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Ai-enabled Workforce and Education Planning for the Uk Net Zero Transition: Forecasting Skills Demand and Aligning Training Supply

Chika Abolle-Okoyeagu , Raphael Essiet , Ambrose Onne Okpu and Micheal Ayeni

Robert Gordon University Aberdeen, the United Kingdom

Abstract

Achieving the UK's Net Zero commitments will require large-scale deployment of renewable energy, hydrogen, carbon capture, and advanced manufacturing technologies. These projects depend on a workforce trained through higher education, further education, and apprenticeship systems. Current labour market forecasts are limited in scope, often static, and rarely linked to education planning. This paper develops an AI-enabled framework to forecast skills demand and align training supply for the Net Zero transition. We integrate data on industrial project pipelines, occupational task requirements, regional labour markets, and student flows across universities, colleges, and vocational programmes. Using machine learning models, we project future workforce needs at occupational and qualification levels, identify regional gaps, and test policy scenarios including expanded STEM enrolments, accelerated conversion courses, and targeted reskilling. Validation against past infrastructure buildouts demonstrates the accuracy of the approach. The findings highlight where and when shortages are most likely to occur, and which education interventions are most effective in closing gaps. The study contributes an evidence base to guide government, universities, and training providers in shaping curricula and investment. By linking workforce forecasting with education planning, it positions education as a cornerstone of a just and timely Net Zero transition.

Keywords: Artificial Intelligence, Education Planning, Net Zero, Skills, Workforce