

DAFTAR PUSTAKA

- Abbie H. Brown and Timothy D. Green. *The Essential of Instructional Design. Connecting Fundamental Principles With Process and Practice.* (New York, Taylor and Francis: 2016). H. 121
- Abruscato J. and DeRosa D, *Teaching Children Science, A Discovery Approach.* Seventh Edition. Pearson International Edition; 2010.
- Afsari Amiati, Jaslin Ikhsan. The effect of virtual reality laboratory on conceptual understanding in electrolytes and non-electrolytes. *Journal of Education and Learning (EduLearn)* Vol. 13, No. 3, August 2019, pp. 362~369 ISSN: 2089-9823 DOI: 10.11591/edulearn.v13i3.13572
- Ahmad Dasuki Mohd Hawari dan Azlin Iryani Mohd Noor. Project Based Learning Pedagogical Design in STEAM Art Education. *Asian Journal of University Education (AJUE)* Volume 16, Number 3, October 2020. <http://doi.org/10.24191/ajue.v16i3.11072>
- An, Y. (2021). A history of instructional media, instructional design, and theories. *International Journal of Technology in Education (IJTE)*, 4(1), 1-21. <https://doi.org/10.46328/ijte.35>
- Anita Woolfolk. *Educational Psychology. Active Learning Edition.* Bagian Kesepuluh. Edisi Kedua, Yogyakarta, Pustaka Pelajar, 2010.
- Anita Woolfolk. *Educational Psychology. Fourteenth.* Global Edition. Harlow, Pearson Education, Inc, 2021.
- Anita Woolfolk. *Educational Psychology. Thirteenth Edition.* Global Edition. Harlow, Pearson Education, Inc, 2016
- Anna Davis, Anne Disney, and Debra Smith. *Chemistry In Focus Year 12,* South Melbourne. Nelson, Cengage Company, 2018;
- Arends, R. I. (2012). *Learning to Teach,* 9th ed. New York: Mc. Graw Hill.
- Azizah Saad Al Rowais. Effectiveness of Marzano's Dimensions of Learning Model in the Development of Creative Thinking Skills among Saudi Foundation Year Students. *World Journal of Education* Vol. 9, No. 4; 2019. <https://doi.org/10.5430/wje.v9n4p49>

- Balemen, N., & Özer Keskin, M. (2018). The effectiveness of Project-Based Learning on science education: A meta-analysis search. *International Online Journal of Education and Teaching (IOJET)*, 5(4), 849-865. <http://iojet.org/index.php/IOJET/article/view/452/297>
- Bates, A.W. (1995). *Technology, open learning and distance education*. London: Routledge. (ERIC Document Reproduction Service No. ED 407 597)
- Blanche w. O'Bannon, and Kathleen Puckett. *Preparing to Use Technology. A Practical Guide to Curriculum Integration*. Second Edition. Boston, Pearson Education, Inc, 2010.
- Branch M. R. *Instructional Design : The Addie Approach*. New York, Springer, 2009.
- Brandon Goodman. *Project-Based Learning. A dynamic approach to teaching in which students explore real-world problems and challenges, simultaneously developing 21st Century skills while working in small collaborative groups*. *Educational Psychology*, Fall. 2010
- Bruce Joyce, Marsha Weil and Emily Calhoun. *Models of Teaching*. Ninth Edition. Boston, Pearson Education, Inc, 2015.
- Bybee Rodger. W, Powell Carlson Janet, and Trowbridge Leslie W, *Teaching Secondary School Science. Strategies For Developing Scientific Literacy*. Ninth Edition. Upper Saddle River, New Jersey Columbus, Ohio.
- Catherine C. Schifter and Melissa E. Markaridian Selverian. *Teaching Learning With Technology. Beyond Constructivism*. New York, Routledge, Taylor and Francis Group, 2010.
- Charles M. Reigeluth and Yunjo An. *Merging The Instructional Design Process With Learner-Centered Theory. The Holistic 4D Model*. (New York, Routledge, Taylor and Francis Group: 2021)., h. 61
- Chris Kyriacou. *Effective Teaching in Schools. Theory and Practice*. Third Edition, Stanley Thornes (Publishers) Ltd 1997
- Claire R. Kilbane and Natalir B. Milman. *Teaching Models. Designing Instruction for 21st Century Learners*. Boston, Pearson Education, Inc. 2014.
- Constantinos Nicolaou, Maria Matsiola and George Kalliris. *Technology-Enhanced Learning and Teaching Methodologies through Audiovisual Media* Constantinos Nicolaou. *Education Sciences*, (9)3. 196-<https://dx.doi.org/10.3390/educsci9030196>.

- Dai, N.V.; Trung, V.Q.; Tiem, C.V.; Hao, K.P.; Anh, D.T.V. Project-Based Teaching in Organic Chemistry through Blended Learning Model to Develop Self-Study Capacity of High School Students in Vietnam. *Educ. Sci.* **2021**, *11*, 346. <https://doi.org/10.3390/educsci11070346>
- Dale H. Schunk. *Learning Theories and Educational Perspective*. Sixth Edition. Boston, Pearson Education, Inc, 2012.
- David Moursund. *Project-Based Learning Using Information Technology*. This is the first edition (1999) of the book. Copyright © David Moursund, 2016.
- Dedi Saputra, Burcu Gürbüz, Haryani Haryani. Android-based Animation for Chemical Elements and Experiments as an Interactive Learning Media. *Journal of Science Learning* 2021.4(2).185-191. <https://doi.org/10.17509/jsl.v4i2.28787>.
- Dennis G. Wiseman and Gilbert Hunt. *Best Practice In Motivation and Management In The Classroom*. Third Edition. © 2014 by CHARLES C THOMAS • PUBLISHER, LTD.
- Derya Basera, M. Yasar Ozden and Hasan Karaarslan. Collaborative project-based learning: an integrative science and technological education project. *Research in Science & Technological Education*, 2017 <http://dx.doi.org/10.1080/02635143.2016.1274723>
- Derek Rowntree. *Preparing Materials for Open Distance and Flexible Learning. An Action Guide for Teacher and Trainers*. London, Kogan Page: 1994.
- Dewi Salma Prawiradilaga, *Prinsip Desain Pembelajaran*. Jakarta, Kencana, Prenada Media Group. 2012.
- Diana Laurillard. *Teaching as a Design Science. Building Pedagogical Patterns for Learning an Technology*, New York and London. Routledge, Taylor and Francis Group, 2012.
- Dick, Walter., Carey, Lou., and Carey, James O. "The Systematic Design of Instruction", Eight Edition. New Jersey: Pearson, (2015).
- Dina Tsybulsky dan Yulia Muchnik-Rozanov. The development of student-teachers professional identity while team-teaching science classes using a project-based learning approach: A multi-level analysis. *Teaching and Teacher Education* (2001). <https://doi.org/10.1016/j.tate.2018.12.006>
- Dina Tsybulsky, Michal Gatenio-Kalush, Musa Abu Ganem & Etty Grobgeld (2020): Experiences of preservice teachers exposed to project-based

learning, *European Journal of Teacher Education*, DOI: <https://doi.org/10.1080/02619768.2019.1711052>

Dina Tsybulsky, Yulia Muchnik-Rozanov. The development of student-teachers' professional identity while team-teaching science classes using a project-based learning approach: A multi-level analysis. *Teaching and Teacher Education* 79 (2019) 48e59. <https://doi.org/10.1016/j.tate.2018.12.006>

Dirk Ifenthaler, & Marc Egloffstein. Development and Implementation of a Maturity Model of Digital Transformation. *Tech Trends*. Association for Educational Communications & Technology 2019, <https://doi.org/10.1007/s11528-019-00457-4>

Donald R. Cruickshank, Deborah B. Jenkins, and Kim K. Metcalf. *Thre Act of Teaching*. Fourth Edition. New York, Mc Graw Hill-Education, 2006

Eggen Paul & Kauchak, Don. *Strategi dan Model Pembelajaran : Mengajarkan konten dan keterampilan berpikir*. edisi 6. Jakarta. PT. Indeks, 2012.

Emily C. Miller, Emily Reigh, Leema Berland, and Joseph Krajcik. Supporting Equity in Virtual Science Instruction Through Project-Based Learning: Opportunities and Challenges in the Era of COVID-19. *Journal of Science Teacher Education*. <https://doi.org/10.1080/1046560X.2021.1873549>

Gary Pan, Poh-Sun Seow, Grace Koh, (2019) "Examining learning transformation in projectbased learning process", *Journal of International Education in Business*, <https://doi.org/10.1108/JIEB-06-2018-0022>

Gary R. Morrison, Steven M. Ross, Jennifer R. Morrison and Howard K. Kalman. *Designing Effective Instruction*. Eight Edition. Jhon Willey and Son, Inc, 2013.

Gerlach, V.S, and Ely, D. P. (1980). *Teaching and Media : A systematic approach* (2nd ed). Englewood Cliffs, N.J.: Prentice-Hall. Reprinted with permission of Prentice-Hall)

Gillian Kidman, Niranjana Casinader. *Inquiry-Based Teaching and Learning across Disciplines Comparative Theory and Practice in Schools*. Basingstoke, England: Palgrave Macmillan: 2017)., h. 23

Glenn V. Lo, Michael A. Janusa. *Chemistry. The Core Concept*. Kona. Publishing and Media Group, 2010.

Hart, J. (2019). Interdisciplinary project-based learning as a means of developing employability skills in undergraduate science degree. *The Journal of*

Teaching and Learning for Graduate Employability. programs. Journal of Teaching and Learning for Graduate Employability, 10(2), 50–66. <https://ojs.deakin.edu.au/index.php/jtlge/>

Heather Wolpert-Gawron. DIY Project Based Learning for Math and Science. (New York, London, Routledge, Taylor & Francis and Group: 2016)., h. 2

Hergenhahn, R. B. Olson, and H. Mathews. Theories of Learning. Seventh Edition. Pearson Education, Inc 2008. <http://dx.doi.org/10.1016/j.chb.2016.11.056>

Hulya Julie Yazici. Empirical Research. Project-Based Learning for Teaching Business Analytics in the Undergraduate Curriculum. Decision Sciences Journal of Innovative Education. August 2020. <https://doi.org/10.1111/dsji.12219>

J. Michael Spector. Foundations of Educational Technology. Second Edition. New York and London, Routledge, Taylor and Francis Group, 2016

Jane Krauss dan Suzie Boss. Thinking Through Project Based Learning. Guiding Deeper Inquiry. (California, Corwin A Sage Company : 2013), h. ix- xiii

Jane L. Howland David H. Jonassen, Rose M. Marra. Meaningful Learning with Technology. Fourth Edition. Harlow, Pearson Education, Inc, 2014

Janna Inkinen, Christopher Klager, Kalle Juuti, Barbara Schneider, Katariina Salmela-Aro, Joseph Krajcik, & Jari Lavonen. High school students' situational engagement associated with scientific practices in designed science learning situations. Science Education. 2020;1–26 <https://sci-hub.st/10.1002/sce.21570>

Jeannette Musengima, Edwige Kampire, Philothère Ntawiha. Factors Affecting Secondary Schools Students' Attitudes toward Learning Chemistry: A Review of Literature. EURASIA Journal of Mathematics, Science and Technology Education, 2021, 17(1), em1931. <https://doi.org/10.29333/ejmste/9379>

Jhon Larmer, Jhon Merghendoller, suzie boss. Setting The Standard for Project Based Learning. A Proven Approach to Rigorous Classroom Instruction. (Beauregard, St Alexandria, USA, ASCD: 2015)., h. 45-46

Jhon S. Phillips, Victor s, Strojak, and Cheryl Wistrom. Chemistry Concept & Applications. Colombus, Ohio, Glencoe/McGraw- Hill Companies, 2002

Jhon. W. Santrock. Educational Psychology. Theory and Application to Fitness and Performance. Sixth Edition. New York, Mc Graw Hill-Education, 2018.

- Jill Stefaniak and Meimei Xu. An Examination of the Systemic Reach of Instructional Design Models: a Systematic Review. Tech Trends. Association for Educational Communications & Technology 2020. <https://doi.org/10.1007/s11528-020-00539-8>
- Jill Stefaniak. The Utility of Design Thinking to Promote Systemic Instructional Design Practices in the Workplace. Tech Trends, Association for Educational Communications & Technology 2019. <https://doi.org/10.1007/s11528-019-00453-8>
- Jim Knight. High Impact Instruction. A Framework For Great Teaching. California, Corwin, A sage Company, 2013
- Joan L. Green. Assistive technology in special education : resources to support literacy, communication, and learning differences. Third Edition. Waco, Texas : Prufrock Press, Inc, 2018
- John T. Moore, Richard Langley. Must Know High School Chemistry. Second Edition. New York, McGraw-Hill, 2022.
- Jos Moust, Peter Bouhuijs, Henk Schmidt. Introduction to Problem-based Learning A guide for students. Fourth Revised Edition. 2021 Noordhoff bv Groningen/Houten, the Netherlands.
- Joseph C.L. Tan, Anne Chapman. Project-Based Learning for Academically-Able Students. Sense Publishers, Rotterdam. 2016
- Joseph S. Krajcik and Charlene M. Czerniak. Teaching Science in Elementary and Middle School A Project-Based Learning Approach Fifth Edition (New York, Routledge, Taylor & Francis Group: 2018)., 2 dan 6
- Judy Lever Duffy and Jean B. Mc Donald. Teaching and Learning with Technology. Five Edition. Boston, Pearson Education, Inc 2015.
- Judy Lever Duffy, and Jean McDonald B. Teaching Learning With Technology. Fourth Edition. Boston, Pearson Education, Inc, 2011.
- Julian Hermida. Facilitating Deep Learning. Pathways to Success for University and College Teachers. Toronto and New Jersey. Apple Academic Press, 2015.
- Julie Stern, Krista Ferraro, and Juliet Mohnkern. Tools for Teaching Conceptual Understanding, Secondary. Designing Lessons and Assessments for Deep Learning. California, Corwin, A sage Company, 2017

- Junghee Choi, Ju-Ho Lee, & Booyuel Kim. How does learner-centered education affect teacher self efficacy? The case of project-based learning in Korea. *Teaching and Teacher Education* 85 (2019) 45-57. <https://doi.org/10.1016/j.tate.2019.05.005>
- Katherine Cennamo dan Debby Kalk. *Real World Instructional Design. An Iterative Approach to Designing Learning Experiences. Second Edition.* (New York, Taylor & Francis Group : 2019).
- Kay Burke. *How to Assess Authentic Learning. Fifth Edition. 5 th edition.* (California, A SAGE Company: 2009,
- Keith Ross, Liz Lakin, Janet McKechnie and Jim Baker. *Teaching Secondary Science Constructing meaning and developing understanding. Fourth edition.* (New York, Routledge: 2015),.
- Keith S Taber. *Teaching Secondary Chemistry. Second Edition.* London, Hodder Education An Hachette UK Company, 2012.
- Kenneth D. Moore. *Effective Instructional Strategies, from Theory to Practice.* California, Sage Publication, Inc, 2005
- Kilbane R. Clare and Milman B. Milman. *Teaching Models. Designing Instruction for 21st Century Learners.* Boston, Pearson Education, Inc, 2014.
- Kriswantoro, Kartowagiran, B., & Rohaeti, E. (2021). A critical thinking assessment model integrated with science process skills on chemistry for senior high school. *European Journal of Educational Research*, 10(1), 285-298. <https://doi.org/10.12973/eu-jer.10.1.285>
- Laurinda Luis D, Ana S. A, and Sofia M. *Contextualizing Teaching To Improve Learningg The Case of Science And Geograpy.* New York, Nova Science Publisher's, 2017.
- Lee Yong Tay, Thaslim Begum Aiyooob, Terence Buan Kiong Chua, Kalavani Ramachandran & Michael Yong Hwa Chia (2021): Pre-schoolers' use of technology and digital media in Singapore: entertainment indulgence and/or learning engagement?, *Educational Media International*, <https://doi.org/10.1080/09523987.2021.1908498>
- Lorin W. Anderson and David Krathwohl. *A Taxonomy for Learning, Teaching, and Assessing. Abridged Edition.* 2001 by Addison Wesley Longman, Ine.
- Lourdes Calvo, Cristina Prieto. *The teaching of enhanced distillation processes using a commercial simulator and a project-based learning approach.*

education for chemical engineers 1 7 (201 6) 65–74.
<http://dx.doi.org/10.1016/j.ece.2016.07.004>

Lynne Wyness, Fiona Dalton. The value of problem-based learning in learning for sustainability: Undergraduate accounting student perspectives. Lynne Wyness, Fiona Dalton. *Journal of Accounting Education* 0748-5751.
<https://doi.org/10.1016/j.jaccedu.2018.09.001> (Q2)

M. Atwi Suparman. *Panduan Para Pengajar dan Inovator Pendidikan. Desain Instruksional Modern*. Jakarta, Penerbit Erlangga, 2012

M. D Roblyer. *Intretgrating Educational Technology into Teaching*. Seventh Edition. Boston, Pearson Education inc, 2016

M. David Merrill. *First Principles of Instruction*. San Fransisco, Jhon & Willey Sons Inc, 2013.

M. Jenice Goldston, Laura Downey. *Your science classroom : becoming an elementary/middle school science teacher*. (Los Angeles; SAGE Publications, Inc: 2013)., h. 17

Margareth Gredler. *Learning and Instruction. Theory Into Practice*. Sixth Edition. New York, Pearson Education, Inc, 2009.

Mari Murtonen, Kieran Balloo, Editors. *Redefning Scientifc Thinking for Higher Education Higher-Order Thinking, EvidenceBased Reasoning and Research Skills*. (Switzerland, Springer Nature Switzerland AG: 2019)., h. 8

Marille Sprenger. *Brain Based Teaching*. In *Digital Age*. Beauregard St, Alexandria, ASCD, 2010.

Martin S. Silberberg. *Principles of general chemistry*. 3rd Edition. New York, McGraw Hill Company, (2013).

McDonald, J.K., & Yanchar, S. C. (2020). Towards a view of originary theory in instructional design. *Educational Technology Research and Development*, 68(2), 633-651. <https://doi.org/10.1007/s11423-019-09734-8>

Meredith T. Harris, George H. Noell, Elise B. McIver & Sarah J. Miller (2019): The effect of instructional set size on learning efficiency, *Educational Studies*, <https://doi.org/10.1080/03055698.2019.1668257>

Michael Simonson, Sharon Smaldino and Susan Zvacek. *Teaching And Learning At A Distance ; Foundations of Distances Education*.Sixth Edition (Information Age Publishing; USA 2015).,h 106

- Michael Simonson, Sharon Smaldino, and Zvacek. Teaching and Learning At A Distance. Fifth Edition. Charlotte, North Carolina. Information Age Publishing, 2012.
- Miri Barak, Shiran Yuan. A . cultural perspective to project-based learning and the cultivation of innovative thinking. *Thinking Skills and Creativity* 39 (2021) 100766. <https://doi.org/10.1016/j.tsc.2020.100766>
- Miri Barak, Shiran Yuan. A cultural perspective to project-based learning and the cultivation of innovative thinking. *Thinking Skill Creativity* (2021). <https://doi.org/10.1016/j.tsc.2020.100766>
- Moore, Kenneth D. Effective instructional strategies: from theory to practice. Fourth editon. 2015 by SAGE Publications, Inc.
- Muhamad Hugerat. How teaching science using project-based learning strategies affects the classroom learning environment. *Learning Environ Res.* (2016). <https://sci-hub.st/10.1007/s10984-016-9212-y>
- Muhammad Syafiq, Hazwan Ruslana, Muhammad Roil Bilad , Mohd Hilmi Noh, Suriati, Sufian. Integrated project-based learning (IPBL) implementation for first year chemical engineering student: DIY hydraulic jack project. *Education for Chemical Engineers,* (2021). <https://doi.org/10.1016/j.ece.2020.12.002>
- Murat Ekicia, Mukaddes Erdem. Developing Science Process Skills through Mobile Scientific Inquiry. *Thinking Skills and Creativity* 36 (2020) 100658. <https://doi.org/10.1016/j.tsc.2020.100658>
- Nainggolan, B., Hutabarat, W., Situmorang, M., & Sitorus, M. (2020). Developing Innovative Chemistry Laboratory Workbook Integrated with Project-based Learning and Characterbased Chemistry. *International Journal of Instruction*, 13(3), 895-908. <https://doi.org/10.29333/iji.2020.13359a>
- Nainggolan, B., Hutabarat, W., Situmorang, M., & Sitorus, M. (2020). Developing Innovative Chemistry Laboratory Workbook Integrated with Project-based Learning Characterbased Chemistry. *International Journal of Instruction*, 13(3), 895-908. <https://doi.org/10.29333/iji.2020.13359a>
- Nasution, W.N. (2018). The Effects of Inquiry-based Learning Approach and Emotional. *Journal of Turkish Science Education.* 15(4), 104-115 106
- Neal R. Shambaugh and Susan G Magliaro. *Instructional Design. A Systematic Approach for Reflective Practice.* Boston, Pearson Education, Inc, 2006

- Newby, T.; Stepich, D .; Lehman, J .; Russell, J .; dan Ottenbreit- Leftwich, A. (2011). *Educational Technology for teaching and learning* (4th ed) Boston: Pearson. Reprint Permission of Pearson
- Nieveen, N. (1997). *Computer support for curriculum developers: A study of the potential of computer support in the domain of formative curriculum evaluation*. Doctoral dissertation. Enschede, The Netherlands: University of Twente.
- Noelia Santamaría-Cárdaba. Families, experiments, and nature: Learning science through project-based learning. *Science Education*, (2020). <http://dx.doi.org/10.1111/ssm.12438>
- Norbert M. Seel, Thomas Lehman, Patrick Blumschein and Oleg A Podolskiy. *Instructional Design For Learning. Theoretical Foundations*. Rotterdam/Boston/Taipei. Sense Publishers, 2017.
- Outi Haatainen and Maija Aksela. Project-based learning in integrated science education: Active teachers' perceptions and practices. *International Journal on Math, Science and Technology Education*, (2021). <https://doi.org/10.31129/>
- Pambas Basil Tandika (2020): *Instructional Materials and the Development of Young Children's 21st Century Skills: Perspectives From Early Educators in Ukerewe, Tanzania*, *Journal of Research in Childhood Education*, <https://doi.org/10.1080/02568543.2020.1834473>
- Parado-Martinez, Purification., & Sanchez-Andajar, Sonia (2020). *Development of Competencies In Postgraduate Studies of Finance: A Project-Based Learning (PBL) Case Study*. *International Review of Economics Education*, 35 (2020), 100192- <https://doi:10.1016/j.iree.2020.100192>
- Patricia L. Smith and Tillman J. Ragan. *Instructional Design*. Third Edition. Jhon Willey and Sons Inc, 2005.
- Paul Eggen and Don Kauchak. *Strategies and Models for Teacher. Teaching content and Thinking Skills*. Sixth Edition. (Boston, Pearson Education, Inc: 2012)., h. 225
- Paul Gluck and Jhon King. *Physics Project Lab*. Oxford University Press, First Published, 2015
- Peggy S. Lisenbee, Jodi Pilgrim and Sheri Vasinda. *Integrating Technology In Literacy Instruction. Models and Framework for All Learner*. First

Published. New York and London, Routledge, Taylor and Francis Group, 2020

Pengyue Guo, Nadira Saab, Lysanne S. Post, Wilfried Admiraal. A review of project-based learning in higher education: Student outcomes and measures. *International Journal of Educational Research* 102 (2020) 101586. <https://doi.org/10.1016/j.ijer.2020.101586>

Peter Westwood. *What teachers Need to Know about Teaching methods*. Camberwell, Vic.: ACER Press, 2008.

Rakesh Belwal, Shweta Belwal, Azlinor Binti Sufian, and, Amal Al Badi. Project-based learning (PBL): outcomes of students' engagement in an external consultancy project in Oman. *Education þ Training* © Emerald Publishing Limited 0040-0912 <https://doi.org/10.1108/ET-01-2020-0006>

Reigeluth, M. Charles. *Instructional Design Theories and Models*. London, Lawrence Erlbaum Associates, Publisher 1983.

Reiser A. Robert and Dempsey V. John. *Trends and Issues in Instructional Design and Technology*. Fourth Edition. New York, Pearson Education, Inc, 2018.

Richard L. Arends. *Learning to Teach*. seventh edition (New York, McGraw Hill Companies, Inc: 2008).

Richard Myers. *The Basic of Chemistry*. Greenwood Press Publishing, Inc. London. 2003

Richard, L. Arends. *Learning to Teach*. Nine Edition. New York, Mc Graw Hill Companies, Inc 2012.

Richey C. Rita, Klein D. James, Tracey, W. Monica. *The Instructional Design Knowledge Base Theory, Research, and Practice*. New York, Routledge (2011).

Ritesh Kumar Shukla. A new systematic approach of teaching and learning of forensic science for interdisciplinary students: A step towards renovating the forensic education system. *Forensic Science International: Synergy* 3 (2021) 100146. <https://doi.org/10.1016/j.fsisyn.2021.100146>

Robert G. Mortimer. *Physical Chemistry*. Third Edition. Fifth Edition. Elsevier, Inc, Amsterdam. 2008.

Robert M. Capraro, Mary Margaret Capraro, USA and James R. Morgan, USA *STEM Project-Based Learning An Integrated Science, Technology,*

Engineering, and Mathematics (STEM) Approach Second Edition. (Rotterdam, Sense Publisher: 2013), h. 2

Robert M. Gagne, Walter W. Wager, Khatarine C. Golas, and Jhon M. Keller. Principles of Instructional Design. Fifth Edition, Australia, Thomson and Wadsworth, 2005

Robert Maloy, Ruth-Ellen Verock-O' Lauhlin, Sharon Edwards, Beverly Woolf. Transforming Learning with New Technologies. Third Edition. (Boston, Pearson Education, Inc: 2017).

Robert Maribe Branch dan Tonia A. Dousay. Survey of Instructional Design, Fifth Edition (USA, Association For Educational Communication and Technology; 2015), h. 24

Rodger W. Bybee, Janet Carlson Powell and Leslie W. Trowbridge. Teaching Secondary School Science; Strategies for Developing Scientific Literacy. Ninth Edition. (New Jersey. Pearson Education, Inc: 2008)., h. 3

Royce Kimmons & Secil Caskurlu. The Students' Guide to Learning Design and Research.ed. tech. books.org, 2020

R. P. Pathak and Jagdeesh Chaudhary. Educational Technology. Delhi, Chennai, Chandigarh, Pearson Education, Inc, 2012.

Rusmini, Suyono, & Agustini, R. (2021). Analysis of science process skills of chemical education students through Self-project Based Learning (SjBL) in the Covid-19 pandemic era. *Journal of Technology and Science Education*, 11(2), 371-387. <https://doi.org/10.3926/jotse.1288>

S. K. Mangal dan Shubra Mangal. Learning and Teaching. New Delhi, PHI Learning, Private Limited, 2019.

Sam Redding. Instructional Design. This topic brief is one in a series on personalized learning prepared for Conversations with Innovators, 2018. Center on Innovations in Learning. Temple University. Philadelphia

Samsudin, M. A., Jamali, S. M., Zain, A. N. M., & Ale Ebrahim, N. (2020). The Effect of STEM Project Based Learning on Self-Efficacy among High-School Physics Students. *Journal of Turkish Science Education*, 17 (1), 94-108. <https://doi.org/10.36681/tused.2020.15>

Santamaria-Cardaba, Noelia. Families, Experiments, and Nature: Learning Science Through Project Based Learning. *School Science and Mathematics*, 120(8), 467-476. <https://doi.org/10.1111/ssm.12438>

- Santyasa, I. W., Agustini, K., & Pratiwi, N. W. E. (2021). Project Based E-Learning and Academic Procrastination of Students in Learning Chemistry. *International Journal of Instruction*, 14(3), 909-928. <https://doi.org/10.29333/iji.2021.14353a>
- Santyasa, I. W., Rapi, N. K., & Sara, I. W. W. (2020). Project Based Learning and Academic Procrastination of Students in Learning Physics. *International Journal of Instruction*, 13(1), 489-508. <https://doi.org/10.29333/iji.2020.13132a>
- Sarı, U., Duygu, E., Şen, Ö. F., & Kırındı, T. (2020). The Effect of STEM Education on Scientific Process Skills and STEM Awareness in Simulation Based Inquiry Learning Environment. *Journal of Turkish Science Education*, 17(3), 387-405.
- Sariyatun., Suryani, N., Sutimin, L. A., Abidin, N. F., & Akmal, A. (2021). The Effect of Digital Learning Material on Students' Social Skills in Social Studies Learning. *International Journal of Instruction*, 14(3), 417-432. <https://doi.org/10.29333/iji.2021.14324a>
- Scott Barge. Principles of Problem and Project Based Learning The Aalborg PBL. (Denmark. Prepared for: Aalborg University Harvard University: 2010)., h. 6-7
- Shanshan Lu, Hualin Bi and Xiufeng Liu. A phenomenographic study of 10th grade students' understanding of electrolytes. *Chemistry Education and Practice*. The Royal Society of Chemistry 2018. <http://doi.org/10.1039/c8rp00125a>
- Sharon E. Smaldino, Deborah L. Lowther, and Cliff Mims. *Instructional Technology and Media for Learning*. Twelfth Edition. (New York, Pearson Education, Inc: 2019).
- Sharon E. Smaldino, Deborah L. Lowther, and James D. Russel, *Instructional Technology and Media For Learning*. (Upper Saddle River, New Jersey: Pearson New International Edition, 2015).
- Sharon E. Smaldino, Deborah L. Lowther, and James D. Russel, *Instructional Technology and Media For Learning*. Ninth Edition (Upper Saddle River, New Jersey: Pearson Education, Inc, 2011).
- Shun Yu Tan, Katja Holtta-Otto, and Franklin Anariba (2019). Development and Implementation of Design-Based Learning Opportunities for Students To Apply Electrochemical Principles in a Designette. *Journal of Chemical Education*., (), acs.jchemed.8b00756-. doi. [10.1021/acs.jchemed.8b00756](https://doi.org/10.1021/acs.jchemed.8b00756)

- Simon Rees, Douglas Newton. Creative Chemists Strategies for Teaching and Learning. Advances in Chemistry Education Series, London. 2020.
- Sims, R., and Jones, D. (2002). Continuous improvement through shared understanding: Reconceptualizing instructional design for online, pp. 1-10. In Winds of change in the sea of learning: Proceedings of the 19th Annual Conference of the Australasian Society for Computers in Learning in Tertiary Education (ASCILITE), Auckland, New Zealand, 8-11 December 2002, UNITEC Institute of Technology, Auckland, N.Z.
- Soares Diana, Carvalho, Oaula Diaz, Diana (2020). Desaining Learning Outcomes in Higher Education Curricula. International Journal of Art & Design Education, 39(2), 392-404. <https://doi.org/10.1111/jade.12286>
- Steven S. Zumdahl, Susan L. Zumdahl, Donald J. DeCoste. World of Chemistry. Houghton Mifflin Company, Boston. 2007.
- Subhalakshmi Nagarajan and Tina Overton. Promoting Systems Thinking Using Project- and Problem-Based Learning. Journal of Chemical Education. Journal of Chemical Education. <http://dx.doi.org/10.1021/acs.jchemed.9b00358>
- Surender S. Dahiya. Educational Technology. Towards Better Teacher Performance. New Delhi, Shipra Publications, 2009
- Sutiani, A., Situmorang, M., & Silalahi, A. (2021). Implementation of an Inquiry Learning Model with Science Literacy to Improve Student Critical Thinking Skills. International Journal of Instruction, 14(2), 117-138. <https://doi.org/10.29333/iji.2021.1428a>
- Syahri, W., Muhaimin., Syamsurizal., & Rusdi, M. (2021). Development of an Instructional Design Model for Physical Chemistry based on Multiple Representatives. International Journal of Instruction, 14(2), 517-534. <https://doi.org/10.29333/iji.2021.14229a>
- Syahril, Nabawi, R.A., & Safitri, D. (2021). Students' perceptions of the project based on the potential of their region: A Project-based learning implementation. Journal of Technology and Science Education, 11(2), 295-314. <https://doi.org/10.3926/jotse.1153>
- Syarifah Rahmiza Muzana, Jumadi, Insih Wilujeng, Bagus Endri Yanto, Abdul Aziz Mustamin. E-STEM project-based learning in teaching science to increase ICT literacy and problem solving. International Journal of Evaluation and Research in Education (IJERE), (2021). DOI: 10.11591/ijere.v10i4.21942

- T. Gomez-del Rio, J. Rodriguez. Design and assessment of a project-based learning in a laboratory for integrating knowledge and improving engineering design skills. *Education for Chemical Engineers* 40 (2022) 17–28. <https://doi.org/10.1016/j.ece.2022.04.002>
- Taina Makkonen, Kirsi Tirri, and Jari Lavonen. Engagement in Learning Physics Through Project- Based Learning: A Case Study of Gifted Finnish Upper-Secondary-Level Students. *Journal of Advanced Academics* 1–32. 2021. [sagepub.com/journals-permissions](https://www.sagepub.com/journals-permissions) DOI:10.1177/1932202X211018644 journals.sagepub.com/home/joaa
- Tekerek, M. & Tekerek, B. Integrated Instructional Material and Development Processes. *Turkish Journal of Education*, 7(3),156-168. <https://doi.org/10.19128/turje.362491>
- Terry L. Contant, Anne L. Tweed, Joel E. Bass, and Arthur A. Carin. *Teaching Science Through Inquiry –Based Instruction*. (New York, Pearson Education, Inc: 2018)., h. 5, 8 dan 33
- Thomas H. Estes dan Susan L. Mintz. *Instruction A Model Approach*. Seventh Edition (New Jersey, Pearson Education, Inc: 2016), h. 37.
- Tingting Li, Emily Miller, I.-Chien Chen, Kayla Bartz , Susan Codere & Joseph Krajcik (2020): The relationship between teacher’s support of literacy development and elementary students’ modelling proficiency in project-based learning science classrooms, *Education* 3-13, DOI: <https://doi.org/10.1080/03004279.2020.1854959>
- Todd Stanley. *Project Based Learning. For Gifted Students. A Step-by-Step Guide to PBL and Inquiry In The Classroom*. New York and London. Taylor and Francis Group. First Published 2021
- Uğur Sari, Esra Duygu, Ömer Faruk Sen, dan Talip Kirindi.. The Effects of STEM Education on Scientific Process Skills and STEM Awareness in Simulation Based Inquiry Learning Environment. *Journal of TURKISH SCIENCE EDUCATION* Volume 17, Issue 3, September 2020
- Ummah, S. K., In’am, A., & Azmi, R. D. (2019). Creating manipulatives: improving students’ creativity through project-based learning. *Journal on Mathematics Education*, 10 (1), 93-102.
- Walter R. Borg, Meredith D. Gall, and Joyce P. Gall. *Educational Research Eight Edition* (New York: Longman: 2008), h. 589

Walter R. Borg and Meredith D. Gall. Educational Research Fourth Edition (New York: Longman: 1983), h. 772

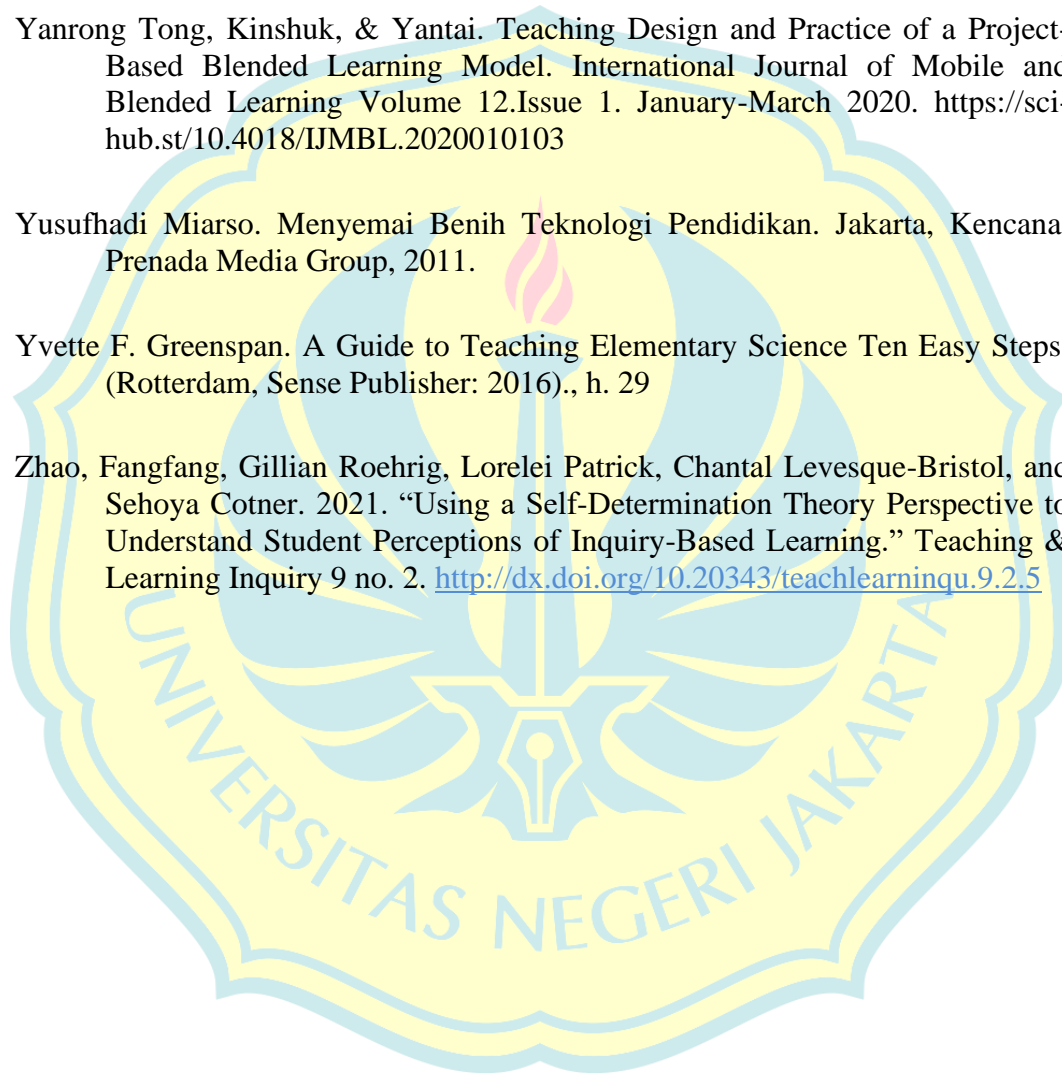
William J. Rothwell and H.C Kazanas, Mastering The Instructional Design Process, A Systematic Process, third edition (San Fransisco: Printed In The United State of America, 2004.

Yanrong Tong, Kinshuk, & Yantai. Teaching Design and Practice of a Project-Based Blended Learning Model. International Journal of Mobile and Blended Learning Volume 12.Issue 1. January-March 2020. <https://scihub.st/10.4018/IJMBL.2020010103>

Yusufhadi Miarso. Menyemai Benih Teknologi Pendidikan. Jakarta, Kencana, Prenada Media Group, 2011.

Yvette F. Greenspan. A Guide to Teaching Elementary Science Ten Easy Steps. (Rotterdam, Sense Publisher: 2016)., h. 29

Zhao, Fangfang, Gillian Roehrig, Lorelei Patrick, Chantal Levesque-Bristol, and Sehoya Cotner. 2021. "Using a Self-Determination Theory Perspective to Understand Student Perceptions of Inquiry-Based Learning." Teaching & Learning Inquiry 9 no. 2. <http://dx.doi.org/10.20343/teachlearningqu.9.2.5>



Intelligentia - Dignitas