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Which are the most important skills and knowledge for today's science jobs? A network analysis of the O*NET occupation database

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In this paper, we identify the most central knowledge and skills competencies for the science jobs by analyzing the characteristics of the jobs-knowledge and jobs-skills bipartite weighted networks for the 48 jobs (and the 33 knowledge domains and 35 skills categories) comprising the "Life, Physical and Social Sciences" job family of the O*NET (Occupational Information Network) database. O*NET is USA's primary source of occupational information (continually updated by surveying a broad range of workers from each occupation.) Our results can be interpreted as the identification of the knowledge and skills "superhighways" of the science jobs, that is, their infinite incipient percolation cluster, for which nodes with high betwenness centrality dominate (Wu et al, 2006.) Such an approach can serve to systematically monitor the "coupling" between education systems and the evolution in the workplace, that is, whether workers' skills and education are, or are not, adequate for the demands of jobs in the current economy, a problem which many believe will become even more serious because the pace of change is accelerating and the workplace is becoming increasingly high tech, service-oriented, and reorganized to involve greater employee participation.)