

<b>School/Department:</b>	<i>Erasmus School of Behavioral Sciences (ESSB), Department of Psychology, Education and Child Studies (DPECS)</i>
<b>Project Title:</b>	<i>Sweaty hands, lousy judgments: The role of cognitive load in self-monitoring</i>
<b>Abstract:</b>	<p><i>Project description:</i>          Nowadays, especially in online learning settings, a learner needs to be able to regulate his or her own learning in order to learn effectively. Self-monitoring (i.e., keeping track of your own performance) is a crucial part of self-regulated learning. Yet, monitoring accuracy is generally low and people tend to overestimate their own performance. Inaccurate monitoring can result in suboptimal learning outcomes, whereas accurate monitoring can enhance learning and lead to better study results. It often seems difficult for learners to self-monitor their learning progress, especially for difficult tasks which overload learners' cognitive capacity. It is, therefore, crucial to understand the precise mechanisms behind self-monitoring to ensure that learners can make more accurate self-monitoring judgments in order to enhance their (self-regulated) learning. Nonetheless, the exact interplay between self-monitoring and cognitive load is not known. Therefore, the aim of the current project is to gain insight on how self-monitoring accuracy, cognitive load, and performance interact with each other. In this project, a series of experiments will be designed to investigate the effect of cognitive load, on monitoring accuracy and learning outcomes. In addition, physiological measures (e.g., galvanic skin response or heart rate) will be used to explore novel ways of measuring cognitive load and relating it to self-monitoring and learning outcomes.</p> <p><i>Previous publications on this topic:</i>          Baars, M., Wijnia, L., de Bruin, A., &amp; Paas, F. (2020). The relation between student's effort and monitoring judgments during learning: A meta-analysis. <i>Educational Psychology Review</i>, 1-24.          Baars, M., Wijnia, L., de Bruin, A., &amp; Paas, F. (2020). Sharing the load: Strategy to Improve Self-regulated Learning. In D. L. Dinsmore, L. K. Fryer, &amp; M. M. Parkinson (Eds.), <i>Handbook of Strategies and Strategic Processing</i> (pp. 234-247). Routledge, New York.          Baars, M., Leopold, C., &amp; Paas, F. (2018). Self-explaining steps in problem-solving tasks to improve self-regulation in secondary education. <i>Journal of Educational Psychology</i>, 110, 578- 595.          Raaijmakers, S. F., Baars, M., Schaap, L., Paas, F., &amp; Van Gog, T. (2017). Effects of performance feedback valence on perceptions of invested mental effort. <i>Learning and Instruction</i>, 51, 36-46.</p>

<p><b>Requirements of candidate:</b></p>	<p>Background:            Educational sciences, educational psychology, cognitive psychology or similar domains; skilled in quantitative research methods, academic writing, SPSS and/or R statistical software packages, programming skills (e.g. python)</p> <p>Master's degree: Yes</p> <p>EUR requirement: IELTS: 7.5 (min. 6.0 for all subs.)            Or TOEFL: 100 (min. 20 for all subs.)</p>
<p><b>Supervisor information:</b></p>	<p><i>The supervisory team will consist of Prof. dr. Fred Paas (promotor) and Dr. Martine Baars (co-promotor)</i></p> <p><b>Promotor</b>            Prof. Dr. Fred Paas            Email address: <a href="mailto:paas@essb.eur.nl">paas@essb.eur.nl</a></p> <p>Fred Paas is a Professor of Educational Psychology at Erasmus University Rotterdam in the Netherlands and a Visiting Professorial Fellow at the University of Wollongong in Australia. His main research interest is in using knowledge about the human cognitive and motor system in the design of instruction for complex learning environments. He has (co-) authored over 300 publications in (S)SCI listed journals, which been cited over 36.000 times.  <a href="https://www.eur.nl/people/fred-paas">https://www.eur.nl/people/fred-paas</a></p> <p><i>Selected publications 2020</i></p> <ol style="list-style-type: none"> <li>1. Ayres, P., Castro-Alonso, J. C., Wong, M., Marcus, N., &amp; Paas, F. (2020). Factors that impact on the effectiveness of instructional animations. In S. Tindall-Ford, S. Agostinho, &amp; J. Sweller (Eds.), <i>Advances in cognitive load theory: Rethinking teaching</i> (pp. 180-193). London: Routledge.</li> <li>2. Baars, M., Wijnia, L., De Bruin, A., &amp; Paas, F. (2020). The relation between student's effort and monitoring judgments during learning: A meta-analysis. <i>Educational Psychology Review</i>.</li> <li>3. Baars, M., Wijnia, L., De Bruin, A., &amp; Paas, F. (2020). Sharing the load: A strategy to improve self-regulated learning. D. Dinsmore, L. Fryer, &amp; M. Parkinson, <i>Handbook of strategies and strategic processing</i>. (pp. 234-247). New York: Routledge</li> <li>4. Castro-Alonso, J. C., Ayres, P., Wong, M., &amp; Paas, F. (2020). Visuospatial tests and multimedia learning: The importance of employing relevant instruments. In S. Tindall-Ford, S. Agostinho, &amp; J. Sweller (Eds.), <i>Advances in cognitive load theory: Rethinking teaching</i> (pp. 89-100). London: Routledge.</li> <li>5. De Koning, B., Rop. G., &amp; Paas, F. (2020). Learning from split-attention materials: Evidence for a mental self-managed</li> </ol>

	<p>integration effect. <i>Computers in Human Behavior</i>, 110, 106379.</p> <ol style="list-style-type: none"> <li>6. De Koning, B., Rop. G., &amp; Paas, F. (2020). The self-management effect in learning from split-attention materials: Mental versus physical integration. <i>Contemporary Educational Psychology</i>, 61, 101873.</li> <li>7. Duchi, L., Lombardi, D., Paas, F., &amp; Loyens, S. (2020). How a growth mindset can change the climate: The power of implicit beliefs in influencing people's thoughts and actions. <i>Journal of Environmental Psychology</i>, 70, 101461.</li> <li>8. Eielts, C., Pouw, W., Ouwehand, K, Van Gog, T., Zwaan, R., &amp; Paas, F. (2020). Co-thought gesturing supports more complex problem solving in subjects with lower visual working-memory capacity. <i>Psychological Research</i>, 84, 502-513.</li> <li>9. Es-Sajjade, A., &amp; Paas, F. (in press). Educational theories and computer game design: Lessons from an experiment in elementary mathematics education. <i>Educational Technology Research and Development</i>.</li> <li>10. Leppink, J., Paas, F., Van Gog, T., &amp; Van Merriënboer, J. J. G. (2020). How to measure effects of self-regulated learning with checklists on the acquisition of task selection skills. In S. Tindall-Ford, S. Agostinho, &amp; J. Sweller (Eds.), <i>Advances in cognitive load theory: Rethinking teaching</i> (pp. 66-79). London: Routledge.</li> <li>11. Liu, T. C., Lin, Y. C., Hsu, C. Y., &amp; Paas, F. (in press). Learning from animations and computer simulations: Modality and reverse modality effects. <i>British Journal of Educational Technology</i>.</li> <li>12. Mavilidi, M., Ouwehand, K., Okely, A. D., Chandler, P., &amp; Paas, F. (2020). Embodying learning through physical activity and gestures in preschool children. In S. Tindall-Ford, S. Agostinho, &amp; J. Sweller (Eds.), <i>Advances in cognitive load theory: Rethinking teaching</i> (pp.103-118). London: Routledge.</li> <li>13. Mavilidi, M., Ouwehand, K., Riley, N., Chandler, P., &amp; Paas, F. (2020). The effects of an acute physical activity break on test anxiety and math test performance. <i>International Journal of Environmental Research and Public Health</i>, 17: 1523.</li> <li>14. Nazlieva, N., Mavilidi, M. F., Baars, M., &amp; Paas, F. (2020). Establishing the scientific consensus on cognitive benefits of physical activity. <i>International Journal of Environmental Research and Public Health</i>, 17, 29.</li> <li>15. Paas, F., &amp; Sweller, J. (in press). Implications of cognitive load theory for multimedia learning. In R. Mayer &amp; L. Fiorella (Eds.), <i>The Cambridge handbook of multimedia learning 2nd edition</i>. New York: Cambridge University Press.</li> <li>16. Paas, F., &amp; Van Merriënboer, J. J. G. (2020). Cognitive load</li> </ol>
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	<p>theory: Methods to manage cognitive load in the learning of complex tasks. <i>Current Directions in Psychological Science</i>, 29, 394-398.</p> <p>17. Pouw, W., Wassenburg, S., Hostetter, A. B., De Koning, B. B., &amp; Paas, F. (2020). Does gesture strengthen sensorimotor knowledge of objects? The case of the size-weight illusion. <i>Psychological Research</i>, 84, 966-980.</p> <p>18. Sepp, S., Howard, S., Tindall-Ford, S., Agostinho, S., &amp; Paas, F. (in press). Working memory: Models and applications. <i>Oxford Research Encyclopedia of Educational Psychology</i>.</p> <p>19. Sepp, S., Agostinho, S., Tindall-Ford, S., &amp; Paas, F. (2020). Gesture-based learning with ICT: Recent developments, opportunities and considerations. In S. Tindall-Ford, S. Agostinho, &amp; J. Sweller (Eds.), <i>Advances in cognitive load theory: Rethinking teaching</i> (pp. 130-141). London: Routledge.</p> <p>20. Van Brussel, S., Verkoeijen, P., Timmermans, M., &amp; Paas, F. (2020). "Consider the opposite" – Effects of elaborative feedback and correct answer feedback on reducing confirmation bias – a pre-registered study. <i>Contemporary Educational Psychology</i>, 61, 101844.</p> <p>21. Weijers, R., De Koning, B. B., &amp; Paas, F. (in press). Nudging in education: towards successful and responsible implication. <i>European Journal of Psychology of Education</i>.</p> <p>22. Wong, M., Castro-Alonso, J. C., Ayres, P., &amp; Paas, F. (2020). The effects of transient information and element interactivity on learning from instructional animations. In S. Tindall-Ford, S. Agostinho, &amp; J. Sweller (Eds.), <i>Advances in cognitive load theory: Rethinking teaching</i> (pp. 80-88). New York: Routledge.</p> <p>23. Xu, M. K., Koorn, P., De Koning, B., Skuballa, I., Lin, L., Henderikx, M., H. W. Marsh, Sweller, J., &amp; Paas, F. (in press). A growth mindset leads to reduced cognitive load and improved learning: Integrating motivation and cognitive load theory. <i>Journal of Educational Psychology</i>.</p> <p>24. Zhang, S., De Koning, B. B., Agostinho, S., Tindall-Ford, S., Chandler, P., &amp; Paas, F. (in press). The cognitive load self-management principle. In R. Mayer &amp; L. Fiorella (Eds.), <i>The Cambridge handbook of multimedia learning 2nd edition</i>. New York: Cambridge University Press.</p> <p>Dr. Martine Baars  <a href="mailto:baars@essb.eur.nl">baars@essb.eur.nl</a>  <a href="https://www.eur.nl/people/martine-baars">https://www.eur.nl/people/martine-baars</a></p> <p><b>Peer reviewed articles</b>  2020  Baars, M., Wijnia, L., de Bruin, A., &amp; Paas, F. (2020). The relation</p>
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	<p>between student's effort and monitoring judgments during learning: A meta-analysis. <i>Educational Psychology Review</i>, 1-24.doi: <a href="https://doi.org/10.1007/s10648-020-09569-3">https://doi.org/10.1007/s10648-020-09569-3</a></p> <p>Nazlieva, N., Mavilidi, M. F., Baars, M., &amp; Paas, F. (2020). Establishing a scientific consensus on the cognitive benefits of physical activity. <i>International Journal of Environmental Research and Public Health</i>, 17, 29-47.</p> <p>Viberg, O., Khalil, M., &amp; Baars, M. (2020, March). Self-regulated learning and learning analytics in online learning environments: a review of empirical research. <i>In Proceedings of the Tenth International Conference on Learning Analytics &amp; Knowledge</i> (pp. 524-533).</p> <p>2019</p> <p>Khalil, M., Wong, J., Baars, M., Zafar, F., &amp; Wasson, B. (2019, September). Evaluating the Usability of a Study Support Mobile App for Higher Education. <i>In World Conference on Mobile and Contextual Learning</i> (pp. 85-93).</p> <p>Raaijmakers, S. F., Baars, M., Paas, F., van Merriënboer, J. J., &amp; Van Gog, T. (2019). Effects of self-assessment feedback on self-assessment and task-selection accuracy. <i>Metacognition and Learning</i>, 14, 21-42.</p> <p>Wong, J., Baars, M., Davis, D., Van Der Zee, T., Houben, G. J., &amp; Paas, F. (2019). Supporting self-regulated learning in online learning environments and MOOCs: A systematic review. <i>International Journal of Human-Computer Interaction</i>, 35(4-5), 356-373.</p> <p>Wong, J., Khalil, M., Baars, M., de Koning, B. B., &amp; Paas, F. (2019). Exploring sequences of learner activities in relation to self-regulated learning in a massive open online course. <i>Computers &amp; Education</i>, 140, 103595.</p> <p>2018</p> <p>Baars, M., Leopold, C., &amp; Paas, F. (2018). Self-explaining steps in problem-solving tasks to improve self-regulation in secondary education. <i>Journal of Educational Psychology</i>, 110, 578- 595.</p> <p>Baars, M., Van Gog, T., De Bruin, A., &amp; Paas, F. (2018). Accuracy of primary school children's immediate and delayed judgments of learning about <i>problem solving tasks</i>. <i>Studies in Educational Evaluation</i>, 58, 51-59.</p> <p>Baars, M., &amp; Wijnia, L. (2018). The relation between task-specific motivational profiles and training of self-regulated learning skills. <i>Learning and Individual Differences</i>, 64, 125-137.</p> <p>Raaijmakers, S. F., Baars, M., Paas, F., van Merriënboer, J. J., &amp; Van Gog, T. (2018). Training self-assessment and task-selection skills to foster self-regulated learning: Do trained skills transfer across domains? <i>Applied cognitive psychology</i>, 32, 270- 277.</p>
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	<p>Raaijmakers, S. F., Baars, M., Schaap, L., Paas, F., van Merriënboer, J., &amp; Van Gog, T. (2018). Training self-regulated learning skills with video modeling examples: Do task-selection skills transfer? <i>Instructional Science</i>, 46, 273-290.</p> <p>2017</p> <p>Baars, M., Van Gog, T., de Bruin, A., &amp; Paas, F. (2017). Effects of problem solving after worked example study on secondary school children's monitoring accuracy. <i>Educational Psychology</i>, 37, 810-834.</p> <p>Baars, M., Wijnia, L., &amp; Paas, F. (2017). The association between motivation, affect, and selfregulated learning when solving problems. <i>Frontiers in psychology</i>, 8, 1346.</p> <p>Raaijmakers, S. F., Baars, M., Schaap, L., Paas, F., &amp; Van Gog, T. (2017). Effects of performance feedback valence on perceptions of invested mental effort. <i>Learning and Instruction</i>, 51, 36-46.</p> <p><b>Book chapters</b></p> <p>2020</p> <p>Baars, M., Wijnia, L., de Bruin, A., &amp; Paas, F. (2020). Sharing the load: Strategy to Improve Self-regulated Learning. In D. L. Dinsmore, L. K. Fryer, &amp; M. M. Parkinson (Eds.), <i>Handbook of Strategies and Strategic Processing</i> (pp. 234-247). Routledge, New York.</p> <p>Wong, J., Baars, M., de Koning, B. B., van der Zee, T., Davis, D., Khalil, M., Davis, D., Houben, G. J., &amp; Paas, F. (2019). Educational theories and learning analytics: From data to knowledge. In Ifenthaler, D., Mah, D., Yau, J. Y. (Eds.), <i>Utilizing Learning Analytics to Support Study Success</i> (pp. 3-25). Springer, Cham.</p> <p>Submitted</p> <p>Baars, M., Zafar, F., Hrehovcsik, M., De Jongh, E., &amp; Paas, F. (2020). Ace your self-study: A mobile application to support self-regulated learning. Manuscript submitted for publication.</p> <p>Wijnia, L., &amp; Baars, M. (2020). The role of motivation in learning problem-solving and selfassessment skills with video modeling examples. Manuscript submitted for publication.</p> <p>Wijnia, L., Ista, J., Baars, M., Eielts, C., Wijnen, M. &amp; Loyens, S. (2020). Self-Study in Problem-Based Learning: Can Students Select and Integrate Information from Scientific Texts? Manuscript submitted for publication.</p> <p>Wong, J., Baars, M., De Koning, B., &amp; Paas, F. (2020). Prompting self-regulated learning in a massive open online course: Do learners benefit? Manuscript submitted for publication.</p>
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