References

Abt, C. C. (1970). *Serious Games*. New York: Viking Press.

Aldemir, T., Celik, B., & Kaplan, G. (2018). A qualitative investigation of student perceptions of game elements in a gamified course. *Computers in Human Behavior*, *78*, 235–254.

Altıok, S., Başer, Z., & Yükseltürk, E. (2019). Metacognitive awareness of undergraduates through using an e-educational video environment. *Computers & Education*, *139*, 129–145.

Ames, C., & Archer, J. (1988). Achievement goals in the classroom: Students' learning strategies and motivation processes. *Journal of Educational Psychology*, *80*(3), 260–267.

Amory, A. (2007). Game object model version II: A theoretical framework for educational game development. *Educational Technology Research and Development*, *55*(1), 51–77.

Anderson, L. W., & Krathwohl, D. R. (2001). *A taxonomy for learning, teaching, and assessing: A revision of Bloom's taxonomy of educational objectives*. *Theory Into Practice*. Addison Wesley.

Andriessen, D., & Van Turnhout, K. (2023). Stromingen in ontwerpgericht onderzoek. In K. Van Turnhout, D. Andriessen, & P. Cremers (Eds.), *Handboek ontwerpgericht wetenschappelijk onderzoek* (pp. 77–98). Amsterdam: Boom Uitgevers.

Arnab, S., De Freitas, S., Bellotti, F., Lim, T., Louchart, S., Suttie, N., … De Gloria, A. (2012). Pedagogy-driven design of serious games: An overall view on learning and game mechanics mapping, and cognition-based models. Serious Games Institute.

Arnab, S., Lim, T., Carvalho, M. B., Bellotti, F., De Freitas, S., Louchart, S., … De Gloria, A. (2015). Mapping learning and game mechanics for serious games analysis. *British Journal of Educational Technology*, *46*, 391–411.

Arroyo, I., Woolf, B. P., Burelson, W., Muldner, K., Rai, D., & Tai, M. (2014). A multimedia adaptive tutoring system for mathematics that addresses cognition, metacognition and affect. *International Journal of Artificial Intelligence in Education*, *24*(4), 387–426.

Asgari, M., & Kaufman, D. (2004). Relationships among computer games, fantasy, and learning. *Proceedings of the 2nd International Conference on Imagination and Education*, 1–8.

Azevedo, R. (2005a). Computer environments as metacognitive tools for enhancing learning. *Educational Psychologist*, *40*(4), 193–197.

Azevedo, R. (2005b). Using hypermedia as a metacognitive tool for enhancing student learning? The role of self-regulated learning. *Educational Psychologist*, *40*(4), 199–209.

Azevedo, R. (2020). Reflections on the field of metacognition: issues, challenges, and opportunities. *Metacognition and Learning*, *15*, 91–98.

Azevedo, R., Behnagh, R. F., Duffy, M., Harley, J. M., & Trevors, G. (2012). Metacognition and self-regulated learning in student-centered learning environments. In *Theoretical Foundations of Learning Environments* (pp. 171–197). Routledge.

Azevedo, R., Cromley, J. G., Winters, F. I., Moos, D. C., & Greene, J. A. (2006). Using computers as metacognitive tools to foster students' self-regulated learning. *Technology, Instruction, Cognition & Learning*, *3*, 97–104.

Azevedo, R., & Hadwin, A. F. (2005). Scaffolding self-regulated learning and metacognition - Implications for the design of computer-based scaffolds. *Instructional Science*, *33*(5–6), 367–379.

Azevedo, R., & Jacobson, M. J. (2008). Advances in scaffolding learning with hypertext and hypermedia: a summary and critical analysis. *Educational Technology Research and Development*, *59*(93), 93–100.

Baker, L., & Brown, A. L. (1984). Metacognitive skills and reading. *Handbook of Reading Research*, *1*, 353–394.

Bandura, A. (1977). *Social Learning Theory*. Englewood Cliffs, New Jersey: Prentice-Hall.

Bandura, A. (1986). *Social Foundations of Thought and Action: A Social Cognitive Theory*. Englewood Cliffs, New Jersey: Prentice-Hall.

Bang, A. L., & Eriksen, M. A. (2014). Experiments all the way in programmatic design research. *Artifact*, *III*(2), 4.1-4.14.

Bannert, M., Hildebrand, M., & Mengelkamp, C. (2009). Effects of a metacognitive support device in learning environments. *Computers in Human Behavior*, *25*(4), 829–835.

Bannert, M., & Mengelkamp, C. (2013). Scaffolding hypermedia learning through metacognitive prompts. In R. Azevedo & V. Aleven (Eds.), *International Handbook of Metacognition and Learning Technologies* (pp. 171–186). Springer.

Bannert, M., & Reimann, P. (2012). Supporting self-regulated hypermedia learning through prompts. *Instructional Science*, *40*, 193–211.

Barab, S. A., Dodge, T., Tuzun, H., Job-sluder, K., Jackson, C., Arici, A., … Heiselt, C. (2007). The Quest Atlantis Project: A socially-responsive play space for learning. In B. E. Shelton & D. Wiley (Eds.), *The Educational Design and Use of Simulation Computer Games* (pp. 159–186). Rotterdam, The Netherlands: Sense Publishers.

Barab, S. A., Dodge, T., Tuzun, H., Job-Sluder, K., Jackson, C., Arici, A., … Heiselt, C. (2007). The Quest Atlantis Project: A socially-responsive play space for learning. In B. E. Shelton & D. Wiley (Eds.), *The Educational Design and Use of Simulation Computer Games* (pp. 159–186). Rotterdam, The Netherlands: Sense Publishers.

Barab, S. A., Thomas, M., Dodge, T., Carteaux, R., & Tuzun, H. (2005). Making learning fun: Quest Atlantis, a game without guns. *Educational Technology Research and Development*, *53*(1), 86–107.

Bedwell, W. L., Pavlas, D., Heyne, K., Lazzara, E. H., & Salas, E. (2012). Toward a taxonomy linking game attributes to learning. *Simulation & Gaming*, *43*(6), 729–760.

Bessarabova, E., Piercy, C. W., King, S., Vincent, C., Dunbar, N. E., Burgoon, J. K., … Lee, Y. H. (2016). Mitigating bias blind spot via a serious video game. *Computers in Human Behavior*, *62*, 452–466.

Betts, A. L., & Rothschild, M. K. (2020). Massively multiplayer online games as spaces for metacognition and self-regulated learning. In M. Farber (Ed.), *Global Perspectives on Gameful and Playful Teaching and Learning* (pp. 78–104). Colorado, CO, USA: IGI Global.

Binder, T. (2019). Commentary: "Experiments all the way in programmatic design research" revisited. *Journal of Design Practice*, *6*, 1–2.

Binder, T., & Redström, J. (2006). Examplary design research. In K. Friedman, T. Love, E. Côrte-Real, & C. Rust (Eds.), *Wonderground - DRS International Conference*.

Bjork, R. A., Dunlosky, J., & Kornell, N. (2013). Self-regulated learning: Beliefs, techniques, and illusions. *Annual Review of Psychology*, *64*(1), 417–444.

Boekaerts, M. (1997). Self-regulated learning: A new concept embraced by researchers, policy makers, educators, teachers, and students. *Learning and Instruction*, *7*(2), 161–186.

Boekaerts, M., & Cascallar, E. (2006). How far have we moved toward the integration of theory and practice in self-regulation? *Educational Psychology Review*, *18*, 199–210.

Boyle, E. A., Hainey, T., Connolly, T. M., Gray, G., Earp, J., Ott, M., … Pereira, J. (2016). An update to the systematic literature review of empirical evidence of the impacts and outcomes of computer games and serious games. *Computers & Education*, *94*, 178–192.

Braad, E., Degens, N., Barendregt, W., & IJsselsteijn, W. A. (2021). Development of a design framework for metacognition in game-based learning. *Journal of Interactive Learning Research*, *32*(4), 295–323.

Braad, E., Degens, N., Barendregt, W., & IJsselsteijn, W. A. (2022). Improving metacognition through self-explication in a digital self-regulated learning tool. *Educational Technology Research and Development*.

Braad, E., Degens, N., & IJsselsteijn, W. A. (2019a). MeCo: A digital card game to enhance metacognitive awareness. In L. Elbaek, G. Majgaard, A. Valente, & S. Khalid (Eds.), *Proceedings of the 13th European Conference on Games Based Learning* (pp. 92–100). Sonning Common, United Kingdom: Academic Conferences and Publishing International.

Braad, E., Degens, N., & IJsselsteijn, W. A. (2019b). Towards a framework for metacognition in game-based learning. In L. Elbaek, G. Majgaard, A. Valente, & S. Khalid (Eds.), *Proceedings of the 13th European Conference on Games Based Learning* (pp. 101–109). Sonning Common, United Kingdom: Academic Conferences and Publishing International.

Braad, E., Degens, N., & IJsselsteijn, W. A. (2020). Designing for metacognition in game-based learning: A qualitative review. *Translational Issues in Psychological Science*, *6*(1), 53–69.

Braad, E., Folkerts, J., & Jonker, N. (2013). Attributing design decisions in the evaluation of game-based health interventions. In B. Schouten, S. Fedtke, T. Bekker, M. Schijven, & A. Gekker (Eds.), *Proceedings of the 3rd European Conference on Gaming and Playful Interaction in Health Care* (pp. 61–74). Springer.

Braad, E., Žavcer, G., & Sandovar, A. (2016). Processes and models for serious game design and development. In R. Dorner, S. Gobel, M. D. Kickmeier-Rust, M. Masuch, & K. Zweig (Eds.), *Entertainment Computing and Serious Games*. Springer.

Brady, M., Seli, H., & Rosenthal, J. (2013). Metacognition and the influence of polling systems: How do clickers compare with low technology systems. *Educational Technology Research and Development*, *61*(6), 885–902.

Braun, V., & Clarke, V. (2012). Thematic analysis. In H. Cooper (Ed.), *APA Handbook of Research Methods in Psychology* (pp. 57–71). American Psychological Association.

Broadbent, J., Panadero, E., Lodge, J. M., & De Barba, P. (2020). Technologies to enhance self-regulated learning in online and computer-mediated learning environments. In M. J. Bishop, E. Boling, J. Elen, & V. Svihla (Eds.), *Handbook of Research in Educational Communications and Technology* (pp. 37–52). Springer.

Brown, A. L. (1978). Knowing when, where, and how to remember: A problem of metacognition. In R. Glaser (Ed.), *Advances in Instructional Psychology (Volume 1)* (pp. 77–165). New Jersey, USA: Lawrence Erlbaum Associates.

Brown, A. L. (1992). Design experiments: Theoretical and methodological challenges in creating complex interventions in classroom settings. *Journal of the Learning Sciences*, *2*(2), 141–178.

Brown, A. L., Bransford, J. D., Ferrara, R., & Campione, J. (1983). Learning, remembering, and understanding. In J. H. Flavell & E. M. Markman (Eds.), *Handbook of Child Psychology* (pp. 77–166). New York: Wiley.

Brown, A. L., & Palinscar, A. S. (1989). Guided, cooperative learning and individual knowledge acquisition. In Lauren B. Resnick (Ed.), *Knowing, Learning, and Instruction: Essays in Honor of Robert Glaser* (pp. 393–451). New York: Routledge.

Burguillo, J. C. (2010). Using game theory and competition-based learning to stimulate student motivation and performance. *Computers & Education*, *55*(2), 566–575.

Callender, A. A., Franco-Watkins, A. M., & Roberts, A. S. (2016). Improving metacognition in the classroom through instruction, training, and feedback. *Metacognition and Learning*, *11*(2), 215–235.

Carpenter, J., Sherman, M. T., Seth, A. K., & Fleming, S. M. (2019). Domain-general enhancements of metacognitive ability through adaptive training. *Journal of Experimental Psychology: General*, *148*(1), 51–64.

Carvalho, M. B., Bellotti, F., Berta, R., De Gloria, A., Sedano, C. I., Hauge, J. B., … Rauterberg, M. (2015). An activity theory-based model for serious games analysis and conceptual design. *Computers & Education*, *87*, 166–181.

Castronovo, F., Van Meter, P. N., & Messner, J. I. (2018). Leveraging metacognitive prompts in construction educational games for higher educational gains. *International Journal of Construction Management*, *22*(1), 19–30.

Chandra, L., Seidel, S., & Gregor, S. (2015). Prescriptive knowledge in IS research: Conceptualizing design principles in terms of materiality, action, and boundary conditions. In *48th Hawaii International Conference on System Sciences Prescriptive* (pp. 4039–4048). IEEE.

Charles, D., Hanna, C., Paul, R., & Charles, T. (2012). Rapid development of games inspired metacognitive learning experiences using Moodle and Gamemaker. In P. Felicia (Ed.), *Proceedings of the 6th European Conference on Games Based Learning* (pp. 93–101). Cork, Ireland: Academic Conferences.

Chen, C.-H., Shih, C.-C., & Law, V. (2020). The effects of competition in digital game-based learning (DGBL): A meta-analysis. *Educational Technology Research and Development*, *68*, 1855–1873.

Chen, Z.-H., & Lee, S.-Y. (2018). Application-driven educational game to assist young children in learning English vocabulary. *Educational Technology & Society*, *21*(1), 70–81.

Clarebout, G., Elen, J., Juarez Collazo, N. A., Lust, G., & Jiang, L. (2013). Metacognition and the use of tools. In R. Azevedo & V. Aleven (Eds.), *International Handbook of Metacognition and Learning Technologies* (pp. 187–195). Springer.

Clarke, V., & Braun, V. (2014). Thematic analysis. In A. C. Michalos (Ed.), *Encyclopaedia of Quality of Life and Well-Being Research* (pp. 6626–6628).

Cloude, E. B., Taub, M., Lester, J. C., & Azevedo, R. (2019). The role of achievement goal orientation on metacognitive process use in game-based learning. In S. Isotani, E. Millán, A. Ogan, P. Hastings, B. McLaren, & R. Luckin (Eds.), *Artificial Intelligence in Education* (pp. 36–40). Springer.

Cnossen, Y. (2009). *Fostering self-directed learning in a competency-based learning environment*. Open Universiteit Nederland, Heerlen, The Netherlands.

Connolly, T. M., Boyle, E. A., MacArthur, E., Hainey, T., & Boyle, J. M. (2012). A systematic literature review of empirical evidence on computer games and serious games. *Computers & Education*, *59*, 661–686.

Connor, C. M., Day, S. L., Zargar, E., Wood, T. S., Taylor, K. S., Jones, M. R., & Hwang, J. K. (2019). Building word knowledge, learning strategies, and metacognition with the word-knowledge e-book. *Computers & Education*, *128*, 284–311.

Coulson, D., & Harvey, M. (2013). Scaffolding student reflection for experience-based learning: A framework. *Teaching in Higher Education*, *18*(4), 401–413.

Crocco, F., Offenholley, K., & Hernandez, C. (2016). A proof-of-concept study of game-based learning in higher education. *Simulation & Gaming*, *47*(4), 403–422.

Dansereau, D. F. (1978). The development of a learning strategies curriculum. In H. F. O'Neil (Ed.), *Learning Strategies* (pp. 63–82). New York: Academic Press.

Dansereau, D. F. (1985). Learning strategy research. In J. W. Segal, S. F. Chipman, & R. Glaser (Eds.), *Thinking and Learning Skills: Relating Instruction to Research* (pp. 209–241). Routledge.

De Villiers, M. R., & Harpur, P. A. (2013). Design-based research – the educational technology variant of design research: Illustrated by the design of an m-learning environment. In P. Machanick & M. Tsietsi (Eds.), *Proceedings of the South African Institute for Computer Scientists and Information Technologists Conference* (pp. 252–261). East London, South Africa: ACM.

Degens, N., Bril, I., & Braad, E. (2015). A three-dimensional model for educational game analysis & design. In *Proceedings of the Foundations of Digital Games Conference 2015*. Monterey Bay, California, USA.

Derry, S. J. (1989). Putting learning strategies to work. *Educational Leadership*, *47*(5), 4–10.

Derry, S. J., & Murphy, D. A. (1986). Designing systems that train learning ability: From theory to practice. *Review of Educational Research*, *56*(1), 1–39.

Deterding, S., Dixon, D., Khaled, R., & Nacke, L. (2011). From game design elements to gamefulness: Defining gamification. In *Proceedings of the 15th International Academic MindTrek Conference on Envisioning Future Media Environments* (pp. 9–11). ACM.

Dickey, M. D. (2006). Game design narrative for learning: Appropriating adventure game design narrative devices of interactive learning environment. *Educational Technology Research and Development*, *54*(3), 245–263.

Dickey, M. D. (2019). Narrative in game-based learning. In J. L. Plass, R. E. Mayer, & B. D. Homer (Eds.), *Handbook of Game-Based Learning* (pp. 283–306). Cambridge, MA, USA: The MIT Press.

Dignath, C., & Büttner, G. (2008). Components of fostering self-regulated learning among students . A meta-analysis on intervention studies at primary and secondary school level. *Metacognition and Learning*, *3*, 231–264.

Dinsmore, D. L., Alexander, P. A., & Loughlin, S. M. (2008). Focusing the conceptual lens on metacognition, self-regulation, and self-regulated learning. *Educational Psychology Review*, *20*, 391–409.

Dondlinger, M. J. (2007). Educational video game design: A review of the literature. *Journal of Applied Educational Technology*, *4*(1), 21–31.

Dong, A., Maton, K., & Carvalho, L. (2014). The structuring of design knowledge. In *The Routledge Companion to Design Knowledge* (pp. 38–49). Routledge.

Dunlosky, J., Bottiroli, S., & Hartwig, M. (2009). Sins committed in the name of ecological validity: A call for representative design in education science. In D. J. Hacker, J. Dunlosky, & A. C. Graesser (Eds.), *Handbook of Metacognition in Education* (pp. 430–441).

Dunlosky, J., Rawson, K. A., Marsh, E. J., Nathan, M. J., & Willingham, D. T. (2013). Improving students' learning with effective learning techniques. *Psychological Science in the Public Interest*, *14*(1), 4–58.

Dweck, C. S. (1986). Motivational processes affecting learning. *American Psychologist*, *41*(10), 1040–1048.

Easterday, M. W., Lewis, D. R., & Gerber, E. M. (2014). Design-based research process: Problems, phases, and applications. In J. L. Polman, E. A. Kyza, D. K. O'Neill, I. Tabak, W. R. Penuel, A. S. Jurow, … L. D'Amico (Eds.), *Learning and Becoming in Practice: The International Conference of the Learning Sciences (ICLS) 2014* (pp. 317–324). Colorado, CO, USA: International Society of the Learning Sciences.

Easterday, M. W., Rees Lewis, D. G., & Gerber, E. M. (2018). The logic of design research. *Learning: Research and Practice*, *4*(2), 131–160.

Eccles, D. W., & Feltovich, P. J. (2008). Implications of domain-general "psychological support skills" for transfer of skill and acquisition of expertise. *Performance Improvement Quarterly*, *21*(1), 43–60.

Echeverría, A., Barrios, E., Nussbaum, M., Améstica, M., & Leclerc, S. (2012). The atomic intrinsic integration approach: A structured methodology for the design of games for the conceptual understanding of physics. *Computers & Education*, *59*(2), 806–816.

Efklides, A. (2006). Metacognition and affect: What can metacognitive experiences tell us about the learning process? *Educational Research Review*, *1*(1), 3–14.

Efklides, A. (2011). Interactions of metacognition with motivation and affect in self-regulated learning: The MASRL model. *Educational Psychologist*, *46*(1), 6–25.

Efklides, A. (2014). How does metacognition contribute to the regulation of learning? An integrative approach. *Psihologijske Teme*, *23*(1), 1–30.

Ertmer, P. A., & Newby, T. J. (1996). The expert learner: Strategic, self-regulated, and reflective. *Instructional Science*, *24*(1), 1–24.

Fallman, D. (2007). Why research-oriented design isn't design-oriented research: on the tensions between design and research in an implicit design discipline. *Knowledge, Technology & Policy*, *20*, 193–200.

Fessl, A., Bratic, M., & Pammer, V. (2014). Continuous learning with a quiz for stroke nurses. *International Journal of Technology Enhanced Learning*, *6*(3), 265–275.

Fiorella, L., & Mayer, R. E. (2012). Paper-based aids for learning with a computer-based game. *Journal of Educational Psychology*, *104*(4), 1074–1082.

Fiorella, L., & Vogel-Walcutt, J. J. (2011). Metacognitive prompting as a generalizable instructional tool in simulation-based training. In *Proceedings of the Human Factors and Ergonomics Society 55th Annual Meeting* (pp. 565–569). HFES.

Fishovitz, J., Crawford, G. L., & Kloepper, K. D. (2020). Guided heads-up: A collaborative game that promotes metacognition and synthesis of material while emphasizing higher-order thinking. *Journal of Chemical Education*, *97*(3), 681–688.

Flavell, J. H. (1976). Metacognitive aspects of problem solving. In L.B. Resnick (Ed.), *The Nature of Intelligence* (pp. 231–235). Hillsdale, NJ: Erlbaum.

Flavell, J. H. (1979). Metacognition and cognitive monitoring: A new area of cognitive-development inquiry. *American Psychologist*, *34*(10), 906–911.

Foster, S. R., Esper, S., & Griswold, W. G. (2013). From competition to metacognition: designing diverse, sustainable educational games. In W. E. Mackay, S. A. Brewster, & S. Bodker (Eds.), *SIGCHI Conference on Human Factors in Computing Systems* (pp. 99–108). ACM.

Frayling, C. (1994). Research in art and design. *Royal College of Art Research Papers*, *1*(1).

Frazier, L. D., Schwartz, B. L., & Metcalfe, J. (2021). The MAPS model of self-regulation : Integrating metacognition, agency, and possible selves. *Metacognition and Learning*, *16*, 297–318.

Gagné, R. (1980). Learnable aspects of problem solving. *Educational Psychologist*, *15*, 84–92.

Gajadhar, B. J., De Kort, Y. A. W., & IJsselsteijn, W. A. (2008). Shared fun is doubled fun: Player enjoyment as a function of social setting. In P. Markopoulos, B. de Ruyter, W. A. IJsselsteijn, & D. Rowland (Eds.), *Fun and Games: International Conference on Fun and Games* (pp. 106–117). Springer-Verlag.

Gallagher, P. S., & Prestwich, S. H. (2013). Can game design be leveraged to enhance cognitive adaptability? *Electronic Journal of E-Learning*, *11*(1), 1–19.

Garris, R., Ahlers, R., & Driskell, J. E. (2002). Games, motivation, and learning: A research and practice model. *Simulation & Gaming*, *33*(4), 441–467.

Gascoine, L., Higgins, S., & Wall, K. (2016). The assessment of metacognition in children aged 4-16 years: A systematic review. *Review of Education*, *5*(1), 3–57.

Gee, J. P. (2004). Learning by design: Games as learning machines. *Interactive Educational Multimedia*, *8*(8), 15–23.

Graesser, A. C. (2017). Reflections on serious games. In P. Wouters & H. Van Oostendorp (Eds.), *Instructional Techniques to Facilitate Learning and Motivation of Serious Games* (pp. 199–212).

Graham, S., & Harris, K. R. (2000). The role of self-regulation and transcription skills in writing and writing development. *Educational Psychologist*, *35*(1), 3–12.

Greene, J. A., & Azevedo, R. (2007). A theoretical review of Winne and Hadwin's model of self-regulated learning: New perspectives and directions. *Review of Educational Research*, *77*(3), 334–372.

Griffin, T. D., Wiley, J., & Salas, C. R. (2013). Supporting effective self-regulated learning: The critical role of monitoring. In R. Azevedo & V. Aleven (Eds.), *International Handbook of Metacognition and Learning Technologies* (pp. 19–35). New York: Springer.

Habgood, M. P. J. (2007). *The Effective Integration of Digital Games and Learning Content*. University of Nottingham.

Habgood, M. P. J., & Ainsworth, S. E. (2011). Motivating children to learn effectively: Exploring the value of intrinsic integration in educational games. *Journal of the Learning Sciences*, *20*(2), 169–206.

Hacker, D. J. (2017). The role of metacognition in learning via serious games. In R. Zheng & M. K. Gardner (Eds.), *Handbook of Research on Serious Games for Educational Applications* (pp. 19–40). Hershey, PA, USA: IGI Global.

Hacker, D. J., & Bol, L. (2019). Calibration and self-regulated learning: Making the connections. In J. Dunlosky & K. A. Rawson (Eds.), *The Cambridge Handbook of Cognition and Educations* (pp. 647–677). Cambridge, MA, USA: Cambridge University Press.

Hadwin, A. F., & Winne, P. H. (2001). CoNoteS2: A software tool for promoting Self-regulation. *Educational Research and Evaluation*, *7*(2–3), 313–334.

Hamari, J., Shernoff, D. J., Rowe, E., Coller, B., Asbell-Clarke, J., & Edwards, T. (2016). Challenging games help students learn: An empirical study on engagement, flow and immersion in game-based learning. *Computers in Human Behavior*, *54*, 170–179.

Hammond, K. R. (1998). Ecological validity: Then and now. Retrieved from https://www.albany.edu/cpr/brunswik/notes/essay2.html

Harrison, G. M., & Vallin, L. M. (2018). Evaluating the metacognitive awareness inventory using empirical factor-structure evidence. *Metacognition and Learning*, *13*(1), 15–38.

Hartman, H. J. (1998). Metacognition in teaching and learning: An introduction. *Instructional Science*, *26*(1/2), 1–3.

Hartman, H. J. (2001a). Developing students' metacognitive knowledge and strategies. In H. J. Hartman (Ed.), *Metacognition in Learning and Instruction: Theory, Research, and Practice* (pp. 33–68). Dordrecht, The Netherlands: Kluwer Academic Publishers.

Hartman, H. J. (2001b). Teaching metacognitively. In H. J. Hartman (Ed.), *Metacognition in Learning and Instruction: Theory, Research, and Practice* (pp. 149–169). Dordrecht, The Netherlands: Kluwer Academic Publishers.

Hattie, J. (2009). *Visible Learning: A Synthesis of Over 800 Meta-Analyses Relating to Achievement*. London: Routledge.

Hattie, J., Biggs, J., & Purdie, N. (1996). Effects of learning skills interventions on student learning: A meta-analysis. *Review of Educational Research*, *66*(2), 99–136.

Hevner, A. R. (2007). A three cycle view of design science research. *Scandinavian Journal of Information Systems*, *19*(2), 87–92.

Hevner, A. R., & Chatterjee, S. (2010). *Design Research in Information Systems*. New York, NY, USA: Springer.

Hevner, A. R., March, S. T., Park, J., & Ram, S. (2004). Design science in information systems research. *MIS Quarterly*, *28*(1), 75–105.

Hoffman, B., & Spatariu, A. (2008). The influence of self-efficacy and metacognitive prompting on math problem-solving efficiency. *Contemporary Educational Psychology*, *33*(4), 875–893.

Holleman, G. A., Hooge, I. T. C., Kemner, C., & Hessels, R. S. (2020). The "real-world approach" and its problems: A critique of the term ecological validity. *Frontiers in Psychology*, *11*, 721.

Höök, K., & Löwgren, J. (2012). Strong concepts: Intermediate-level knowledge in interaction. *ACM Transactions on Computer-Human Interaction*, *19*(3), 1–18.

Houde, S., & Hill, C. (1997). What do prototypes prototype? In M. Helander, T. Landauer, & P. Prabhu (Eds.), *Handbook of Human-Computer Interaction* (pp. 367–381). Amsterdam, The Netherlands: Elsevier.

Hoyningen-Huene, P. (1987). On the varieties of the distinction between the context of discovery and the context of justification. *Studies in History and Philosophy of Science*, *18*(4), 501–515.

Hoyningen-Huene, P. (2006). Context of discovery versus context justification and Thomas Kuhn. In J. Schickore & F. Steinle (Eds.), *Revisiting Discovery and Justification: Historical and Philosophical Perspectives on the Context Distinction* (pp. 119–131). Springer.

Hung, W., & Van Eck, R. (2010). Aligning problem solving and gameplay: A model for future research and design. In R. Van Eck (Ed.), *Interdisciplinary Models and Tools for Serious Games: Emerging Concepts and Future Directions* (pp. 227–263). IGI Global.

Hunicke, R. (2005). The case for dynamic difficulty adjustment in games. In *Proceedings of the 2005 ACM SIGCHI International Conference on Advances in Computer Entertainment Technology* (pp. 429–433).

Hunicke, R., LeBlanc, M., & Zubek, R. (2004). MDA: A formal approach to game design and game research. In *Proceedings of the AAAI Workshop on Challenges in Game AI* (pp. 1–5).

Jacobs, J. E., & Paris, S. G. (1987). Children's metacognition about reading: Issues in definition, measurement, and instruction. *Educational Psychologist*, *22*(3–4), 255–278.

Jansen, R. S., Leeuwen, A. Van, Janssen, J., Conijn, R., & Kester, L. (2020). Supporting learners' self-regulated learning in massive open online courses. *Computers & Education*, *146*, 103771.

Järvelä, S., Malmberg, J., Sobocinski, M., & Kirschner, P. A. (2021). Metacognition in collaborative learning. In U. Cress, C. Rosé, A. F. Wise, & J. Oshima (Eds.), *International Handbook of Computer-Supported Collaborative Learning* (pp. 281–294). Springer.

Johannesson, P., & Perjons, E. (2014). *An Introduction to Design Science*. Springer.

Johnson, C. I., Bailey, S. K. T., & Van Buskirk, W. L. (2017). Designing effective feedback messages in serious games and simulations: A research review. In P. Wouters & H. Van Oostendorp (Eds.), *Instructional Techniques to Facilitate Learning and Motivation of Serious Games* (pp. 119–140). Springer.

Johnson, E. K. (2019). Waves: Scaffolding self-regulated learning to teach science in a whole-body educational game. *Journal of Science Education and Technology*, *28*, 133–151.

Kalyuga, S., & Plass, J. L. (2009). Evaluating and managing cognitive load in games. In R.E. Ferdig (Ed.), *Handbook of Research on Effective Electronic Gaming in Education* (pp. 719–737). IGI Global Press.

Kane, S., Lear, M., & Dube, C. M. (2014). Reflections on the role of metacognition in student reading and learning at higher education level. *Africa Education Review*, *11*(4), 512–525.

Kautzmann, T. R., & Jaques, P. A. (2019). Effects of adaptive training on metacognitive knowledge monitoring ability in computer-based learning. *Computers & Education*, *129*, 92–105.

Ke, F. (2008a). A case study of computer gaming for math: Engaged learning from gameplay? *Computers & Education*, *51*(4), 1609–1620.

Ke, F. (2008b). Alternative goal structures for computer game-based learning. *International Journal of Computer-Supported Collaborative Learning*, *3*(4), 429–445.

Ke, F. (2008c). Computer games application within alternative classroom goal structures: Cognitive, metacognitive, and affective evaluation. *Educational Technology Research and Development*, *56*(5–6), 539–556.

Ke, F. (2009). A qualitative meta-analysis of computer games as learning tools. In Richard E. Ferdig (Ed.), *Handbook of Research on Effective Electronic Gaming in Education* (pp. 1–32). IGI Global.

Ke, F. (2016). Designing and integrating purposeful learning in game play: a systematic review. *Educational Technology Research and Development*, *64*, 219–244.

Ke, F., Shute, V. J., Clark, K. M., & Erlebacher, G. (2019). An evolving design framework for game-based learning platforms. In F. Ke, V. Shute, K. M. Clark, & G. Erlebacher (Eds.), *Interdisciplinary Design of Game-Based Learning Platforms* (pp. 141–151). Springer.

Kenny, R. F., & Gunter, G. A. (2007). Endogenous fantasy-based serious games: Intrinsic motivation and learning. *International Journal of Social Sciences*, *2*(1), 8–13.

Khaled, R., Lessard, J., & Barr, P. (2018). Documenting trajectories in design space: A methodology for applied game design research. In *FDG18: Foundations of Digital Games*. New York, NY, USA: ACM.

Kihlstrom, J. F. (2021). Ecological validity and "ecological validity." *Perspectives on Psychological Science*, *16*(2), 466–471.

Kim, B. K., Park, H. S., & Baek, Y. (2009). Not just fun, but serious strategies: Using meta-cognitive strategies in game-based learning. *Computers and Education*, *52*(4), 800–810.

King, A. (1992). Facilitating elaborative learning through guided student-generated questioning. *Educational Psychologist*, *27*(1), 111–126.

Klauer, K. J. (1988). Teaching for learning-to-learn: A critical appraisal with some proposals. In *Annual Meeting of the American Educational Research Association*.

Kolarić, S., Beck, J., & Stolterman, E. (2020). On the hierarchical levels of design knowledge. In *Proceedings of the Design Society: DESIGN Conference* (pp. 51–60). Cambridge University Press.

Krathwohl, D. R. (2002). A revision of Bloom's taxonomy: An overview. *Theory Into Practice*, *41*(4), 212–218.

Krogh, P. G., & Koskinen, I. (2020). Drifting in four epistemic traditions. In *Drifting by Intention* (pp. 29–45). Cham, Switzerland: Springer.

Kuhn, D. (2000). Metacognitive development. *Current Directions in Psychological Science*, *9*(5), 178–181.

Kuhn, D., Garcia-Mila, M., Zohar, A., Andersen, C., White, S. H., Klahr, D., & Carver, S. M. (1995). Strategies of knowledge acquisition. *Monographs of the Society for Research in Child Development*, *60*(4), 1–157.

Lameras, P., Arnab, S., Dunwell, I., Stewart, C., Clarke, S., & Petridis, P. (2017). Essential features of serious games design in higher education: Linking learning attributes to game mechanics. *British Journal of Educational Technology*, *48*(4), 972–994.

Lee, H. W., Lim, K. Y., & Grabowski, B. L. (2010). Improving self-regulation, learning strategy use, and achievement with metacognitive feedback. *Educational Technology Research and Development*, *58*, 629–648.

Lee, J., & Choi, H. (2017). What affects learner's higher-order thinking in technology-enhanced learning environments? The effects of learner factors. *Computers & Education*, *115*, 143–152.

Lim, T., Louchart, S., Suttie, N., Ritchie, J. M., Aylett, R. S., Stanescu, I. A., … Moreno-Ger, P. (2013). Strategies for effective digital games development and implementation. In Y. Baek & N. Whitton (Eds.), *Cases on digital game-based learning: Methods, models, and strategies* (pp. 168–198). IGI Global.

Lin, X. (2001). Designing metacognitive activities. *Educational Technology Research and Development*, *49*(2), 23–40.

Lins de Holanda Coelho, G., Hanel, P. H. P., & Wolf, L. J. (2018). The very efficient assessment of need for cognition: Developing a six-item version. *Assessment*, *27*(8), 1870–1885.

Liu, S., & Liu, M. (2020). The impact of learner metacognition and goal orientation on problem-solving in a serious game environment. *Computers in Human Behavior*, *102*, 151–165.

Löwgren, J., Larsen, H. S., & Hobye, M. (2013). Towards programmatic design research. *Designs for Learning*, *6*(1–2), 80–100.

Malone, T. W. (1980). *What makes things fun to learn? A study of intrinsically motivating computer games*. Stanford University.

Malone, T. W. (1981). Toward a theory of intrinsically motivating instruction. *Cognitive Science*, *4*, 333–369.

Malone, T. W., & Lepper, M. R. (1987). Making learning fun: A taxonomy of intrinsic motivations for learning. In R. E. Snow & M. J. Farr (Eds.), *Aptitude, Learning, and Instruction* (pp. 223–253). Hillsdale, NJ, USA: Lawrence Erlbaum Associates.

March, S. T., & Smith, G. F. (1995). Design and natural science research on information technology. *Decision Support Systems*, *15*(4), 251–266.

Martinez-Garza, M. M., & Clark, D. B. (2017). Two systems, two stances: A novel theoretical framework for model-based learning in digital games. In P. Wouters & H. Van Oostendorp (Eds.), *Instructional Techniques to Facilitate Learning and Motivation of Serious Games* (pp. 37–58). Springer.

Marzano, R. J., & Kendall, J. S. (2007). *The New Taxonomy of Educational Objectives* (2nd ed.). Thousand Oaks: Corwin Press.

Maton, K. (2009). Cumulative and segmented learning: exploring the role of curriculum structures in knowledge-building. *British Journal of Sociology of Education*, *30*(1), 43–57.

Mayer, R. E. (2014a). *Computer Games for Learning: An Evidence-Based Approach*. Cambridge, MA, USA: MIT Press.

Mayer, R. E. (2014b). Examples of three genres of game research. In *Computer Games for Learning: An Evidence-Based Approach*. Cambridge, MA, USA: The MIT Press.

Mayer, R. E. (2016). The role of metacognition in STEM games and simulations. In H. F. O'Neil, E. L. Baker, & R. S. Perez (Eds.), *Using Games and Simulations for Teaching and Assessment: Key Issues* (pp. 183–205). New York: Routledge.

McCarthy, K. S., Jacovina, M. E., Snow, E. L., Guerrero, T. A., & McNamara, D. S. (2017). iSTART therefore I understand: But metacognitive supports did not enhance comprehension gains. In E. André, R. Baker, X. Hu, M. M. T. Rodrigo, & B. Du Boulay (Eds.), *International Conference on Artificial Intelligence in Education* (pp. 201–211). Springer.

McCormick, C. B., Dimmitt, C., & Sullivan, F. R. (2013). Metacognition, learning, and instruction. In W. M. Reynolds, G. E. Miller, & I. B. Weiner (Eds.), *Handbook of Psychology, Volume 7: Educational Psychology* (2nd ed., pp. 69–97). Wiley.

McKenney, S., & Reeves, T. C. (2012). *Conducting Educational Design Research*. Abingdon, UK: Routledge.

McNamara, D. S. (2009). Self-explanation and metacognition. In D. J. Hacker, J. Dunlosky, & A. C. Graesser (Eds.), *Handbook of Metacognition in Education* (pp. 60–81). Routledge.

McQuiggan, S., & Hoffmann, K. (2008). Examining self-regulated learning in a narrative-centered learning environment: An inductive approach to modeling metacognitive monitoring. *Proceedings of the ITS'08 Workshop on Metacognition and Self-Regulated Learning in Educational Technologies*, 51–60.

Meijer, J., Sleegers, P., Elshout-Mohr, M., Van Daalen-Kapteijns, M., Meeus, W., & Tempelaar, D. (2013). The development of a questionnaire on metacognition for students in higher education. *Educational Research*, *55*(1), 31–52.

Merriënboer, J. J. G. Van, & Bruin, A. B. H. De. (2019). Cue-based facilitation of self-regulated learning: A discussion of multidisciplinary innovations and strategies. *Computers in Human Behavior*, *100*, 384–391.

Molenaar, I., Boxtel, C. A. M. Van, & Sleegers, P. J. C. (2011). Metacognitive scaffolding in an innovative learning arrangement. *Instructional Science*, *39*(6), 785–803.

Moser, S., Zumbach, J., & Deibl, I. (2017). The effect of metacognitive training and prompting on learning success in simulation-based physics learning. *Science Education*, *101*, 944–967.

Moshman, D. (2018). Metacognitive theories revisited. *Educational Psychology Review*, *30*, 599–606.

Muijs, D., Kyriakides, L., Werf, G. Van Der, Creemers, B., Timperley, H., & Earl, L. (2014). State of the art – Teacher effectiveness and professional learning. *School Effectiveness and School Improvement*, *25*(2), 231–256.

Nadolny, L., Valai, A., Cherrez, N. J., Elrick, D., Lovett, A., & Nowatzke, M. (2020). Examining the characteristics of game-based learning: A content analysis and design framework. *Computers & Education*, *156*, 103936.

Narciss, S., Proske, A., & Koerndle, H. (2007). Promoting self-regulated learning in web-based learning environments. *Computers in Human Behavior*, *23*(3), 1126–1144.

Nebel, S., Schneider, S., Beege, M., & Rey, G. D. (2017). Leaderboards within educational videogames: The impact of difficulty, effort and gameplay. *Computers & Education*, *113*, 28–41.

Nelson, T. O., & Narens, L. (1990). Metamemory: A theoretical framework and new findings. In *The Psychology of Learning and Motivation* (pp. 125–173). Academic Press.

Nelson, T. O., & Narens, L. (1994). Why investigate metacognition? In J. Metcalfe & A. P. Shimamura (Eds.), *Metacognition: Knowing about knowing* (pp. 1–25). Cambridge, MA, USA: MIT Press.

Nerial. (2016). Reigns. Devolver Digital.

Nietfeld, J., & Shores, L. R. (2011). Self-regulation within game-based learning environments. In L. Annetta & S. C. Bronack (Eds.), *Serious Educational Game Assessment* (pp. 19–42). Sense Publishers.

Novak, K. (2017). It takes a guild – Social metacognition and collaborative creation of a learning organization: Massively multiplayer online game. In A. Stricker, C. Calongne, B. Truman, & F. Arenas (Eds.), *Integrating an Awareness of Selfhood and Society into Virtual Learning* (pp. 198–224). IGI Global.

O'Rourke, E., Haimovitz, K., Ballwebber, C., Dweck, C. S., & Popović, Z. (2014). Brain Points: A growth mindset incentive structure boosts persistence in an Educational game. In *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems* (pp. 3339–3348).

Oguz, A., & Sahin, I. (2011). Literature Review on Metacognition and its Measurement. *Procedia Social and Behavioral Sciences*, *15*, 3731–3736.

Ohtani, K., & Hisasaka, T. (2018). Beyond intelligence: a meta-analytic review of the relationship among metacognition, intelligence, and academic performance. *Metacognition and Learning*, *13*, 179–212.

Osman, M. E., & Hannafin, M. J. (1992). Metacognition research and theory: Analysis and implications for instructional design. *Educational Technology Research and Development*, *40*(2), 83–99.

Ouellette, M. A. (2019). "I'm controlling and composing": The role of metacognition in The Incredible Machine. *InVisible Culture*, *30*.

Panadero, E. (2017). A review of self-regulated learning: Six models and four directions for research. *Frontiers in Psychology*, *8*, 422.

Panadero, E., & Järvelä, S. (2015). Socially shared regulation of learning: A review. *European Psychologist*, *20*(3), 190–203.

Pannese, L., Morosini, D., Moore, A., & Pammer, V. (2012). User models and affective metacognitive scaffolding for adaptive games. In P. Felicia (Ed.), *Proceedings of the 6th European Conference on Games Based Learning* (pp. 649–652). Cork, Ireland: Academic Conferences.

Paras, B., & Bizzocchi, J. (2005). Game, motivation, and effective learning: An integrated model for educational game design. In *Proceedings of DiGRA 2005 Conference: Changing Views: Worlds in Play.*

Paris, S. G., & Winograd, P. (1990). How metacognition can promote academic learning and instruction. In B. F. Jones & L. Idol (Eds.), *Dimensions of Thinking and Cognitive Instruction* (pp. 15–51). Routledge.

Pawar, S., Tam, F., Plass, J. L., & Pawar, S. (2019). Emerging design factors in game-based learning: Emotional design, musical score, and game mechanics design. In J. L. Plass, R. E. Mayer, & B. D. Homer (Eds.), *Handbook of Game-Based Learning* (pp. 347–365). Cambridge, MA, USA: MIT Press.

Peffers, K., Tuunanen, T., Rothenberger, M. A., & Chatterjee, S. (2007). A design science research methodology for information systems research. *Journal of Management Information Systems ISSN:*, *24*(3), 45–77.

Peña-Ayala, A. (Ed.). (2015). *Metacognition: Fundaments, Applications, and Trends*. Springer.

Pieschl, S. (2009). Metacognitive calibration — An extended conceptualization and potential applications. *Metacognition and Learning*, *4*, 3–31.

Pintrich, P. R. (2000). The role of goal orientation in self-regulated learning. In M. Boekaerts & P. R. Pintrich (Eds.), *Handbook of Self-Regulated Learning* (pp. 13–39). Academic Press.

Pintrich, P. R. (2002). The role of metacognitive knowledge in learning, teaching, and assessing. *Theory into Practice*, *41*(4), 219–225.

Pintrich, P. R., Smith, D. A. F., Garcia, T., & McKeachie, W. J. (1993). Reliability and predictive validity of the motivated strategies for learning questionnaire (MSLQ). *Educational and Psychological Measurement*, *53*, 801–813.

Pintrich, P. R., Wolters, C. A., & Baxter, G. P. (2000). Assessing metacognition and self-regulated learning. In G. Schraw & J. C. Impara (Eds.), *Issues in the Measurement of Metacognition*. Lincoln, NE, USA: Buros Center for Testing.

Plass, J. L., Homer, B. D., & Kinzer, C. K. (2015). Foundations of game-based learning. *Educational Psychologist*, *50*(4), 258–283.

Plass, J. L., Homer, B. D., Mayer, R. E., & Kinzer, C. K. (2019). Theoretical foundations of game-based and playful learning. In J. L. Plass, R. E. Mayer, & B. D. Homer (Eds.), *Handbook of Game-Based Learning* (pp. 3–24). Cambridge, MA, USA: The MIT Press.

Plomp, T. (2013). Educational design research: An introduction. In T. Plomp & N. Nieveen (Eds.), *Educational Design Research* (pp. 10–51). Enschede: SLO.

Prensky, M. (2003). Digital game-based learning. *Computers in Entertainment*, *1*(1), 21–24.

Proulx, J.-N., Romero, M., & Arnab, S. (2017). Learning mechanics and game mechanics under the perspective of self- determination theory to foster motivation in digital game based learning. *Simulation & Gaming*, *48*(1), 81–97.

Przybylski, A. K., Rigby, C. S., & Ryan, R. M. (2010). A motivational model of video game engagement. *Review of General Psychology*, *14*(2), 154–166.

Puustinen, M., & Pulkkinen, L. (2001). Models of self-regulated learning: A review. *Scandinavian Journal of Educational Research*, *45*(3), 269–286.

Raybourn, E. M. (2009). Intercultural competence game that fosters metacognitive agility and reflection. In A. A. Ozok & P. Zaphiris (Eds.), *Online Communities* (pp. 603–612). Springer-Verlag.

Redström, J. (2011). Some notes on program/experiment dialectics. In *Nordic Design Research Conference*. Helsinki: Aalto University.

Rhodes, M. G. (2019). Metacognition. *Teaching of Psychology*, *46*(2), 168–175.

Ricker, A. A., & Richert, R. A. (2021). Digital gaming and metacognition in middle childhood. *Computers in Human Behavior*, *115*, 106593.

Rieber, L. P. (1996). Seriously considering play. *Eudcational Technology Research and Development*, *44*(2), 43–58.

Roll, I., Aleven, V., McLaren, B. M., Ryu, E., Baker, R. S. J. d., & Koedinger, K. R. (2006). The help tutor: Does metacognitive feedback improve students' help-seeking actions, skills and learning? In *International Conference on Intelligent Tutoring Systems* (pp. 360–369). Springer.

Romainville, M. (1994). Awareness of cognitive strategies: The relationship between university students' metacognition and their performance. *Studies in Higher Education*, *19*(3), 359–366.

Romero, M., Usart, M., Ott, M., Earp, J., De Freitas, S., & Arnab, S. (2012). Learning through playing for or against each other? Promoting collaborative learning in digital game based learning. In *European Conference on Information Systems 2012 Proceedings*.

Ryan, R. M., & Deci, E. L. (2000). Self-determination theory and the facilitation of intrinsic motivation, social development, and well-being. *American Psychologist*, *55*(1), 68–78.

Ryan, R. M., Rigby, C. S., & Przybylski, A. (2006). The motivational pull of video games: A self-determination theory approach. *Motivation and Emotion*, *30*(4), 347–363.

Sabourin, J. L., Shores, L. R., Mott, B. W., & Lester, J. C. (2013). Understanding and predicting student self-regulated learning strategies in game-based learning environments. *International Journal of Artificial Intelligence in Education*, *23*(1–4), 94–114.

Salen, K., & Zimmerman, E. (2004). *Rules of Play: Game Design Fundamentals*. Cambridge, MA, USA: MIT Press.

Sanchez, E. (2017). Competition and collaboration for game-based learning: A case study. In P. Wouters & H. Van Oostendorp (Eds.), *Instructional Techniques to Facilitate Learning and Motivation of Serious Games* (pp. 161–184). Springer.

Sandoval, W. A. (2004). Developing learning theory by refining conjectures embodied in educational designs. *Educational Psychologist*, *39*(4), 213–223.

Sandoval, W. A. (2014). Conjecture mapping: An approach to systematic educational design research. *Journal of the Learning Sciences*, *23*(1), 18–36.

Sandoval, W. A., & Bell, P. (2004). Design-based research methods for studying learning in context. *Educational Psychologist*, *39*(4), 199–201.

Scheel, A. M., Tiokhin, L., Isager, P. M., & Lakens, D. (2021). Why hypothesis testers should spend less time testing hypotheses. *Perspectives on Psychological Science*, *16*(4), 744–755.

Schell, J. (2019). *The Art of Game Design - A Book of Lenses*. AK Peters/CRC Pres.

Schellings, G., & Van Hout-Wolters, B. H. A. M. (2011). Measuring strategy use with self-report instruments: Theoretical and empirical considerations. *Metacognition and Learning*, *6*, 83–90.

Schneider, W. (2008). The development of metacognitive knowledge in children and adolescents: Major trends and implications for education. *Mind, Brain, and Education*, *2*(3), 114–121.

Schoenfeld, A. H. (1987). What's all the fuss about metacognition? In A. H. Schoenfeld (Ed.), *Cognitive Science and Mathematics Education* (pp. 189–215). Lawrence Erlbaum Associates.

Schoenfeld, A. H. (2009). Instructional research and the improvement of practice. In J. D. Bransford, D. J. Stipek, N. . Vye, L. M. Gomez, & D. Lam (Eds.), *The Role of Research in Educational Improvement* (pp. 161–188). Cambridge, MA, USA: Harvard Education Press.

Schön, D. A. (1983). *The Reflective Practitioner: How Professionals Think in Action*. Basic Books.

Schraw, G. (1998). Promoting general metacognitive awareness. *Instructional Science*, *26*, 113–125.

Schraw, G. (2009). Measuring metacognitive judgments. In D. J. Hacker, J. Dunlosky, & A. C. Graesser (Eds.), *Handbook of Metacognition in Education* (pp. 415–429). New York, NY, USA: Routledge.

Schraw, G., Crippen, K. J., & Hartley, K. (2006). Promoting self-regulation in science education: Metacognition as part of a broader perspective on learning. *Research in Science Education*, *36*(1–2), 111–139.

Schraw, G., & Dennison, R. S. (1994). Assessing metacognitive awareness. *Contemporary Educational Psychology*, *19*, 460–475.

Schraw, G., Horn, C., Thorndike-Christ, T., & Bruning, R. (1995). Academic goal orientations and student classroom achievement. *Contemporary Educational Psychology*, *20*(3), 359–368.

Schraw, G., & Moshman, D. (1995). Metacognitive theories. *Educational Psychology Review*, *7*(4), 351–371.

Schwarzer, R., & Jerusalem, M. (1995). Generalized self-efficacy scale. In J. Weinman, S. Wright, & M. Johnston (Eds.), *Measures in health psychology: A user's portfolio. Causal and control beliefs* (pp. 35–37).

Schwonke, R., Ertelt, A., Otieno, C., Renkl, A., Aleven, V., & Salden, R. J. C. M. (2013). Metacognitive support promotes an effective use of instructional resources in intelligent tutoring. *Learning and Instruction*, *23*(1), 136–150.

Scoresby, J., & Shelton, B. E. (2014). Reflective redo from the point of error: Implications for after action review. *Simulation & Gaming*, *45*(4–5), 666–696.

Shelton, B. E., & Scoresby, J. (2011). Aligning game activity with educational goals: Following a constrained design approach to instructional computer games. *Educational Technology Research and Development*, *59*(1), 113–138.

Shimamura, A. P. (2008). A neurocognitive approach to metacognitive monitoring and control. In J. Dunlosky & R. A. Bjork (Eds.), *Handbook of Memory and Metamemory: Essays in Honor of Thomas O. Nelson* (pp. 373–390). New York: Psychology Press.

Sitzmann, T. (2011). A meta-analytic examination of the instructional effectiveness of computer-based simulation games. *Personnel Psychology*, *64*(2), 489–528.

Slussareff, M., Braad, E., Wilkinson, P., & Strååt, B. (2016). Games for learning. In R. Dorner, S. Gobel, M. D. Kickmeier-Rust, M. Masuch, & K. Zweig (Eds.), *Entertainment Computing and Serious Games*. Springer.

Snow, E. L. (2015). *Promoting Self-Regulation and Metacognition through the Use of Online Trace Data*.

Snow, E. L., Jacovina, M. E., & McNamara, D. S. (2015). Promoting metacognition within a game-based environment. In *International Conference on Artificial Intelligence in Education* (pp. 864–867). Springer.

Snow, E. L., McNamara, D. S., Jacovina, M. E., Allen, L. K., Johnson, A. M., Perret, C. A., … Weston, J. L. (2015). Promoting metacognitive awareness within a game-based intelligent tutoring system. In C. Conati, N. Heffernan, A. Mitrovic, & M. Verdejo (Eds.), *AIED 2015: Artificial Intelligence in Education* (pp. 786–789).

Squire, K. D. (2006). From content to context: Videogames as designed experience. *Educational Researcher*, *35*(8), 19–29.

Steiner, C. M., Kickmeier-Rust, M. D., Mattheiss, E., Göbel, S., & Albert, D. (2012). Balancing on a high wire: Adaptivity, a key factor of future learning games. In M. D. Kickmeier-rust & D. Albert (Eds.), *An Alien's Guide to Multi-Adaptive Educational Computer Games*. Informing Science Press.

Steinkuehler, C., & Tsaasan, A. M. (2019). Sociocultural foundations of game-based learning. In J. L. Plass, R. E. Mayer, & B. D. Homer (Eds.), *Handbook of Game-Based Learning* (pp. 177-). Cambridge, MA, USA: The MIT Press.

Sternberg, R. J. (2001). Metacognition, abilities, and developing expertise: What makes an expert student? In H. J. Hartman (Ed.), *Metacognition in Learning and Instruction* (pp. 274–260). Springer.

Stokes, D. (1997). *Pasteur's Quadrant: Basic Science and Technological Innovation*. Washington, DC: Brookings Institution Press.

Sun-Lin, H.-Z. S., & Chiou, G.-F. (2017). Effects of comparison and game-challenge on sixth graders' algebra variable learning achievement, learning attitude, and meta-cognitive awareness. *Eurasia Journal of Mathematics, Science and Technology Education*, *13*(6), 2627–2644.

Sung, H.-Y., Hwang, G. J., Lin, C. J., & Hong, T. W. (2017). Experiencing the analects of Confucius: An experiential game-based learning approach to promoting students' motivation and conception of learning. *Computers & Education*, *110*, 143–153.

Taito. (1978). Space Invaders. Atari.

Tang, Y., Shetty, S., Bielefeldt, T., Jahan, K., Henry, J., & Hargrove, S. K. (2012). Sustain City - A cyberinfrastructure-enabled game system for science and engineering design. *Journal of Computational Science Education*, *3*(1).

Tang, Y., Shetty, S., & Chen, X. (2012). Educational effectiveness of virtual reality games promoting metacognition. In *ASEE Annual Conference and Exposition*. American Society for Engineering Education.

Tarricone, P. (2011). *The Taxonomy of Metacognition*. Hove, East Sussex, UK: Psychology Press.

Taub, M., Azevedo, R., Bradbury, A. E., & Mudrick, N. V. (2020). Self-regulation and reflection during game-based learning. In J. L. Plass, R. E. Mayer, & B. D. Homer (Eds.), *Handbook of Game-Based Learning* (pp. 239–262). Cambridge, MA, USA: MIT Press.

Taub, M., Mudrick, N. V., Azevedo, R., Millar, G. C., Rowe, J. P., & Lester, J. (2016). Using multi-level modeling with eye-tracking data to predict metacognitive monitoring and self-regulated learning with Crystal Island. In A. Micarelli, J. Stamper, & K. Panourgia (Eds.), *Intelligent Tutoring Systems (ITIS 2016)* (pp. 240–246). Cham, Switzerland: Springer.

Ter Vrugte, J., & De Jong, T. (2017). Self-explanations in game-based learning: from tacit to transferable knowledge. In P. Wouters & H. Van Oostendorp (Eds.), *Instructional Techniques to Facilitate Learning and Motivation of Serious Games* (pp. 141–159). Springer.

Ter Vrugte, J., De Jong, T., Vandercruysse, S., Wouters, P., Van Oostendorp, H., & Elen, J. (2015). How competition and heterogeneous collaboration interact in prevocational game-based mathematics education. *Computers & Education*, *89*, 42–52.

Tremblay, M. A., Blanchard, M., Taylor, S., Pelletier, L. G., & Villeneuve, M. (2009). Work extrinsic and intrinsic motivation scale: Its value for psychology research. *Canadian Journal of Behavioural Science*, *41*(4), 213–226.

Tüysüz, C. (2009). Effect of the computer based game on pre-service teachers' achievement, attitudes, metacognition and motivation in chemistry. *Scientific Research and Essays*, *4*(8), 780–790.

Usart, M., Romero, M., & Almirall, E. (2011). Impact of the feeling of knowledge explicitness in the learners' participation and performance in a collaborative game based learning activity. In M. Ma, M. Fradinho Oliveira, & J. Madeiras Pereira (Eds.), *Serious Games Development and Applications* (pp. 23–35). Springer.

Van den Akker, J., Branch, R. M., Gustafson, K., Nieveen, N., & Plomp, T. (1999). *Design Approaches and Tools in Education and Training*. (J. Van den Akker, R. M. Branch, K. Gustafson, N. Nieveen, & T. Plomp, Eds.). Springer.

Van Der Meij, H., Leemkuil, H., & Li, J. L. (2013). Does individual or collaborative self-debriefing better enhance learning from games? *Computers in Human Behavior*, *29*(6), 2471–2479.

Van Eck, R., & Hung, W. (2010). A taxonomy and framework for designing educational games to promote problem solving. In *Videogame Cultures & the Future of Interactive Entertainment Annual Conference of the Inter-Disciplinary.net Group*. Oxford, United Kingdom.

Van Oostendorp, H., & Wouters, P. (2017). Narration-based techniques to facilitate game-based learning. In P. Wouters & H. Van Oostendorp (Eds.), *Instructional Techniques to Facilitate Learning and Motivation of Serious Games* (pp. 103–117). Springer.

Van Overschelde, J. P. (2008). Metacognition: Knowing about knowing. In J. Dunlosky & R. A. Bjork (Eds.), *Handbook of Metamemory and Memory* (pp. 44–71). New York: Psychology Press.

Van Staalduinen, J.-P., & De Freitas, S. (2011). A game-based learning framework linking game design and learning outcomes. In M. S. Khyne (Ed.), *Learning to Play: Exploring the Future of Education with Video Games* (pp. 29–54). New York: Peter Lang.

Vandercruysse, S., & Elen, J. (2017). Towards a game-based learning instructional design model focusing on integration. In P. Wouters & H. van Oostendorp (Eds.), *Instructional Techniques to Facilitate Learning and Motivation of Serious Games* (pp. 17–35).

Veenman, M. V. J. J. (2011a). Alternative assessment of strategy use with self-report instruments: A discussion. *Metacognition and Learning*, *6*, 205–211.

Veenman, M. V. J. J. (2011b). Learning to self-monitor and self-regulate. In R. E. Mayer & P. Alexander (Eds.), *Handbook of Research on Learning and Instruction* (pp. 197–218). New York: Routledge.

Veenman, M. V. J. J., Elshout, J. J., & Busato, V. K. (1994). Metacognitive mediation in learning with computer-based simulations. *Computers in Human Behavior*, *10*, 93–106.

Veenman, M. V. J. J., Kerseboom, L., & Imthorn, C. (2000). Test anxiety and metacognitive skillfulness: Availability versus production deficiencies. *Anxiety, Stress, and Coping*, *13*, 391–412.

Veenman, M. V. J. J., & Spaans, M. A. (2005). Relation between intellectual and metacognitive skills: Age and task differences. *Learning and Individual Differences*, *15*, 159–176.

Veenman, M. V. J. J., Van Hout-Wolters, B. H. A. M., & Afflerbach, P. (2006). Metacognition and learning: conceptual and methodological considerations. *Metacognition and Learning*, *1*, 3–14.

Verpoorten, D., Castaigne, J.-L., Westera, W., & Specht, M. (2014). A quest for meta-learning gains in a physics serious game. *Education and Information Technologies*, *19*, 361–374.

Vlachopoulos, D., & Makri, A. (2017). The effect of games and simulations on higher education: a systematic literature review. *International Journal of Educational Technology in Higher Education*, *14*(1), 22.

Wang, C. Y. (2015). Exploring general versus task-specific assessments of metacognition in university chemistry students: A multitrait–multimethod analysis. *Research in Science Education*, *45*(4), 555–579.

Wang, M. C., Haertel, G. D., & Walberg, H. J. (1990). What influences learning? A content analysis of review literature. *Journal of Educational Research*, *84*(1).

Wensveen, S., & Matthews, B. (2014). Prototypes and prototyping in design research. In P. A. Rodgers & J. Yee (Eds.), *The Routledge Companion to Design Research* (pp. 262–276). Abingdon, UK: Taylor & Francis.

White, B. Y., & Frederiksen, J. (2005). A theoretical framework and approach for fostering metacognitive development. *Educational Psychologist*, *40*(4), 211–223.

White, B. Y., & Frederiksen, J. R. (1998). Inquiry, modeling, and metacognition: Making science accessible to all students. *Cognition and Instruction*, *16*(1), 3–118.

Winne, P. H. (2010). Bootstrapping learner's self-regulated learning. *Psychological Test and Assessment Modeling*, *52*(4), 472–490.

Winne, P. H., & Hadwin, A. F. (1998). Studying as self-regulated learning. In D. J. Hacker, J. Dunlosky, & A. C. Graesser (Eds.), *Metacognition in Educational Theory and Practice* (pp. 277–304). Lawrence Erlbaum Associates.

Winne, P. H., & Hadwin, A. F. (2013). nStudy: Tracing and supporting self-regulated learning in the internet. In R. Azevedo & V. Aleven (Eds.), *International Handbook of Metacognition and Learning Technologies* (pp. 293–208). Springer.

Winne, P. H., & Jamieson-Noel, D. (2002). Exploring students' calibration of self reports about study tactics and achievement. *Contemporary Educational Psychology*, *27*, 551–572.

Winne, P. H., & Nesbit, J. C. (2009). Supporting self-regulated learning with cognitive tools. In D. J. Hacker, J. Dunlosky, & A. C. Graesser (Eds.), *Handbook of Metacognition in Education* (pp. 271–289). Routledge.

Winne, P. H., Nesbit, J. C., Kumar, V., Hadwin, A. F., Lajoie, S. P., Azevedo, R., & Perry, N. E. (2006). Supporting self-regulated learning with gStudy software: The learning kit project. *Technology, Instruction, Cognition & Learning*, *3*, 105–113.

Winters, F. I., Greene, J. A., & Costich, C. M. (2008). Self-regulation of learning within computer-based learning environments: A critical analysis. *Educational Psychology Review*, *20*(4), 429–444.

Wouters, P., Van Nimwegen, C., Van Oostendorp, H., & Van der Spek, E. D. (2013). A meta-analysis of the cognitive and motivational effects of serious games. *Journal of Educational Psychology*, *105*(2), 249–265.

Wouters, P., & Van Oostendorp, H. (2013). A meta-analytic review of the role of instructional support in game-based learning. *Computers & Education*, *60*(1), 412–425.

Wouters, P., & Van Oostendorp, H. (2017). Overview of instructional techniques to facilitate learning and motivation of serious games. In P. Wouters & H. Van Oostendorp (Eds.), *Instructional Techniques to Facilitate Learning and Motivation of Serious Games* (pp. 1–16). Cham, Switzerland: Springer.

Yeh, Y., Chen, M., Hung, P., & Hwang, G. (2010). Optimal self-explanation prompt design in dynamic multi-representational learning environments. *Computers & Education*, *54*(4), 1089–1100.

Young, M. F., Slota, S., Cutter, A. B., Jalette, G., Mullin, G., Lai, B., … Yukhymenko, M. (2012). Our princess is in another castle: A review of trends in serious gaming for education. *Review of Educational Research*, *82*(1), 61–89.

Zainuddin, Z., Kai, S., Chu, W., Shujahat, M., & Jacqueline, C. (2020). The impact of gamification on learning and instruction: A systematic review of empirical evidence. *Educational Research Review*, *30*.

Zepeda, C. D., Hlutkowsky, C. O., Partika, A. C., & Nokes-Malach, T. J. (2018). Identifying teachers' supports of metacognition through classroom talk and its relation to growth in conceptual learning. *Journal of Educational Psychology*, *111*(3), 522–541.

Zepeda, C. D., Richey, J. E., Ronevich, P., & Nokes-Malach, T. J. (2015). Direct instruction of metacognition benefits adolescent science learning, transfer, and motivation: An in vivo study. *Journal of Educational Psychology*, *107*(4), 954–971.

Zheng, L., Li, X., Zhang, X., & Sun, W. (2019). The effects of group metacognitive scaffolding on group metacognitive behaviors, group performance, and cognitive load in computer-supported collaborative learning. *The Internet and Higher Education*, *42*(19), 13–24.

Zimmerman, B. J. (1989). A social cognitive view of self-regulated academic learning. *Journal of Educational Psychology*, *81*(3), 329–339.

Zimmerman, B. J. (1990). Self-regulating academic learning and achievement: The emergence of a social cognitive perspective. *Educational Psychology Review*, *2*, 173–201.

Zimmerman, B. J., & Campillo, M. (2003). Motivating self-regulated problem solvers. In J. E. Davidson & R. J. Sternberg (Eds.), *The Psychology of Problem Solving* (pp. 233–262). Cambridge University Press.

Zimmerman, B. J., & Schunk, D. H. (1989). *Self-Regulated Learning and Academic Achievement: Theory, Research, and Practice*. New York: Springer-Verlag.

Zimmerman, B. J., & Tsikalas, K. E. (2005). Can computer-based learning environments (CBLEs) be used as self-regulatory tools to enhance learning? *Educational Psychologist*, *40*(4), 267–271.

Zimmerman, J., & Forlizzi, J. (2008). The role of design artifacts in design theory construction. *Artifact*, *II*(1), 41–45.

Zimmerman, J., & Forlizzi, J. (2014). Research through design in HCI. In J. Olson & W. Kellogg (Eds.), *Ways of Knowing in HCI*. New York: Springer.

Zimmerman, J., Forlizzi, J., & Evenson, S. (2007). Research through design as a method for interaction design research in HCI. In *Proceedings of the SIGCHI conference on Human factors in computing systems* (pp. 493–502).

Zumbach, J., Rammerstorfer, L., & Deibl, I. (2020). Cognitive and metacognitive support in learning with a serious game about demographic change. *Computers in Human Behavior*, *103*, 120–129.