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Visual learning analytics of educational data: A systematic literature review and research agenda

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Title: Visual Learning Analytics of Educational Data: A Systematic Literature Review and Research Agenda

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Abstract

We present a systematic literature review of the emerging field of visual learning analytics. We review existing work in this field from two perspectives: First, we analyze existing approaches, audiences, purposes, contexts, and data sources—both individually and in relation to one another—that designers and researchers have used to visualize educational data. Second, we examine how established literature in the fields of information visualization and education has been used to inform the design of visual learning analytics tools and to discuss research findings. We characterize the reviewed literature based on three dimensions: (a) connection with visualization background; (b) connection with educational theory; and (c) sophistication of visualization(s). The results from this systematic review suggest that: (1) little work has been done to bring visual learning analytics tools into classroom settings; (2) few studies consider background information from the students, such as demographics or prior performance; (3) traditional statistical visualization techniques, such as bar plots and scatter plots, are still the most commonly used in learning analytics contexts, while more advanced or novel techniques are rarely used; (4) while some studies employ sophisticated visualizations, and some engage deeply with educational theories, there is a lack of studies that both employ sophisticated visualizations and engage deeply with educational theories. Finally, we present a brief research agenda for the field of visual learning analytics based on the findings of our literature review.

Keywords: visual analytics, learning analytics, educational data mining, literature review

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