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SHORT COMMUNICATION

Electrical safety in educational and work environments: a regional análisis

Seguridad eléctrica en entornos educativos y laborales: Un análisis regional

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ABSTRACT

The research analyzed electrical hazards in Latin America, highlighting their impact on educational and work environments. In Ecuador and Colombia, studies showed that lack of maintenance, improper handling of equipment and lack of technical training significantly increased electrical accidents. Cazallas Suárez and Gámez Gómez (2021) identified in Colombia the consequences of these risks in buildings constructed before the Technical Regulations for Electrical Installations (RETIE), highlighting effects such as irreversible damage and mortality.In Ecuador, a research by Correa Iván Marcelo (2020) pointed out that the use of equipment without technical knowledge increased the risks in educational institutions. In the Atahualpa Educational Unit, in Ambato, deficiencies in electrical safety were evidenced, such as lack of signaling, absence of protocols and use of low quality materials, exposing students and teachers to considerable dangers.In 2022, these issues became more relevant due to the inequalities aggravated by the pandemic and the growing use of electrical technologies. The International Labor Organization promoted safety measures, but their implementation faced financial barriers. The research highlighted the importance of clear protocols, constant training and a culture of safety. It also emphasized the role of parents and authorities in ensuring safe facilities and adequate resources. In conclusion, it highlighted the need for a comprehensive approach that combines education, regulation and investment in infrastructure to prevent electrical accidents, ensure well-being and promote sustainable development in the region.

Keywords: Electrical hazards; educational safety; technical training; safety protocols; prevention.

RESUMEN

La investigación analizó los riesgos eléctricos en América Latina, destacando su impacto en los ámbitos educativos y laborales. En Ecuador y Colombia, estudios demostraron que la falta de mantenimiento, la manipulación inadecuada de equipos y la ausencia de capacitación técnica aumentaron significativamente los accidentes eléctricos. Cazallas Suárez y Gámez Gómez (2021) identificaron en Colombia las consecuencias de estos riesgos en predios construidos antes del Reglamento Técnico de

Instalaciones Eléctricas (RETIE), subrayando efectos como daños irreversibles y mortalidad. En Ecuador, una investigación de Correa Iván Marcelo (2020) señaló que el uso de equipos sin conocimientos técnicos incrementó los riesgos en instituciones educativas. En la Unidad Educativa Atahualpa, en Ambato, se evidenciaron deficiencias en la seguridad eléctrica, como falta de señalización, ausencia de protocolos y uso de materiales de baja calidad, exponiendo a estudiantes y docentes a peligros considerables.
En 2022, estas problemáticas cobraron relevancia debido a las desigualdades agravadas por la pandemia y al uso creciente de tecnologías eléctricas. La Organización Internacional del Trabajo promovió medidas de seguridad, pero su implementación enfrentó barreras financieras. La investigación resaltó la importancia de protocolos claros, capacitación constante y una cultura de seguridad. Además, enfatizó el papel de los padres y autoridades en garantizar instalaciones seguras y recursos adecuados. En conclusión, se destacó la necesidad de un enfoque integral que combine educación, regulación e inversión en infraestructura para prevenir accidentes eléctricos, garantizar el bienestar y promover el desarrollo sostenible en la región.

Palabras clave: Riesgos eléctricos; seguridad educativa; capacitación técnica; protocolos de seguridad; prevención.

Currently, preventing electrical risks is a growing concern in Latin America, where industrial development and educational needs have increased the use of electrical installations in various contexts. In Ecuador, significant research has been carried out on this issue, highlighting the impact of prolonged exposure to sources of electrical risk in both work and educational environments. For example, a study carried out in Colombia by Cazallas Suárez and Gámez Gómez (2021) at the Universidad de la Salle in Bogotá analyzed electrical risks in buildings constructed before the implementation of the Technical Regulations for Electrical Installations (RETIE). This study revealed that the consequences of these risks materializing can include irreversible damage to health and, in extreme cases, death. The leading causes identified were lack of proper maintenance, incorrect handling of electrical equipment, and lack of technical training.

Similar studies have underlined the importance of implementing preventive measures in educational institutions in Ecuador. Research by Correa Iván Marcelo (2020) at the Technical University of Cotopaxi showed that using measuring equipment without adequate technical knowledge significantly increases electrical risks. The research highlighted the need to adopt basic procedure manuals to promote a safe working environment and prevent direct and indirect accidents. Direct accidents, such as electric shocks, usually occur through contact with cables or plugs. In contrast, indirect accidents can include bumps, falls, and injuries resulting from initial contact with the current.

Significant shortcomings in electrical safety were evident at the Atahualpa Educational Unit, located in Ambato, especially in the Electrical Equipment and Machinery Installations course. The electricity workshops, which include areas such as electrical load, distribution, transformers, public lighting, and substations, expose students and teachers to considerable risks. These shortcomings include a lack of maintenance in electrical installations, absence of safety protocols, and inadequate signage, which makes it challenging to locate essential elements for protection and emergency.

In the Latin American context of 2022, these situations take on special relevance due to the challenges facing education and labor systems in the region. The COVID-19 pandemic exacerbated pre-existing inequalities, leaving many institutions without sufficient resources to guarantee the safety of their facilities. In addition, the increased digitization and electrical technologies in recent years have generated new vulnerabilities, especially in countries with outdated infrastructures.

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In the case of the Atahualpa Educational Unit, electrical risks are also aggravated by students' lack of training. Harmful practices, such as using low-quality materials and installing substandard facilities without technical criteria, increase the likelihood of accidents. This situation reflects a common problem in many countries in the region, where technical education often lacks the necessary resources to guarantee safe and quality learning.

Poor signage and the absence of safety protocols represent a critical challenge. In 2022, organizations such as the International Labor Organization (ILO) promoted initiatives to strengthen workplace safety, including training programs and regulatory updates. However, implementing these measures often faces financial and logistical barriers in countries with limited resources.

The research also highlights the importance of establishing clear protocols that include risk identification, planning of preventive strategies, and constant training. These measures improve safety and contribute to students' integral development, preparing them to face the challenges of the labor market. In addition, fostering a safety culture can positively impact the entire educational community, including teachers, authorities, and parents.

In the broader Latin American context, electrical hazards are also present in homes and public spaces. Old electrical networks, unregulated appliances, and a lack of maintenance increase the likelihood of accidents. For example, in countries such as Peru and Bolivia, incidents related to faulty home installations have been reported, highlighting the need for stricter regulation and public awareness programs.

The Atahualpa Educational Unit's case represents a representative example of the challenges facing the region. Despite the limitations, the research proposes viable solutions, such as implementing clear signage and using guaranteed materials for installations. These measures can be replicated in other educational institutions and adapted to different contexts to improve electrical safety throughout Latin America.

A noteworthy aspect of the research is its focus on training. In 2022, it became clear that technical education must include specific electrical safety modules, emphasizing the proper use of equipment and tools. Training students and teachers is essential to prevent accidents and foster a safety culture.

In addition, the research highlights the importance of involving the entire educational community in identifying and mitigating risks. Parents, for example, can play a key role by supporting safety initiatives and promoting good practices at home. Education authorities, for their part, have a responsibility to ensure that facilities comply with safety standards and to provide the necessary resources for their maintenance.

In conclusion, preventing electrical hazards in Latin America requires a comprehensive approach that combines education, regulation, and investment in infrastructure. The case of the Atahualpa Educational Unit highlights the need to implement preventive measures and strengthen technical training to reduce electrical accidents. In a regional context where structural inequalities persist, guaranteeing electrical safety is an essential step towards sustainable development and the well-being of communities. This effort will benefit educational institutions and contribute to the construction of a safer society that is more resilient to electrical risks.

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