INDOOR AIR QUALITY ASSESSMENT AND MONITORING OF NEWLY CONSTRUCTED CLASSROOMS IN VVCE CAMPUS USING INTERNET OF THINGS (IOT)

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Introduction

In recent years, there have been many studies on indoor environmental quality (IEQ) in schools and colleges in different countries and climatic areas. The scientific literature has widely analyzed the vulnerability of students to indoor environmental conditions in high-occupancy spaces and its potential effect on their health and wellbeing, as well as on the learning process and academic performance. A guideline book was also published to describe the optimal design and operation of schools and colleges with respect to low energy cost and performance of students, focusing on healthy indoor environment among other aspects.

Most of these studies, several of which took place in the Mediterranean climate, reported frequent deficiencies in indoor environmental conditions, mainly the indoor air quality (IAQ), resulting from inadequate or misused ventilation systems. In this regard, the school and colleges environment must be homogeneously clean, safe, and comfortable in order to reduce exposure to chemical and biological agents, prevent diseases, facilitate cognitive development, and avoid unequal educational outcomes.

In spite of this, neither the public nor private administration has focused special attention on the IAQ of schools and colleges, and more surprisingly, it has also been neglected by the educational community and parents' associations. CO_2 is a good bio-effluents indicator, and it could be correlated with the ventilation of a room, therefore, its concentration rate is used as the main indicator of IAQ and to determine the ventilation rate in occupied spaces such as schools. However, if the levels of pollution are higher outside than indoors, CO_2 does not indicate indoor pollutants with health risk. Except for a few studies, the monitoring of CO_2 levels in classrooms and the relationship of these levels to the use of ventilation systems have barely been studied. Air exchange rate (AER) is a key determinant in the infiltration of particle pollution in indoor environment.

GAP IDENTIFICATION

According to the studies carried out, the naturally ventilated classrooms have less quality of indoor air than the AC classrooms. It was evaluated the concentration of CO_2, ventilation rates and other parameters in the classrooms. Insufficient ventilation can result in the accumulation of pollutants. S. Sadrizadeh et al., (2022) concluded that there is a great need for more comprehensive studies with a characterization of strategies to promote indoor school environmental quality on environmental health exposure, student health and wellness outcomes, indoor satisfaction, and cognitive performance. Both ecological and behavioral factors affecting classroom air quality should be characterized along with the effects of indoor environmental controls on energy consumption. In this research work, with the help of IoT an attempt to assess the quality of indoor air in our newly built classrooms will be made.

Objectives

The goal of this research is to assess the IAQ in classrooms in newly built classrooms in VVCE campus using Internet of Things (IoT).

Specific Objectives

- To assess the concentration of CO2, humidity and temperature
- To evaluate the air exchange rate in selected classrooms
- To determine the level of SPM, $PM_{2.5}$, bio aerosols
- Indoor air quality assessment using IoT in selected classrooms of M block

Scope Of the Study

A healthy learning environment can reduce the absence rate, improves test scores, and enhances pupil/teacher learning/teaching productivity. Pupils' exposure to indoor air pollutants in school buildings is a leading public concern and may cause severe damage to the pupils' health since they inhale a larger volume of air corresponding to their body weights than do adults. The respiratory, immunological, reproductive, central nervous, and digestive system of occupants are not uniform, will vary from one person to another.

Expected Outcomes

Indoor air quality management in classrooms using IoT (Internet of Things) involves deploying sensors to monitor and control air quality parameters such as temperature, humidity, CO_2 levels, and particulate matter. These sensors collect real-time data and ransmit it to a central system for analysis. By leveraging this data, campus administrators

can ensure optimal air quality, reducing health risks and enhance the learning environment. The indoor air quality data was collected when students were present in the classrooms.

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