The aim of the present study was to extend the knowledge on the suitability and performance of different ventilation retrofit solutions for school buildings located in a temperate climate. A unique approach was used, where four similar and adjacent classrooms in the same school unit located north of Copenhagen, Denmark, were retrofitted either with a decentralized, balanced supply and exhaust mechanical ventilation unit with heat recovery; automatically operable windows with an exhaust fan; automatically operable windows with alternating counter-flow heat recovery through slots in the outside wall; or a visual feedback display unit showing the current classroom carbon dioxide concentration, thus advising when the windows should be opened. For comparison, one classroom retained the original approach for achieving ventilation by manual opening of windows. One year after retrofitting the classrooms carbon dioxide concentrations, temperatures, energy use, and window and door opening behavior were recorded during a four week period in the heating season in January. The measured carbon dioxide concentrations were significantly lower in the classrooms with the mechanical ventilation system and the system with automatic window opening and an exhaust fan as compared with the classrooms with automatic window opening and heat recovery, with visual carbon dioxide feedback and where windows were opened manually. The automatically controlled windows were open for 71% of the occupied time including breaks with an exhaust fan and for 49% with heat recovery. The façade windows were open up to 17% of the occupied time including breaks in the classrooms with manual window opening (with or without visual feedback). The classroom temperature was generally within the recommended thermal comfort range. The present results indicate that in temperate climates the mechanical ventilation system and both systems with automatic window opening are the recommended systems for classrooms in temperate climates. Providing simply visual feedback on the current carbon dioxide concentration, as a motivation for window opening, did not do so.

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