Exploiting networks of concepts in learning paths

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Almost everyone met in his life a great teacher. Beside the individual nature of those mentors, a question arises whether it is possible to highlight some general directions an efficient learning (teaching) strategy should follow. A line of research focuses on optimal strategies to present concepts in order to maximize scholars learning abilities. Think for instance you have to learn a language or in a simplified picture a list of words. You should find a trade-off between look at new material and reviewing what you have already seen. I will review a simple mathematical model that captures this issue in an idealized form, including the ”spacing effect” famous in cognitive science, according to which, loosely speaking, review is useful only if it is neither too soon nor too late. In this basic model the words to be learned are deprived of their semantic value and considered as a list of uncorrelated items. However, semantic relations play undoubtedly a fundamental role in learning processes. We investigate this aspect by considering different strategies for exploring concepts to be learned when those are represented as nodes in a network of semantic relations. We highlight both semantic structures and ways to exploit them which are optimal with respect to learning efficiency. Both results on synthetic graphs and results on real world structures, such as the collaborative on-line encyclopedia Wikipedia and the graph emerging from a words-association game (Human Brain Cloud) will be discussed.