

*To be presented at:
12th International Conference on Human-Computer Interaction.
2007, Beijing, P.R. China.*

Exploring Neural Trajectories of Scientific Problem Solving Skill Acquisition

Ronald H. Stevens¹, Trysha Galloway¹, Chris Berka²

¹ UCLA IMMEX Project, 5601 W. Slauson Ave. #255, Culver City, CA 90230
immex_ron@hotmail.com,
tryshag@gmail.com

² Advanced Brain Monitoring, Inc, Carlsbad, CA 92008
chris@b-alert.com

Abstract. We have modeled changes in electroencephalography (EEG) - derived measures of cognitive workload, engagement, and distraction as individuals developed and refined their problem solving skills in science. Subjects performing a series of problem solving simulations showed decreases in the times needed to solve the problems; however, metrics of high cognitive workload and high engagement remained the same. When these indices were measured within the navigation, decision, and display events in the simulations, significant differences in workload and engagement were often observed. In addition, differences in these event categories were also often observed across a series of the tasks, and were variable across individuals. These preliminary studies suggest that the development of EEG-derived models of the dynamic changes in cognitive indices of workload, distraction and engagement may be an important tool for understanding the development of problem solving skills in secondary school students.

Keywords: EEG, Problem solving, Skill Acquisition, Cognitive Workload