

**Adaptive Dispositions, Metacognitive Skills, and Cognitive Skills of Adaptive Expertise**

|   | Ability to explain decisions and justify outcomes of these processes <sup>a,b,c,d,e</sup>  |  |
|---|--|--|
| Adaptive Dispositions   | Metacognitive Skills   | Cognitive Skills   |
| Maintain an epistemic distance between prior knowledge and model of a case or problem at hand <sup>c</sup><br>Willing to abandon previously held understandings <sup>f</sup><br>Willing to replace prior assumptions <sup>g</sup><br>Holding theories lightly <sup>h</sup><br>Resisting initial ideas about a problem <sup>g</sup><br>Plasticity of thinking <sup>l</sup> | Questioning current levels of expertise <sup>k</sup>   | Cognitive flexibility <sup>c</sup><br>Respond to variability in classroom <sup>j</sup><br>Accounts for multiple perspectives <sup>o</sup><br>Invent new procedures <sup>n</sup><br>Balance of efficiency and innovation <sup>f,g</sup> |
| An epistemic stance that views the world as complex, messy, irregular, dynamic, etc. <sup>c</sup>   |  |  |
| Comfort or willingness to reveal and work at the limits of one's knowledge and skill <sup>c</sup><br>Willing to ask questions <sup>g</sup><br>Willing to take managed risks that may result in mistakes <sup>h</sup><br>Seeking out feedback from others (different others) <sup>h</sup>  | Monitoring own learning <sup>c</sup><br>Monitor own comprehension <sup>h</sup><br>Self-assess <sup>k</sup><br>Systematic understanding of the self as a learner <sup>a,b</sup>   |  |
|   | Assessing own knowledge states <sup>c</sup><br>Self-assess thinking <sup>h</sup>   |  |
|   | Assessing adequacy of current knowledge for solving case at hand <sup>c,k</sup>  |  |
| An inclination toward learning rather than merely applying knowledge <sup>c</sup><br>Never satisfied with current levels of understanding <sup>c,f,j</sup><br>Opportunistic <sup>h</sup><br>Motivation to problem solve <sup>k</sup><br>Curiosity <sup>h</sup><br>Enjoy challenge <sup>a,b</sup><br>Prepared to learn from new situations <sup>g,l</sup>                  | Seeking and analyzing feedback about problem-solving processes and outcomes <sup>c</sup><br>Higher order problem solving <sup>l</sup><br>Systematic understanding of the self as a problem solver learner <sup>a,b</sup> | Causal reasoning (Develop underlying model or set of contributing factors) <sup>c</sup>  |
|   | Monitoring results and performance <sup>c</sup><br>Modify existing procedural skills <sup>m,n</sup><br>Invent new procedures <sup>n</sup>  | Data-driven forward reasoning (hypothesis-based reasoning) <sup>c</sup><br>Higher order problem solving <sup>l</sup><br>Select routine or adaptive approach based on data & hypothesis <sup>h</sup>                                    |

<sup>a-b</sup> Bransford, J., 2004. <sup>c</sup> Crawford, V. M., Schlager, M., Toyama, Y., Riel, M., & Vahey, P., 2005. <sup>d</sup> Hatano, G., & Inagaki, K., 1986. <sup>e</sup> Inagaki, K., & Miyake, N., 2007. <sup>f</sup> Bransford, J., Derry, S, Berliner, D., & Hammerness, K., 2005. <sup>g</sup> Schwartz, D. L., Bransford, J. D., & Sears, D., 2005. <sup>h</sup> Crawford, V. M., & Brophy, S., 2006, <sup>i</sup> Lin, X., Schwartz, D. L., & Hatano, G., 2005. <sup>j</sup> National Research Council, 2000. <sup>k</sup> Bell, E., Horton, G., Blashki, G., & Seidel, B. M., 2012. <sup>l</sup> Lin, X., Schwartz, D. L., & Bransford, J., 2007. <sup>m</sup> Goodnow, J. J., Peterson, C., & Lawrence, J. A., 2007. <sup>n</sup> Hatano, G., & Oura, Y., 2003. <sup>o</sup> Fisher, F. T., & Peterson, P. L., 2001.