Preparation of a Teaching Module on Heat Loss in Residential Units

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Project Background

- Greentrofit™ EPICS Team 2008-09
  - Quantified energy fluxes and losses for a typical low-income home in Trenton
  - Developed an energy model to calculate heat losses from a home
  - Determined the cost effectiveness of energy retrofit options
- Isles Center for Energy and Environmental Training (CEET)
Project Description

- Identified the need for a teaching module on heat loss concepts aimed at high school graduates receiving job training in energy audits and weatherization

- Goals:
  - Create an effective teaching module on whole-house heat loss
  - Convert energy model developed during EPICS into a useful training tool
  - Observe and learn about energy education programs
Project Description

Approach

- Preparation of visual aids to illustrate basic heat transfer concepts relevant to heat loss from a house in the winter
- Development of simple equations and examples for convective and conductive heat losses as well as boiler inefficiencies
- Formulation of instructions for using energy model spreadsheet developed during EPICS
  - Including example application
- Conducting a full-day class at Isles as a beta test of the module
Module Outline

- Energy and Heat Overview
  - Types of energy usage
  - Units
- Heat Transfer Mechanisms
  - 3 types of heat transfer
  - How heat transfer occurs in a house
- Heat Loss Calculations
  - Thermal conductivity, R-values, U-values
  - Conductive and convective calculation examples
- Energy Model
  - Excel spreadsheet
Module Testing

- Observed existing Building Analyst and Air-Sealing classes at Isles’ Center for Energy and Environmental Training

- Beta test at Isles:
  - Led a class of students participating in the CEET Training Programs
Conclusion

- Revisions of the module slides and examples were made based on feedback from students.
- This module will hopefully be continued to be used by Isles as well as other similar energy education programs.
- Learning about energy education, formulating this teaching tool, and having to conduct a class were valuable experiences for me.
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