Parallel Coordinates: How Buildings Traverse Feature Dimensions
(n = 500 buildings sampled; thick lines = cluster means)
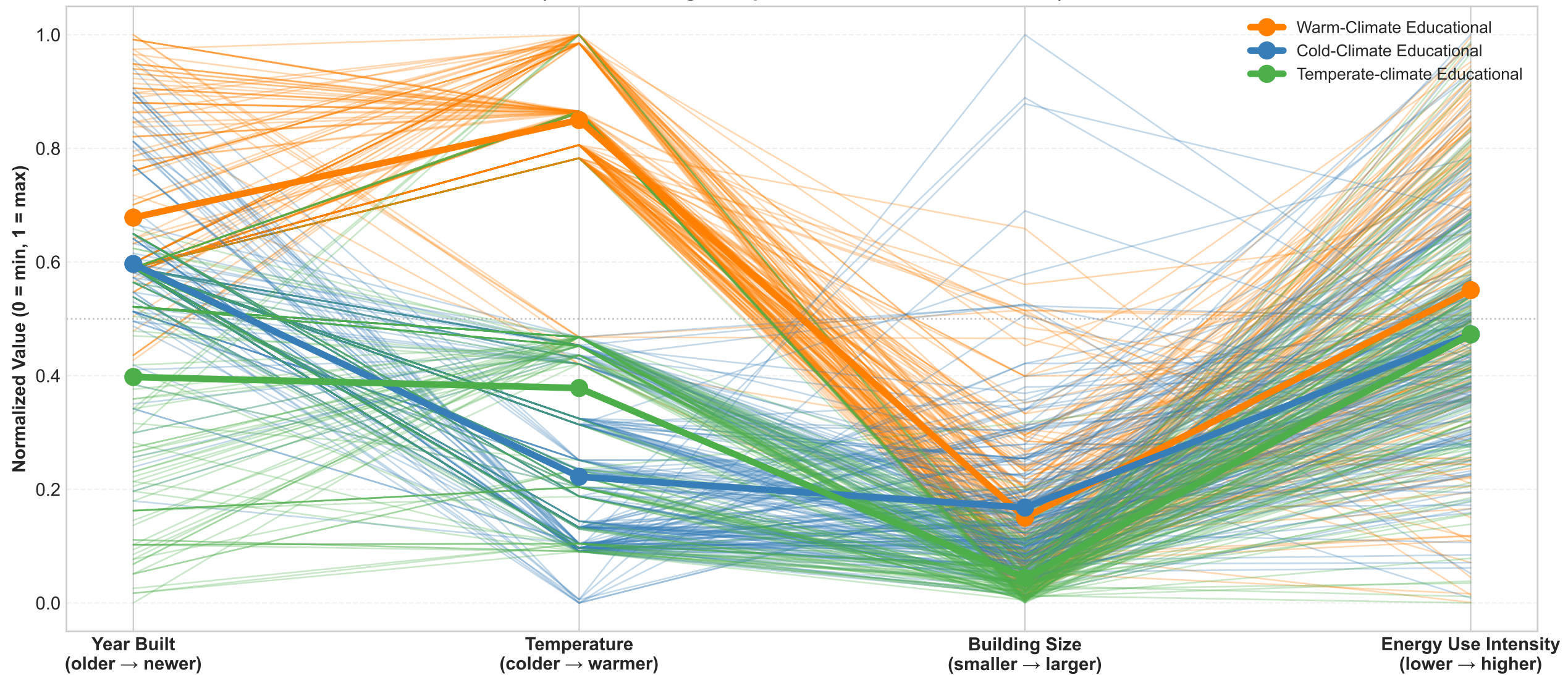
Legend:
- Warm-Climate Educational
- Cold-Climate Educational
- Temperate-climate Educational

Y-axis: Normalized Value (0 = min, 1 = max)

X-axis labels:
- Year Built (older → newer)
- Temperature (colder → warmer)
- Building Size (smaller → larger)
- Energy Use Intensity (lower → higher)

FIGURE 9. Parallel coordinates reveal multi-dimensional building profiles and identify key differentiating features.

HOW TO READ THIS CHART:
• Each thin line represents one building, connecting its normalized values across four dimensions
• Thick lines with markers show cluster averages (centroids)
• Features are normalized (0 = lowest value, 1 = highest value in dataset)
• Crossing lines between clusters indicate feature overlap; parallel lines indicate good separation

KEY OBSERVATIONS:
• "Temperature (°C)" shows the strongest cluster separation (cluster means most spread apart on this axis)
• Temperature clearly differentiates warm-climate (high) from cold-climate (low) buildings
• The warm-climate cluster (orange) shows consistently higher values across size and EUI
• Significant line overlap on "Year Built" confirms construction era is NOT a primary differentiator

WHAT THIS MEANS FOR BUILDING OWNERS:
→ Your building's position on each axis shows how it compares to the full dataset
→ Trace your building's line across all features to understand your complete profile
→ If your EUI (rightmost axis) is higher than your peer group's thick line, improvement potential exists

WHAT THIS MEANS FOR POLICYMAKERS:
→ Temperature is the dominant clustering driver—climate-specific policies are justified
→ Building size correlates with energy use—large buildings may need separate attention
→ The spread of thin lines within each cluster shows internal variation available for benchmarking