

School/Department:	<i>Erasmus School of Behavioral Sciences (ESSB), Department of Psychology, Education and Child Studies (DPECS)</i>
Project Title:	<i>Better together? The Effect of Sharing the Cognitive Load on Self-regulated Learning of Complex Problem-solving Tasks</i>
Abstract:	<p><i>Project description:</i></p> <p>In modern society it is of vital importance to educate and develop oneself. Therefore, optimizing academic success is an important challenge for higher education. The main aim of this research project is investigating ways to support and develop self-regulation skills of students in order to enhance their academic success. Self-regulation is a crucial skill to promote academic success. To self-regulate their learning processes students need to be able to accurately keep track of their own learning process (i.e., monitoring) and use that information to regulate their learning process (e.g., choose the next task, or ask help). Yet, numerous studies have shown that students are not capable of accurately judging their own learning processes and use that to regulate further learning. Especially learning more complex materials can have a high demand on cognitive resources, leaving too little to also monitor and regulate the learning process. This battle for cognitive resources during the self-regulated learning process is the central challenge in the current project. From a cognitive load theory perspective, dividing the demands of learning a complex task over different learners who are collaborating can lead to a more effective and efficient way of learning. This could mean that collaborative learning could free cognitive resources that can also be used to monitor and regulate learning processes more successfully. In this project you will investigate the effect of collaborative learning on self- and co-regulation of the learning process when learning to solve complex problem-solving tasks.</p> <p><i>Previous publication on this topic:</i></p> <p>Baars, M., Wijnia, L., de Bruin, A., & Paas, F. (2020). Sharing the load: Strategy to Improve Self-regulated Learning. In D. L. Dinsmore, L. K. Fryer, & M. M. Parkinson (Eds.), <i>Handbook of Strategies and Strategic Processing</i> (pp. 234-247). Routledge, New York.</p> <p>Baars, M., Leopold, C., & 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. doi: 10.1037/edu0000223</p> <p>Baars, M., Vink, S., Van Gog, T., de Bruin, A., & Paas, F. (2014). Effects of training self-assessment and using assessment standards on retrospective and prospective monitoring of problem solving. <i>Learning and Instruction</i>, 33, 92-107. doi:</p>

	<p>10.1016/j.learninstruc.2014.04.004</p> <p>Baars, M., Visser, S., Van Gog, T., de Bruin, A., & Paas, F. (2013). Completion of partially worked-out examples as a generation strategy for improving monitoring accuracy. <i>Contemporary Educational Psychology</i>, 38(4), 395-406. doi: http://dx.doi.org/10.1016/j.cedpsych.2013.09.001</p> <p>Baars, M., & 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. doi: https://doi.org/10.1016/j.lindif.2018.05.007</p>
Requirements of candidate:	<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>
Supervisor information:	<p><i>The supervisory team will consist of Prof. dr. Fred Paas (promotor) and Dr. Martine Baars (co-promotor)</i></p> <p>Promotor Prof. Dr. Fred Paas Email address: paas@essb.eur.nl 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 have been cited over 36.000 times. https://www.eur.nl/people/fred-paas</p> <p><i>Selected publications 2020</i></p> <ol style="list-style-type: none"> 1. Ayres, P., Castro-Alonso, J. C., Wong, M., Marcus, N., & Paas, F. (2020). Factors that impact on the effectiveness of instructional animations. In S. Tindall-Ford, S. Agostinho, & J. Sweller (Eds.), <i>Advances in cognitive load theory: Rethinking teaching</i> (pp. 180-193). London: Routledge.

	<ol style="list-style-type: none"> 2. Baars, M., Wijnia, L., De Bruin, A., & Paas, F. (2020). The relation between student's effort and monitoring judgments during learning: A meta-analysis. <i>Educational Psychology Review</i>. 3. Baars, M., Wijnia, L., De Bruin, A., & Paas, F. (2020). Sharing the load: A strategy to improve self-regulated learning. D. Dinsmore, L. Fryer, & M. Parkinson, <i>Handbook of strategies and strategic processing</i>. (pp. 234-247). New York: Routledge 4. Castro-Alonso, J. C., Ayres, P., Wong, M., & Paas, F. (2020). Visuospatial tests and multimedia learning: The importance of employing relevant instruments. In S. Tindall-Ford, S. Agostinho, & J. Sweller (Eds.), <i>Advances in cognitive load theory: Rethinking teaching</i> (pp. 89-100). London: Routledge. 5. De Koning, B., Rop. G., & Paas, F. (2020). Learning from split-attention materials: Evidence for a mental self-managed integration effect. <i>Computers in Human Behavior</i>, 110, 106379. 6. De Koning, B., Rop. G., & Paas, F. (2020). The self-management effect in learning from split-attention materials: Mental versus physical integration. <i>Contemporary Educational Psychology</i>, 61, 101873. 7. Duchi, L., Lombardi, D., Paas, F., & 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. 8. Eielts, C., Pouw, W., Ouweland, K, Van Gog, T., Zwaan, R., & 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. 9. Es-Sajjade, A., & 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>. 10. Leppink, J., Paas, F., Van Gog, T., & 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, & J. Sweller (Eds.), <i>Advances in cognitive load theory: Rethinking teaching</i> (pp. 66-79). London: Routledge. 11. Liu, T. C., Lin, Y. C., Hsu, C. Y., & Paas, F. (in press). Learning from animations and computer simulations: Modality and reverse modality effects. <i>British Journal of Educational Technology</i>. 12. Mavilidi, M., Ouweland, K., Okely, A. D., Chandler, P., & Paas, F. (2020). Embodying learning through physical activity and gestures in preschool children. In S. Tindall-Ford, S.
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	<p>Agostinho, & J. Sweller (Eds.), <i>Advances in cognitive load theory: Rethinking teaching</i> (pp.103-118). London: Routledge.</p> <p>13. Mavilidi, M., Ouwehand, K., Riley, N., Chandler, P., & 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.</p> <p>14. Nazlieva, N., Mavilidi, M. F., Baars, M., & 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.</p> <p>15. Paas, F., & Sweller, J. (in press). Implications of cognitive load theory for multimedia learning. In R. Mayer & L. Fiorella (Eds.), <i>The Cambridge handbook of multimedia learning 2nd edition</i>. New York: Cambridge University Press.</p> <p>16. Paas, F., & Van Merriënboer, J. J. G. (2020). Cognitive load 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., & 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., & 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., & Paas, F. (2020). Gesture-based learning with ICT: Recent developments, opportunities and considerations. In S. Tindall-Ford, S. Agostinho, & 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., & 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., & 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., & Paas, F. (2020). The effects of transient information and element interactivity on learning from instructional animations. In S. Tindall-Ford, S. Agostinho, & 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., & Paas, F. (in press). A growth mindset leads to reduced cognitive load and</p>
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	<p>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., & Paas, F. (in press). The cognitive load self-management principle. In R. Mayer & L. Fiorella (Eds.), <i>The Cambridge handbook of multimedia learning 2nd edition</i>. New York: Cambridge University Press.</p> <p><i>Dr. Martine Baars</i> baars@essb.eur.nl https://www.eur.nl/people/martine-baars</p> <p>Peer reviewed articles</p> <p>2020</p> <p>Baars, M., Wijnia, L., de Bruin, A., & Paas, F. (2020). The relation between student's effort and monitoring judgments during learning: A meta-analysis. <i>Educational Psychology Review</i>, 1-24.doi: https://doi.org/10.1007/s10648-020-09569-3</p> <p>Nazlieva, N., Mavilidi, M. F., Baars, M., & 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., & 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 & Knowledge</i> (pp. 524-533).</p> <p>2019</p> <p>Khalil, M., Wong, J., Baars, M., Zafar, F., & 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., & 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., & 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., & Paas, F. (2019). Exploring sequences of learner activities in relation to self-regulated learning in a massive open online course. <i>Computers & Education</i>, 140, 103595.</p>
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	<p>2018</p> <p>Baars, M., Leopold, C., & 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., & 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., & 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., & 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> <p>Raaijmakers, S. F., Baars, M., Schaap, L., Paas, F., van Merriënboer, J., & 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., & 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., & 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., & 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>Book chapters</p> <p>2020</p> <p>Baars, M., Wijnia, L., de Bruin, A., & Paas, F. (2020). Sharing the load: Strategy to Improve Self-regulated Learning. In D. L. Dinsmore, L. K. Fryer, & 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., & 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., & Paas, F.</p>
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	<p>(2020). Ace your self-study: A mobile application to support self-regulated learning. Manuscript submitted for publication.</p> <p>Wijnia, L., & 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. & 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., & 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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