

# EFFECTS OF SOLAR COLLECTORS ON INDOOR AIR QUALITY IN JUNIOR CLASSROOMS IN WINTER 2013

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**Abstract:** The indoor air quality (IAQ) is poor in schools, especially in winter in classrooms that are naturally ventilated. Mechanical ventilation of classrooms can improve the IAQ in but at the expense of energy consumption. As the school occupancy is closely aligned with solar radiation, a solar collector that warms ventilation air appears to be a good solution to achieve acceptable IAQ in classrooms. This study explored the effects of solar collectors on IAQ in junior classrooms in winter 2013 from July 27 to September 29 (school term 3). Data on classrooms temperature, relative humidity and carbon dioxide (CO<sub>2</sub>) was monitored during school hours (between 9am and 3pm) in six occupied classrooms in three Palmerston North primary schools. We also monitored the use of existing heater(s) in classrooms. In each school, adjacent classrooms were either assigned to a control (solar collector disabled), or treatment (solar collector activated) group. With the use of solar collectors, we found that the mean concentration of CO<sub>2</sub> was 994.67ppm and 1036.62ppm in the treatment classrooms and control classrooms respectively. There is no significant association ( $P_{\text{value}} = 0.86$ ) between the concentration of CO<sub>2</sub> in control and treatment classrooms. The temperatures in the six classrooms were all above 18°C. There was no obvious difference on temperature among each pair of treatment and control classrooms. However the ratio of the total time of using their existing heater(s) between the treatment and control classrooms during the school term 3 in the three schools was 26.16%, 33.56% and 70.40% respectively. The level of RH ranged from 40% to 60% during a large proportion of school hours in the six classrooms. In conclusion, the solar collectors played a positive role on improving IAQ in classrooms and reducing heater using.

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