of literature on web portals is related or connected to higher education, the university community, information and communication technologies, digital humanities, etc. It is worth noting that in many universities or institutions web portals did not have requirements, standards or laws of the government, regulatory entities and this generated that students and teachers did not have access to virtual content, it is also noteworthy that the web portals of some universities were very limited and did not present educational portals. In addition to the above, there were many internet, economic, cultural and physical limitations in the distance learning modality because some students do not have sufficient economic resources, and this produces gaps of misinformation in the students.

This literature review covered topics such as innovation, science, technological tools and knowledge regarding digitization. Even more the reality of higher education is that new teachers have knowledge in the digital world being able to do digital tasks such as: uploading a video to the cloud, how to create a virtual meeting or distance, being able to work with operating systems such as Lynux, among others. It is vital to mention that web portals conceive technical, logical, informational capabilities and skills with virtual spaces in the people who use them.

On the other hand, new technologies give rise to new applications of artificial intelligence in the dynamics of instructing the student in virtual reality. In the XXI century, a technological, socio-economic and cultural revolution is taking place, due to the impact that digital technology is having on the educational system, a revolution of technology is being provoked in the educational field so that everything can be done through web portals, websites, social networks, digital newspapers, news on web pages, in a universe of digital technologies to bring students, teachers, rectors and university administrators to a contextual environment of a digital and information society.

References

Alcarraz-Curi, L., & Sanchez-Huamaní, E. M. (2021). Plan de acción tutorial y su aporte a un programa de estudios universitarios. *Revista Electrónica Calidad En La Educación Superior*, *12*(2), 201–219. https://doi.org/10.22458/CAES.V12I2.2857

Anacona Ortiz, J. D., Millán Rojas, E. E., & Gómez Cano, C. A. (2019). Aplicación de los metaversos y la realidad virtual en la enseñanza. *Entre Ciencia e Ingeniería*, *13*(25), 59–67. https://doi.org/10.31908/19098367.4015

Area, M., & Adell, J. (2021). Tecnologías Digitales y Cambio Educativo. Una Aproximación Crítica. *REICE. Revista Iberoamericana Sobre Calidad, Eficacia y Cambio En Educación*, *19*(4), 83–96. https://doi.org/10.15366/REICE2021.19.4.005

Bordignon, F., BLANCO, L. D.-E. E., & 2023, undefined. (2023). Tecnologías digitales, docentes y estudiantes a comienzos del Covid-19. Pistas para la educación superior a por venir: Array. *Ojs2.Fch.Unicen.Edu.Ar*. https://doi.org/10.37177/UNICEN/EB33-350

Bossolasco, M. L., Chiecher, A. C., & Dos Santos, D. A. (2020a). Profiles of access and appropriation of ICT in freshmen students. Comparative study in two Argentine public universities. *Pixel-Bit, Revista de Medios y Educacion*, *57*, 151–172. https://doi.org/10.12795/PIXELBIT.2020.I57.06

Bossolasco, M. L., Chiecher, A. C., & Dos Santos, D. A. (2020b). Profiles of access and appropriation of ICT in freshmen students. Comparative study in two Argentine public universities. *Pixel-Bit, Revista de Medios y Educacion*, *57*, 151–172. https://doi.org/10.12795/PIXELBIT.2020.I57.06

Breton, A., Journal, S. T.-M. C., & 2021, undefined. (n.d.). Diagnóstico de la percepción de los estudiantes universitarios de comunicación sobre las plataformas online y el uso del lenguaje transmedia. *Mlsjournals.com*. Retrieved April 21, 2023, from https://www.mlsjournals.com/MLS-Communication-Journal/article/view/707

Castañeda-Camey, N., Cortez, M. E. C., & Medina, M. C. (2022). Percepciones de jóvenes universitarios sobre sus habilidades digitales académicas y educación virtual durante la pandemia. *Hachetetepé. Revista Científica de Educación y Comunicación*, *25*, 2206–2206. https://doi.org/10.25267/HACHETETEPE.2022.I25.2206

Castillo, G. M. (2022). Comunicación pública de la ciencia en la Universidad Nacional de San Martín : escenarios e itinerarios alternativos de visibilización de su producción científica. *Estudios Sociales Contemporáneos*, *26*, 279–303. https://doi.org/10.48162/REV.48.036

Chanchí, G., SPACES, C. H.-L.-R., & 2020, undefined. (n.d.). Estrategia basada en TIC para la organización de ferias virtuales de divulgación académica durante la pandemia de COVID-19. *W.Revistaespacios.Com*. Retrieved April 21, 2023, from http://w.revistaespacios.com/a20v41n42/a20v41n42p06.pdf

Coneglian, C. S., Arakaki, A. C. S., Gonçalez, P. R. V. A., & Santarem Segundo, J. E. (2019). Recursos audiovisuais na *Web* de Dados: a construção do Portal Semântico Audiovisual. *Transinformação*, *31*, e180046. https://doi.org/10.1590/1678-9865201931E180046

Domingo, R. P. (2019). Ensino em Foco. *Ensino Em Foco*, *2*(4), 73–83. https://doi.org/10.55847/EF.V2I4.565

Fernández, A. R., ... I. A. G.-R., & 2019, undefined. (n.d.). Gestión de la calidad de los procesos universitarios. *Revistaespacios.Com*. Retrieved April 21, 2023, from https://www.revistaespacios.com/a19v40n31/a19v40n31p27.pdf

Fiormonte, D., & Sordi, P. (2019). Liinc em Revista. *Instituto Brasileiro de Informação Em Ciência e Tecnologia*, *15*(1), 108-130. https://doi.org/10.18617/LIINC.V15I1.4730

Freiberg-Hoffmann, A., Fernandez-Liporace, M., Freiberg-Hoffmann, A., & Fernandez-Liporace, M. (2023). Learning Styles Type Indicator: una adaptación para estudiantes medios y universitarios argentinos. *Academo (Asunción)*, *10*(1), 1–12. https://doi.org/10.30545/ACADEMO.2023.ENE-JUN.1

González, J. R., & Delgado, M. M. (2020). *Estrategias docentes para la educación a distancia del programa Aprende en Casa I*. http://148.217.50.3/jspui/handle/20.500.11845/2199

Grimaldos Olmos, R., & Paz Baptista, A. (2019). Servicios Web 2.0 en el portal UNICA. *Telos: Revista de Estudios Interdisciplinarios En Ciencias Sociales*, *21*(3), 643–660. https://doi.org/10.36390/TELOS213.08

Lancheros-González, J.-A., Herrera-Marchena, M., Morantes-Hernández, P.-J., Buitrago-Bernal, R.-A., López-Buitrago, I.-D., & Pombo, J. R. (2021). Un espacio virtual para vivir la ciencia y la tecnología por medio de streaming. *Revista Internacional de Pedagogía e Innovación Educativa*, *1*(2), 103–124. https://doi.org/10.51660/RIPIE.V1I2.44

Lazcano-Peña, D., & Reyes-Lillo, D. (2020a). Redes académicas en la investigación en Comunicación en Chile: análisis de co-autorías en el trabajo científico. *Revista Española de Documentación Científica*, *43*(1), e259–e259. https://doi.org/10.3989/REDC.2020.1.1626

Lazcano-Peña, D., & Reyes-Lillo, D. (2020b). Redes académicas en la investigación en Comunicación en Chile: análisis de co-autorías en el trabajo científico. *Revista Española de Documentación Científica*, *43*(1), e259–e259. https://doi.org/10.3989/REDC.2020.1.1626

Leonidovych, K. I., Mykolayovych, V. O., Alexandrovna, G. I., Vasyliovych, M. P., & Ivanivna, K. I. (2021). Creating the Informational and Educational Environment of the University Based on

the Distance Learning Platform LIKAR_NMU. *Archives Of Pharmacy Practice*, *12*(3), 66–74. https://doi.org/10.51847/5ZZEROABWA

López-Sánchez, J., Landazábal, N. S., & Valencia-Arias, A. (2022). Tendencias en estudios sobre el uso y adopción de tecnologías de información y comunicación en instituciones de educación superior: un análisis bibliométrico. *Revista Virtual Universidad Católica Del Norte*, *67*, 136–162. https://doi.org/10.35575/RVUCN.N67A6

Miranda-Zapata, E., ... F. A.-... de D. and, & 2021, undefined. (n.d.). Plataforma online de evaluación de compromiso escolar, versión 2.0: Desde la experiencia chilena al uso en países de Iberoamérica. *Redalyc.Org*. Retrieved April 21, 2023, from https://www.redalyc.org/journal/4596/459669142012/459669142012.pdf

Morales Vargas, A. (2019). *Datos abiertos y visualización de información en sitios web de universidades chilenas: una asignatura pendiente*. https://repositorio.uchile.cl/handle/2250/142788

Navarrete Cazales, Z., Manzanilla Granados, H., Ocaña-Pérez, L., Navarrete Cazales, Z., Manzanilla Granados, H., & Ocaña-Pérez, L. (2021). La educación después de la pandemia: propuesta de implementación de un modelo de Educación Básica a Distancia. *Diálogos Sobre Educación. Temas Actuales En Investigación Educativa*, *12*(22). https://doi.org/10.32870/DSE.V0I22.920

Nini Johanna, R. Alvarez. P. C. E. Javier. B. D. R. Alfredo. O.-C. R. F. (2019). Evaluación experimental de factores que afectan el tiempo de permanencia de un lector en un portal web de noticias en Colombia. *Comuni@cción*, *10*(2), 99–110. https://doi.org/10.33595/2226-1478.10.2.382

Olmedo, E. O., Vázquez-Cano, E., Arias-Sánchez, S., & López-Meneses, E. (2021). Las Competencias en el uso de las Tecnologías de la Información y la Comunicación en el alumnado universitario. *Pixel-Bit, Revista de Medios y Educacion*, *60*, 153–167. https://doi.org/10.12795/PIXELBIT.74860

Parco, R. A. R., & Prado, H. G. C. (2021). DESEMPEÑO DOCENTE ANTE LA ENSEÑANZA VIRTUAL EN ESCENARIOS PANDÉMICOS. *REVISTA CIENTIFICA EPISTEMIA*, *5*(1). https://doi.org/10.26495/RE.V5I1.1886

Rodriguez-Villamizar, L. A., Sosa-Avila, L. M., Zafra-Carrillo, L. H., Rodriguez-Medina, J., Prada-Albarracin, V. M., Vera-Cala, L. M., Rodríguez-Villamizar, L. A., Sosa-Avila, L. M., Zafra-Carrillo, L. H., Rodríguez-Medina, J., Prada-Albarracín, V. M., & Vera-Cala, L. M. (2022). Desarrollo y resultados de la respuesta institucional dirigida a la comunidad universitaria UIS frente a la pandemia por COVID-19 durante 2020-2021. *Revista de La Universidad Industrial de Santander. Salud*, *54*(1). https://doi.org/10.18273/SALUDUIS.54.E:22039

Romero Alonso, R., Valenzuela Gárate, J., & Anzola Vera, J. J. (2023). The Facilitating Role of the Teacher in Asynchronous Online Training and Academic Outcomes: An Exploratory Study. *RIED-Revista Iberoamericana de Educacion a Distancia*, *26*(1), 83–100. https://doi.org/10.5944/RIED.26.1.33982

Romero, M., Romeu, T., Guitert, M., & Baztán, P. (2023). La transformación digital en la educación superior: el caso de la UOC. *RIED-Revista Iberoamericana de Educación a Distancia*, *26*(1), 163–179. https://doi.org/10.5944/RIED.26.1.33998

Ruiz Martínez, L. E., & Cuenca Arbella, Y. (2019). *La Web como herramienta para la orientación a estudiantes universitarios en el empleo de la tecnología educativa*. *2*, 116-126. http://repositorio.uho.edu.cu/xmlui/handle/uho/7035

Salazar Martínez, R. Á., & Moreno, R. P. (2021). Comunicación, Desarrollo y Cambio Social en la oferta académica universitaria de pregrado en América Latina. *Quórum Académico*, *18*, 9–31.

Torres-Flórez, D., & Pachón-Pérez, Y. (2021). Las competencias digitales en los profesores universitarios de las ciencias económico administrativas. *Pensamiento Americano*, *14*(28), 77–93. https://doi.org/10.21803/PENAMER.14.28.447

Urdiales Toledo, J. L., & Campoverde Molina, M. A. (2020). Análisis de accesibilidad de los portales web de las Universidades de América del Sur clasificadas en la Webometrics. *Dominio de Las Ciencias, ISSN-e 2477-8818, Vol. 6,No. 3, 2020 (Copy Dedicated to: July-September 2020), Pp. 134-156*, *6*(3), 134–156. https://dialnet.unirioja.es/servlet/articulo?codigo=7539719&info=resumen&idioma=SPA

Vasquez, C. L., Luna Cardozo, M., Torres Samuel, M., Bucci, N., & Amelec, V. (2019). *Arquitectura información al de portales web de las universidades latinoamericanas en los rankings*. https://doi.org/10.1/JQUERY.MIN.JS

Xavier Tigre Atienza, W., & Vilchez, J. L. (2023). Variables contextuales y rendimiento académico en estudiantes universitarios: Array. *ESPACIOS EN BLANCO. Revista de Educación (Serie Indagaciones)*, *1*(33), 107-120. https://doi.org/10.37177/UNICEN/EB33-345

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Approach to exponential and logarithmic functions through didactic analysis

Aproximación a las funciones exponencial y logarítmica a través del análisis didáctico

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ABSTRACT

Keywords:
exponential function, logarithmic function, didactic analysis.

The article presented focuses on the planning and organization of teaching and learning of exponential and logarithmic functions and is born from the need to improve learning in Mathematics. The theoretical framework used is Didactic Analysis, in its four sub-analyses (content, cognitive, instructional and performance) through the design and implementation of a didactic unit and, as a methodology, a mixed-cut study with two groups of fourth-year students from an Argentine educational institution. The didactic unit consists of title, objectives, content, methodology, evaluation and tasks. The results show that the organization of teaching under this approach determines a higher academic performance of students in Mathematics in the subject of exponential and logarithmic functions, since the scores, analyzed by the U Man Whitney test, of the experimental group were higher than those of the control group with a statistical significance of less than 0.05. Likewise, interviews were conducted with the students in the experimental group at the end of the teaching unit, on each of the exercises and problems in it, and their opinions indicated that they reached a more complete understanding of the subject, so that through this intervention they not only improved their grades, but also their understanding of the subject in question.

RESUMEN

Palabras clave:
función exponencial, función logarítmica, análisis didáctico.

El artículo que se presenta centra su atención en la planificación y organización de la enseñanza y del aprendizaje de la función exponencial y logarítmica y nace de la necesidad de mejora de los aprendizajes en Matemáticas. Se utiliza como marco teórico el Análisis Didáctico, en sus cuatro subanálisis (de contenido, cognitivo, de instrucción y de actuación) mediante el diseño y la implementación de una unidad didáctica y, como metodología, un estudio de corte mixto con dos grupos de estudiantes de

	cuarto año de una institución educativa argentina. La unidad didáctica se compone de título, objetivos, contenidos, metodología, evaluación y las tareas. Los resultados muestran que la organización de la enseñanza bajo este enfoque determina un mayor rendimiento académico de los alumnos en Matemáticas en el tema de funciones exponenciales y logarítmicas, ya que las puntuaciones, analizadas mediante la prueba U Man Whitney, del grupo experimental fueron superiores al del grupo control con una significancia estadística menor a 0,05. Asimismo, se realizaron entrevistas a los estudiantes del grupo experimental, al finalizar la unidad didáctica, sobre cada uno de los ejercicios y problemas de ésta y sus opiniones denotaron que llegaron a una comprensión más acabada del tema, por lo que mediante esta intervención no solo mejoraron sus calificaciones, sino que además mejoró su comprensión del tema en cuestión.

Introduction

This research is intended as a contribution to the improvement of Mathematics teaching and learning processes, which is necessary due to the negative results of students' performance in Mathematics in the last decades, particularly in the Exponential and Logarithmic Function, in terms of posing and solving exponential and logarithmic equations and the complete study of these functions, including their graphs, at the middle level.

This work is based on the planning, design and implementation of a didactic unit (See Annex 1) corresponding to the 4th year program of the intermediate level of Mathematics and the topic of Exponential and Logarithmic Functions based on the Didactic Analysis method, with students of a private school with a bachelor's degree in computer science, in the Autonomous City of Buenos Aires, Argentina.

The objective of this article is "To apply Didactic Analysis in a didactic unit of the exponential and logarithmic function in mathematics in the 4th year of secondary school".

The didactic unit is composed of TITLE, OBJECTIVES, CONTENTS, METHODOLOGY, EVALUATION and TASKS.

The implementation of a didactic unit for the teaching and learning of the exponential and logarithmic function, from the Didactic Analysis aims to improve the effective learning that is intended to be achieved, in this context the theoretical framework provided by the Didactic Analysis is reviewed:

According to Martínez, Triviño and Bonilla (2023) Didactic Analysis develops the competence of curricular planning that allows the mathematics teacher to design, develop and evaluate the mathematical content to be managed in the classroom, where the elements, times and ideal conditions for the management process of a didactic unit can be foreseen. (p.43)

Rico, Lupianez and Molina (2013) state that Didactic Analysis consists of four analyses: content, cognitive, instructional and performance.

According to these authors, in the content analysis located in the cultural and conceptual dimension of the curriculum, the teacher must identify, select and organize the meanings of the concepts and procedures of the mathematical topic in question that he/she believes are relevant to plan as approved school content for instruction. To review and organize the concepts and procedures, the way in which they can be represented and the organization of the phenomena and problems to which they can provide solutions, will delimit the curriculum organizers that make up the content analysis.

According to Martínez (2020) who follows Lupiáñez (2009), he differentiates different levels of content analysis: the knowledge that is imparted and that was considered in the course of history, the contents that education laws indicate should be taught, the contents that are proposed for a subject, and the content of a particular topic.

In this stage of the research, the concepts to be taught were identified, based on the corresponding curricular design, linked to the teaching and learning of the exponential and logarithmic function.

Rico et al., (2013) expand with respect to curriculum organizers:

> The content analysis is organized around 3 curriculum organizers:
>
> Representation systems, where the different ways in which the content and its relationships with other concepts and procedures can be represented are considered.
>
> Phenomenology, which considers the phenomena (contexts, situations and problems) that can give meaning to the content under consideration.

> The conceptual structure, which considers the relationships of the concepts and procedures involved in the content studied, taking into account both the mathematical structure of which they are part, as well as the structure of such concepts and procedures. (Rico et al., 2013, p.85)

In the elaboration of the didactic unit, it was considered that the students work with different representation systems:

Algebraic: it is based on graphemes and has its own writing rules.

Verbal: the way in which mathematical entities, their relationships and priorities are expressed verbally; there is specific terminology to differentiate them.

Graph: based on graphs, it is the one that appears when representing relations or functions on Cartesian axes, numbers on the number line, etc.

Tabular: it deals with information through tables.

Specifically, in the tasks "Juggling balls", "Christmas wreaths" and "Richter scale" they worked with algebraic, verbal and graphic representations, in the task "The million" with algebraic, verbal and tabular, and in the task "Fixed term" they used all four types of representations.

In terms of phenomenology, all the problems in the didactic unit were posed with everyday life situations ("Juggling balls", "Christmas wreaths", "Fixed term", "The million" and "Richter scale", the latter being a scale used to measure the intensity of earthquakes)

The conceptual structure, as defined above, was established after a thorough review of the 4th grade Mathematics textbooks. Year: Funciones 2 Altman, S., Comparatore, C and Kurzrok, L. (2008) and Matemática II Molina, A., Féliz O., Laurens, R., Toribio, C. Cueto, R., Michel, D., Carbonell, L., Larcier, N., Lugo, J. and Montes de Oca, R. (2008).

Continuing with the cognitive analysis:

Rico et al., (2013) illustrate in relation to cognitive analysis:

> Cognitive analysis, located in the cognitive dimension of the curriculum, addresses the problem of how schoolchildren learn this mathematical subject. From a constructivist approach (Coll, 2002), the teacher, based on the information obtained in the previous content analysis and the knowledge about school mathematics and its learning, states and organizes learning expectations about this mathematical topic. It also analyzes those limitations that may interfere with learning, and organizes the selection of tasks that will provide schoolchildren with the opportunity to learn. (Rico et al.,2013, p.83)

According to Martínez (2020) who refers to (Rico and Fernández-Cano, (2013), the cognitive analysis, from the curricular approach, takes into account the complexity of the tasks according to the level of depth of the subject in question, the variety of learning objectives they encompass and the obstacles whose domination they entail.

In this work, in the cognitive analysis stage, the learning objectives were determined from the information obtained in the content analysis and the possible limitations that could appear in the learning of this topic were also analyzed from the errors of the diagnostic tasks (see Annex 2) of the previous knowledge. Subsequently, the relevant tasks were determined.

> In instructional analysis, the teacher selects, designs, and sequences the tasks to be used in instruction to achieve the learning expectations he or she has previously specified. It also analyzes the different materials and resources that can be used in their classes and, among other aspects, defines

> the sequencing of tasks and sessions and delimits central aspects of classroom management. (Rico, et al., 2013, p.83)

Martínez (2020) considers that the instructional analysis, after the previous analyses, focuses on the teaching of the mathematical subject in question, and from the curricular approach it is centered on planning the teaching to find as a result the design of the didactic unit, a design that is justified in the content and cognitive analyses. The author then refers to Gómez (2002) who indicates that in the Didactic Analysis procedure there should be a dialogical relationship between all the sub-analyses, each sub-analysis of the Didactic Analysis not only responds to and builds on the previous one, but also, what is needed in one phase can review and modify the analyses carried out in the previous phases.

In this stage, the tasks and their sequence were designed in relation to the objectives set and the number of classes that make up the didactic unit.

Finally, in the performance analysis:

Rico et al., (2013), on performance analysis state:

> The last analysis, the performance analysis, is carried out after implementing the didactic unit and serves the teacher to gather information about: the extent to which the established learning expectations have been achieved, the functionality of the tasks used or the goodness of the evaluation tools put into play. This information is useful in view of the next implementation of the designed unit or at the beginning of the planning of the next topic. (p.83)

Martínez (2020) follows Lupiáñez (2013) who indicates that, after the instructional analysis, the teacher will reflect on the level of adequacy of his teaching-learning proposal by analyzing the results he found. Martínez (2020) adds that performance analysis has two focuses, one consists of reflecting on whether the learning objectives were achieved and whether the students overcame the expected obstacles, in this focus the previous cognitive analysis is essential; and the other focus should be on teaching as a process, since the results obtained by the students are the product of the teacher's actions and the design of the didactic unit, in this last focus the analysis of content and instruction, both previously performed, is essential. Martínez (2020) referring to Lupiáñez (2013) enunciates that at this stage the teacher may consider:

- Weigh whether the instruction was consistent and coherent in selecting and organizing the tasks and content and whether they were conducive to the learning expectations set.
- Establish the level of achievement of learning expectations and the development of specific mathematical competencies achieved by students.
- Verify that difficulties and errors have been overcome.
- Reflect on the timeliness of the teaching resources and materials used.
- Assess the suitability of evaluation instruments to inform and drive learning.

In previous terms, the analysis of results is materialized by establishing the strengths and weaknesses of what has been proposed in order to seek improvements in the following cycles. Therefore, in this analysis, a new design of the didactic unit is born.

The students' learning was evaluated, through their academic performance, after the implementation of the field work of this research.

The development of each of the classes that make up the implementation of the didactic unit consisted of an introductory explanation by the teacher, then the students

solved the problems and exercises and developed the tasks to finally deliver the resolutions of the problems and exercises, and in the following class they received the corresponding feedback from the teacher.

Method

The research methodology applied was a case study with a mixed and interpretative approach. This methodology was applied to two groups, the control group (one of 19 students cohort 2021 with traditional teaching) and the experimental group of 21 students cohort 2022 (with the implementation of the didactic unit of this research), respectively, of 4th year students of the Colegio de Nuestra Señora (Autonomous City of Buenos Aires - Argentine Republic), in the subject Mathematics.

This work involved the design and implementation of a didactic unit for 4 weeks of 4 teaching hours per week, corresponding to the topic Exponential and logarithmic function based on Didactic Analysis in its four phases (Content, Cognitive, Instructional and Performance Analysis), the students had previously studied real numbers, sequences, probability and statistics and cubic functions. As a limitation, the possible lack of training of teachers involved in the Didactic Analysis current is considered a limitation.

According to the results obtained after performing the diagnostic tasks, the topics in which the students presented greater difficulties in relation to their previous knowledge were: common factor, clearing unknowns, fractional exponent, graphing functions, classifying functions, study of functions, asymptotes, inverse function, systems of equations, quadratic function, canceling property, correct use of the calculator and the calculation of the solutions of an equation and the highest percentages of errors were found in the topic of functions, which leads to the fact that later they cannot correctly assimilate the topic of Exponential and Logarithmic Function.

The theoretical framework explored Didactic Analysis, in its four phases (Content, Cognitive, Instructional and Performance Analysis), which frames this research, as described in the introduction.

The academic performance of the students was measured through the grades obtained in the same written exam, and was compared with respect to the learning level of the students of the previous year. It should be clarified that the traditional methodology was applied to the students of the control group, that is, without the application of the Didactic Analysis and without the implementation of the didactic unit based on it, and the methodology described in this article was applied to the students of the current year at that time, who are the experimental group.

Also, after carrying out the corresponding tasks, interviews (see Appendix 4) were conducted with the students in the experimental group in three stages: initial, developmental and final, the results of which appear in the results section of this article.

Finally, academic performance was compared, according to the results obtained in the control and experimental groups, through the Mann Whitney U test in Microsoft Excel. The Mann Whitney U is used for two independent groups, in samples of less than thirty units of analysis, for an ordinal variable in a non-normal distribution, hence the reason for its choice.

Results

As the students carried out the didactic unit at the end of the tasks, they were interviewed, the results of which show the benefits they perceived in their learning (See Annex 4).

The interviews were conducted with a total of 21 4th grade students. Year.

Grades range from 0 to 10, both inclusive, and the passing grade is equal to or higher than 6, so that those who obtain a grade lower than 6 will fail.

The results obtained in the final evaluation, which served to assess student learning through their academic performance, were as follows:

TABLE 1

Results obtained in the evaluations of both groups

Participant number	Control group notes	Experimental group notes
1	8	10
2	3	10
3	8	7
4	10	10
5	5	8
6	8	10
7	5	6
8	8	7
9	6	6
10	3	8
11	8	10
12	3	8
13	6	5
14	5	9
15	2	8
16	8	4
17	8	10
18	5	9
19	2	8
20		7
21		9

Note. Control group: students cohort 2021 (with traditional teaching) and Experimental group: students cohort 2022 (with the implementation of the didactic unit of this research).

Table 1 shows that in the experimental group the overall scores were higher.

Figure 1 shows the number of passes and the percentage of passes in each group.

FIGURE 1

Number of passes (total number of passes over the total of the corresponding group) and percentage of passes per group

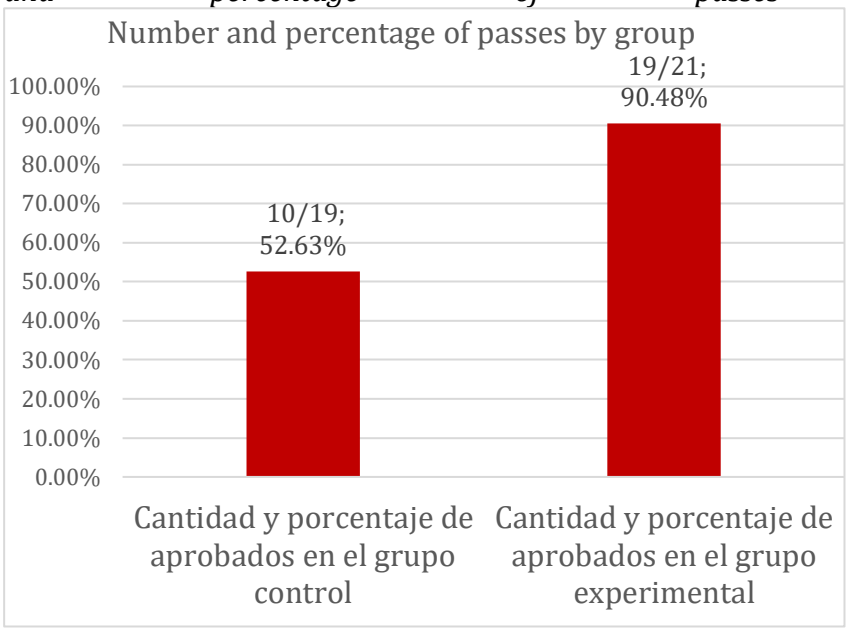


Figure 1 shows how the experimental group has increased the number and, therefore, the percentage of passing grades.

Figure 2 shows the comparison of grade frequencies in both groups, for which the data corresponding to the grades have been divided into 5 intervals, being the values of the grades from 0 to 10 and from 6 the value corresponding to the passing grade:

FIGURE 2

Comparison of grade frequencies in both groups

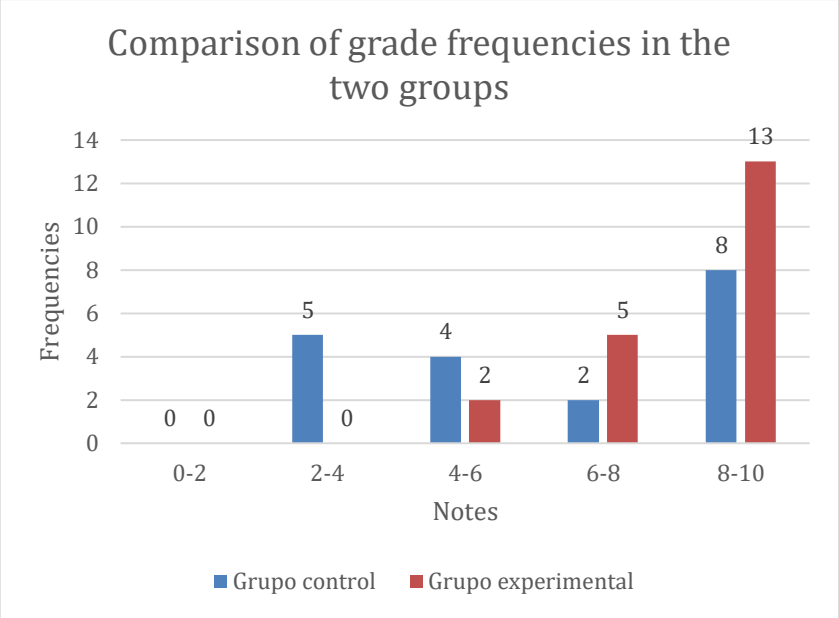


Figure 2 shows that in the experimental group, not only was the number of passers higher, but also, in general, the grades of the failers in the second group were higher than those of the passers.

Table 2 shows the results when applying, for statistical purposes, the Mann Whitney U test used to compare academic performance in both groups:

TABLE 2

Calculation to determine the U Mann Whitney U Result	Amostra 1	Amostra 2
Sample size	19	21
Soma dos Postos (Ri)	286,5	533,5
Median =	6,00	8,00
U =	96,50	
p-value (one-sided) =	,0026	
p-value (bilateral) =	,0053	

Note. Results obtained with Bioestat 5.3 statistical software

Table 2 shows that the groups showed statistically significant differences in academic performance where the scores of the control group (median=6) were lower than that of the experimental group (median=8) U=96.50, p=0.0026. A p-value of less than 0.05 is evidence of a statistically significant difference between the two groups.

It is evident that academic performance improves with the application of the Didactic Analysis, since in Figure 1 it can be observed that in the control group 52.63% of the students passed and in the experimental group 90.48% of the students passed, which represents a difference of 37.85% more students passed in the experimental group. at the same time, the improvement is still evident since, as can be seen in Figure 2, in the experimental group not only was the number of passed students higher, but also the number of failed students in the experimental group was higher than in the passed students, in both groups there were no failed students with grades between 0 and 2, with grades between 2 and 4 there were 5 failures in the control group and no failures in the experimental group, with grades between 4 and 6 there were 4 failures in the control group and only 2 in the experimental group, with grades between 6 and 8 there were 5 passes in the experimental group and only 2 passes in the control group and finally with

grades between 8 and 10 there were 13 passes in the experimental group and only 8 passes in the control group.

Finally, once the results of the test taken by both groups were obtained, it was demonstrated that academic performance in the subject improved with the application of this didactic proposal.

Discussion and Conclusions

After implementing the didactic unit, evaluating the students' performance through the written test and conducting interviews in three stages (initial, developmental and final), the following conclusions were reached:

- It was possible to observe an improvement in the academic performance of the experimental group with respect to the control group.
- The results of the interviews that were applied to the students on each of the exercises on which they were asked for their opinion show that they reached a more complete understanding of the subject.
- The Man Whitney U test shows the significant improvement in the academic performance of the experimental group with respect to the control group.

References

Altman, S., and Comparatore, C., (2008). Matemática. Funciones 2. Ciudad Autónoma de Buenos Aires: Longseller .

Coll, C. (2002) Constructivismo y educación: la concepción constructivista de la enseñanza y el aprendizaje. In Coll, César; Palacios Jesús y Marchessi, Álvaro Desarrollo Psicológico y Educación.Tomo II. Madrid. Spain: Alianza Editorial

Martinez, E., Triviño, J. A. and Bonilla, B. E. (Ed.). (2023). Las prácticas del profesor de matemáticas en formación inicial al diseñar tareas asociadas a la fracción. Florencia, Colombia: Editorial Universidad de la Amazonia

Martinez, S. (2020) diseño, implementación y análisis de una propuesta didáctica para la proporcionalidad en el primer ciclo de secundaria. Valladolid, Spain: Escuela de Doctorado Universidad de Valladolid.

Molina, A., Féliz O., Laurens, R., Toribio, C. Cueto, R., Michel, D., Carbonell, L., Larcier, N., Lugo, J. and Montes de Oca, R. (2008). Matemática II. Ciudad Autónoma de Buenos Aires: Santillana.

Rico, L., Lupianez J. L. and Molina, M. (2013). Análisis Didáctico en Educación Matemática. a. Metodología de investigación, formación de profesores e innovación curricular. Grenada. Spain: Editorial Comares, S.L.

Annexes

Annex 1

Didactic unit

Title:

Exponential and logarithmic functions

Objectives:

Strengthen the concept of function and its related concepts.

Understand the characteristics, graphical behavior and growth of exponential functions, including the concept of inverse function.

Understand the concept of logarithm, properties of logarithms, characteristics of the logarithmic function, graphical behavior and growth, including the concept of inverse function

Solve exponential and logarithmic equations, optimizing these processes.

Apply the knowledge acquired in the resolution of problems, optimizing these processes

Contents:

Review of: density of a substance, area and volume of a sphere, area and perimeter of the circular crown, deduction of formulas, definition of function, graph of functions, quadratic and cubic function, classification of functions, domain, image, zeros, intervals of positivity and negativity, intervals of growth, decrease and constancy, asymptotes and inverse function.

Exponential function, logarithm, properties of logarithms, logarithmic function, logarithmic function, exponential and logarithmic equations. Exercises and problems.

Methodology:

First, the problem statement was read several times and the teacher clarified the doubts that arose, then the students solved them and handed in the resolutions to the teacher, and in the following class they received the pertinent corrections and feedback from the teacher.

Evaluation:

The evaluation was carried out by means of a written test.

Tasks:

Task "Juggling balls"

In a circus they want to build stuffed balls for juggling, calculate:

1. How much padding and how much lining fabric should be purchased per ball if you want to make them 60 mm in diameter filled with rice (density=0.9 g/cm^3).
2. Graph the function of the volume of the ball as a function of radius and the area of the ball as a function of radius.
    a. Graph it
    b. Classify it. Justify.
    c. Indicate its domain, image, zeros, intervals of positivity and negativity, intervals of growth, decrease and constancy. Justify.
    d. Find the asymptotes and the inverse function, if any. Justify.

Task "Christmas wreaths"

You want to make cardboard Christmas wreaths for doors, calculate:

1. To deduce the formula of the circular crown, from the formula of the area of the circle.

2. If the crowns are to be made with a diameter of 25 cm and a thickness of 5 cm, calculate how many m^2 of cardboard would have to be purchased to make 50 crowns.

3. Find the formula for the perimeter of a circular wreath from the formula for the length of a circumference and calculate the m of Christmas ribbon to be purchased to encircle the outside and inside of a Christmas wreath.

4. Plot the function of crown area as a function of thickness.
   a. Graph it.
   b. Classify it. Justify.
   c. Indicate its domain, image, zeros, intervals of positivity and negativity, intervals of growth, decrease and constancy. Justify.
   d. Find the asymptotes and the inverse function, if any. Justify.

Exponential function

Task "Fixed term"

Difference between simple and compound interest:

When an investor places money in a bank for a fixed term that generates for example monthly interest and the investor withdraws the interest he earns each month, this is called SIMPLE INTEREST, in the case that he does not withdraw it and lets it be added to his capital each month to produce new interest, this is called COMPOUND INTEREST.

We place for 4 quarters $100,000 in a bank, which pays 10% interest quarterly, complete the following tables assuming that it does so at simple interest in the first and compound interest in the second, complete, justifying, the missing rows:

PERIOD	CAPITAL AT THE BEGINNING OF THE PERIOD	INTEREST EARNED IN THE PERIOD	AMOUNT
1	$100000	$10000	$110000
2	$100000	$10000	$110000
3	$100000	$10000	$110000
4	$100000	$10000	$110000

PERIOD	CAPITAL AT THE BEGINNING OF THE PERIOD	INTEREST EARNED IN THE PERIOD	AMOUNT
1	$100000	$10000	$110000
2	$110000	$11000	$121000
3	$121000	$12100	$132100
4	$132100	$13210	$145310

Now we are going to derive a formula that allows us to calculate the amount of a capital at compound interest after n periods:

PERIOD	CAPITAL AT THE BEGINNING OF THE PERIOD	INTEREST EARNED IN THE PERIOD	AMOUNT

1	C	I=C. i. 1 (simple interest formula)	C_1=C+I C_1= C+(C.i.1) = C_1=C(1+i)
2	C_1	I=C_1. I. 1	C_2=C_1 + I=C_1+ C_1. I= C_2=C_1 (1+i) =C (1+i) (1+i) C_2= C$(1+i)^2$
3	C_2	I=C_2. I. 1	C_3=C_2 + I=C_2+ C_2. I= C_3=C_2 (1+i) =C $(1+i)^2$ (1+i) C_3= C$(1+i)^3$
4			
n-1			
n			

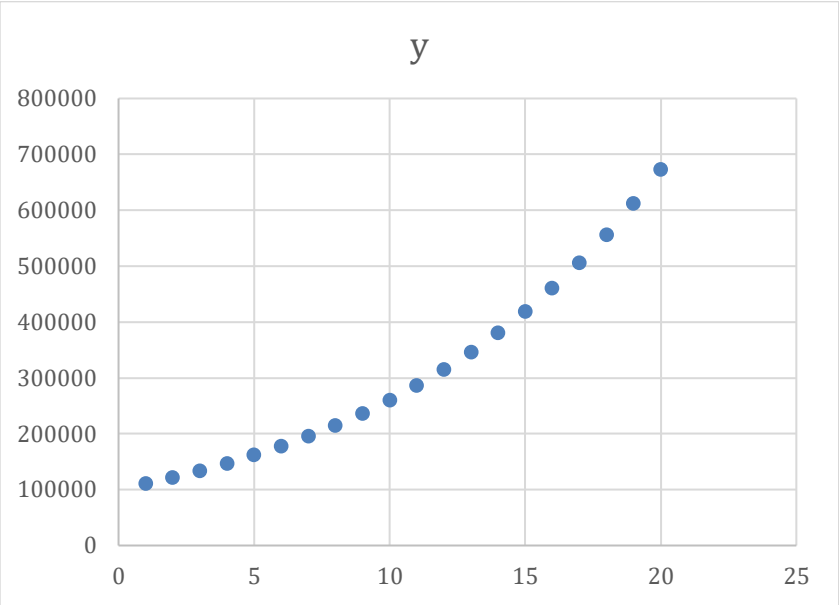
Activity 1:

We will now plot the compound interest amount as a function of the period, using a spreadsheet and the formula just derived for the compound interest amount.

The results to be obtained are shown below:

x	y
1	110000
2	121000
3	133100
4	146410
5	161051
6	177156,1
7	194871,71
8	214358,881
9	235794,769
10	259374,246
11	285311,671
12	313842,838
13	345227,121
14	379749,834
15	417724,817
16	459497,299
17	505447,028
18	555991,731

19	611590,904
20	672749,995



Looking at the graph, answer the following question:

- Does the obtained graph represent a function, if the answer is yes:
  a. Classify it
  b. Indicate its domain, image, zeros, intervals of positivity and negativity, intervals of growth, decrease and constancy.
  c. Find the asymptotes and the inverse function, if any.

Logarithm

Definition: The logarithm is the exponent to which a given base (positive and not equal to 1) must be raised to obtain the given power.

Examples:

$Log_2 8 = 3$ so $2^3=8$

$Log_3 9=2$ so $3^2=9$

$Log_{10} 10=1$ so $10^1=10$

$Log_4 1/16=-2$ so $4^{-2}=1/16$

The expressions $y=a^x$ and $y=\log_a x$ are inverses of each other.

Properties of logarithms

Altman, S., Comparatore, C and Kurzrok, L. (2008, p.41)

- If **m** and **n** are positive numbers and **a**, a base, with: $\mathbf{m}=\mathbf{a}^x$; $\mathbf{n}=\mathbf{a}^y$, then the product of these numbers is: $\mathbf{m}.\mathbf{n}=\mathbf{a}^x.\mathbf{a}^y=\mathbf{a}^{x+y}$.

The above expression shows that the product **m** . **n** can also be expressed as a power of the base **a.**

According to the definition of the logarithm: $\log_a (\mathbf{m} \cdot \mathbf{n}) = x + y$, since $x=\log_a \mathbf{m}$ and $y=\log_a \mathbf{n}$ we conclude that:

$\log_a(\mathbf{m} \cdot \mathbf{n})=\log_a \mathbf{m}+\log_a \mathbf{n}$

That is, the logarithm in base **a** of the product of two numbers is the sum of the logarithms of those numbers, in the same base.

- Since $\frac{\mathbf{m}}{\mathbf{n}} = \boldsymbol{a}^{x-y}$ we can infer that:

$$\log_a \frac{\mathbf{m}}{\mathbf{n}} = \log_a \mathbf{m} - \log_a \mathbf{n}$$

The logarithm, in base **a**, of the quotient of two numbers is the difference of the logarithm of the dividend and the logarithm of the divisor, in the same base.

Other properties of logarithms are:

- The logarithm, in base **a**, of the **r**-th power of a number **m** is equal to the exponent **r** multiplied by the logarithm of that number in the same base.

$$\log_a(\mathbf{m}^r)=\mathbf{r}.\log_a \mathbf{m}$$

- The logarithm, in base **a**, of the **r**-th root of a number **m** is equal to the reciprocal of the index **r** multiplied by the logarithm of that number in the same base.

$$\log_a(\sqrt[r]{\mathbf{m}})=\frac{1}{\mathbf{r}}.\log_a \mathbf{m}$$

Task “The million”

Using the formula found above for the compound interest amount, we will find out, justifying, at what time (number of periods) we will reach the amount of one million pesos:

$C_n=C\ (1+i)^n$

Replacing the data:

$1000.000=100.000\ (1+0,10)^n$

$1000.000/100.000=1,\ 1^n$

$10=1,1^n$

We are looking for the number to raise 1.1 to give a value of 10

Precisely looking for the exponent is looking for a logarithm, as explained above.

In order to find the value of n we apply logarithm to both members and the property of the logarithm of a power:

$\log 10=\log 1,1^n$

$\log 10=n \cdot \log 1,1$, clearing n we are left with:

$n=\log 10/\log 1.1$

solving with the calculator gives us:

$n=24,16$

If in the table of values made in activity 1 we add, for example, up to n=30, we would observe that in period 25 the amount already exceeds one million pesos.

x	y
1	110000
2	121000
3	133100
4	146410
5	161051

6	177156,1
7	194871,71
8	214358,881
9	235794,769
10	259374,246
11	285311,671
12	313842,838
13	345227,121
14	379749,834
15	417724,817
16	459497,299
17	505447,028
18	555991,731
19	611590,904
20	672749,995
21	740024,994
22	814027,494
23	895430,243
24	984973,268
25	1083470,59
26	1191817,65
27	1310999,42
28	1442099,36

Logarithmic Function

Task "Richter Scale"

An earthquake is measured with an amplitude 392 times greater than A0. What is the magnitude of this earthquake using the Richter scale, in tenths? Graph R=f(A) using Graphmatica software. Justify.

Use the Richter scale equation.

$$R = \log\left(\frac{A}{A_0}\right)$$

A - the measure of the earthquake wave amplitude

A0 - amplitude of the smallest detectable wave (or standard wave)

R -earthquake intensity[1]

Exponential and logarithmic equations

Exercise

Altman, S., Comparatore, C and Kurzrok, L. (2008, p.70 and 71)

Find the values of x that verify each of the following equalities.

a. $9^{2x-3} : 3^{x-2} = 27.81^{1-x}$
b. $4^{2x-1} : 8^{2-x} = 16.2^{2-2x}$
c. $3^{2-x}.(5^{x+1})^{2-x}.6 = 3^{2x}:7$
d. $\log_5(3x-4) = -2$

[1] extracted and prepared by https://www.montereyinstitute.org/courses/DevelopmentalMath/TEXTGROUP-15-19_RESOURCE/U18_L4_T2_text_container_es.html

e. $(4^{1-x})^{2-3x}.2^{x+1}=8^{x}.\frac{1}{2}$
f. $\log_3[(4x-1).(x-1)]=1$
g. $\log_4(2x-3)+\log_4(5-x)=2$
h. $\log_3(x-5)+\log_3(2x+3)=-1$
i. $\log_{\frac{1}{3}} 27^{432}$=x
j. x=$\log_2(\frac{1}{8})^{-387}$

Justify all previous resolutions.

Rtas:

a. x=11/7
b. x=14/9
c. x=1,917819203óx=–2,96563
d. x=-101/75
e. x=1
f. x=$\frac{5+\sqrt{57}}{8}$óx=$\frac{5-\sqrt{57}}{8}$
g. There is no solution.
h. x=18
i. x=-1296
j. x=1161

Exercise and problem guide

Solve the following exercises and problems of the book of the mentioned pages, justifying in all cases. Altman, S., Comparatore, C and Kurzrok, L. (2008, p.73,74,75,76,77,78,79 and 80)

Annex 2

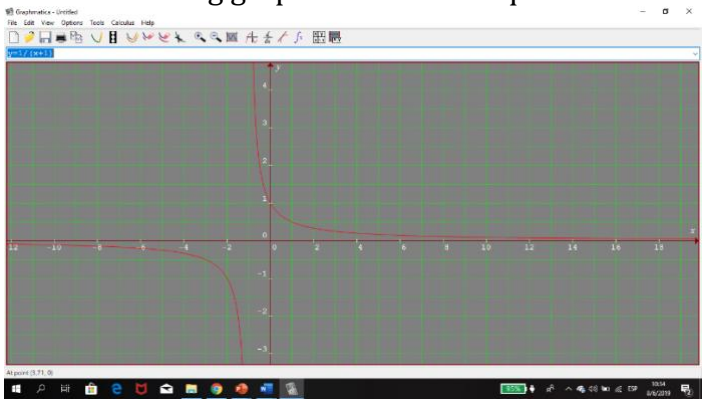
DIAGNOSTIC TASKS

1. Solve by applying properties:
   1. $a^{200}:a^{50}$=
   2. $a^{200}.a^{50}$=
   3. $(a^{200})^{50}$=
2. Extract common factor:
   1. 2x+ax=
   2. $-3x^2+2x$=
3. Find the value of h in the following equations:
   1. h/2-3h=4
   2. 2.(h/2-5)=-3(h+1/2)
4. Convert to an equivalent expression without using the fractional exponent:
   1. $m^{3/2}$
   2. $r^{4/5}$
5. Given the following function:

f(x)=(x-3) $(x+1)^2$

a. Graph it
b. Classify it
c. Indicate its domain, image, zeros, intervals of positivity and negativity, intervals of growth, decrease and constancy.

6. Given the following graph indicate the equations of the asymptotes:



7. Given the function f(x)=2x-2 find $f^{-1}(x)$
8. Solve by the method of equalization the following system of equations:
   2x+3y=4
   -4x+y=6

9. Given the following function: $f(x)=-2x^2+3x+1$, find the coordinates of the zeros, the equation of the axis of symmetry and the coordinates of the vertex.

10. Answer T or F. Justify

a. In the following exercise the commutative property was applied:
   a.b.=c.d. ⇒ a.b.e=c.d.e being e≠0
b. 30/1000=30%
c. The symbol ⇒ means the same thing as the symbol ⇔
d. $(-2)^{-3}= -8$
e. $\sqrt{\sqrt[3]{64}}=2$
f. On the calculator the calculation: $2^8/ (4*8)$ results in 512
g. -2 is a solution of the equation | x - 2| = 4

Annex 3

DIAGNOSTIC TEST
EXPONENTIAL AND LOGARITHMIC FUNCTION

1. Pose and solve the following problem:

The number of bacteria N(t) of a sample, after a time t in seconds, is obtained with the expression $N(t)=e^{k.t}$. If the population growth rate k is 25 individuals per second, how many bacteria will be in the sample after 10 seconds?

2. Solve the following equation by applying the corresponding properties:

$5^{x+1}+5^x=150$

3. Solve by applying the corresponding properties:

$\log_5 (1/125:625)$

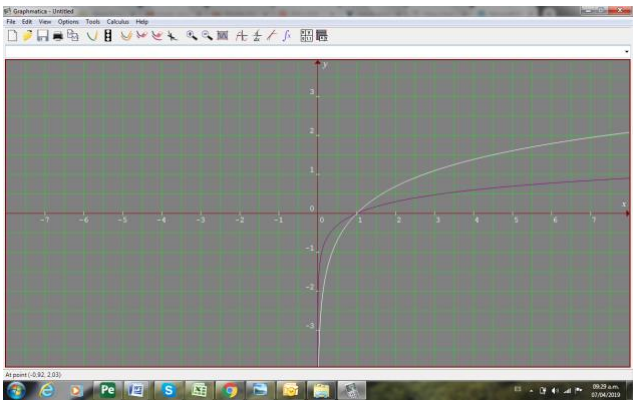
4. Indicate the domain of the following function and represent it graphically:

$f(x)=\log_5(-5x+10)$

5. Solve the following logarithmic equation by applying the corresponding properties:

log (3/2 -x)=log 3/2 - log x

6. Observe the figure and identify which graph corresponds to y=ln x and which to y=log x



Annex 4

Interviews with students

Initial, exploratory or diagnostic interview

Task to which it applies: "Juggling balls" and "Christmas wreaths."

Ask	Some student responses
How did you solve the tasks for the first time?	Student 1: "Listening and doing what the teacher said." Student 2: "We did the activity among all of us (we chatted about it)."
What difficulties did you have in performing the procedure?	Student 1: "More than anything the difficulty was seen because I didn't have the issue well oiled." Student 2: "I did not know the meaning of some words (image, domain, injective, overjective, bijective)."
Could you explain to me how area and volume are plotted as a function of radius?	Student 1: "Yes, by replacing in the formula" Student 2: I used the formula $A=r^2.\pi$ and $V=4/3\ \pi.\ r^3$
Could you explain to me how the functions are analyzed?	Student 1: "Yes, knowing the rankings and looking at the chart." Student 2: "They are analyzed by their intervals of positivity and negativity and their growth and decay."

Development or follow-up interview

Task to which it applies: "Fixed term"

Describe the procedure you used to calculate the interest.	Student 1: "We replace the data in the formula $C=C_0 (1+i)^n$" Student 2: "Rule of 3 with the percentage of interest"
What mathematical concepts did you need to find it?	Student 1: "We require knowledge of logarithms and exponential equations." Student 2: "Knowing how to clear"
How did you recognize if the graph belonged to a function?	Student 1: "Locating the values, if it gives interest the function increases." Student 2: "I don't remember."
What were your difficulties in arriving at the formula?	Student 1: "At first I had a hard time relating it to the reasoning, but after a while, I could." Student 2: "None"

Development or follow-up interview

Task to which it applies: "The Million"

Could you summarize the task in your words and explain the concept of logarithm?	Student 1: "It is the way to find an exponent in an equation where it is unknown" Student 2: "The concept is that if you don't mark base it's 10."
Why was it necessary to apply the definition of logarithm and the properties of logarithms to solve the task?	Student 1: "because otherwise you would not be able to clear the n which was boosted" Student 2: "To realize that without logarithm we can't go on with the problem."

Development or follow-up interview

Task to which it applies: "Richter Scale."

Have you ever observed an earthquake?	Student 1: "Not in person, but I saw videos on TV." Student 2: "Yes"
Did you immediately understand the statement?	Student 1: "no, the truth is that it cost me a lot" Student 2: "It took me a while to understand it."
What strategy do I use to solve it?	Student 1: "Cancel as much as possible. Cleaning up the equation" Student 2: "I applied the formula that was in the homework"

Final interview

Self-assessment questions

How do the tasks you performed contribute to your mathematical education?	Student 1: "It helps me practice the subject more." Student 2: "With the knowledge of terms and formulas".
What was the most significant thing you discovered while performing the tasks?	Student 1: "It helps me practice the subject more." Student 2: "It really reinforces my mathematical knowledge."
How did problem solving enable your understanding of the concept of exponential and logarithmic functions?	Student 1: "It allowed us to deconstruct the subject and help logical thinking." Student 2: "Many times relating abstract situations such as numbers and accounts to real situations helps to understand them much better."