

## REFRENSI

- Abidin, Y. (2014). *Desain Sistem Pembelajaran Dalam Konteks Kurikulum 2013*. Bandung: Refika Aditama
- Adedoyin, O., & Mokobi, T. (2013). Using IRT Psychometric Analysis In Examining the Quality of Junior Certificate Mathematics Multiple Choice Examination Test Items. *International Journal of Asian Social Science*, 3(4), 992-1011.
- Agusti, M., Ginting, S. R. & Solikhin, F. (2021). Pengembangan E-modul Kimia Menggunakan Exe-Learning Berbasis Learning Cycle 5E pada Materi Larutan Penyangga. *Jurnal Pendidikan dan Ilmu Kimia*, 5(2), 198-205.
- Aisyah, S., Sari, R. & Wijayanti, I. E. (2019). Learning the solve e-module to stimulate critical thinking skill student. *Jounal of Chemistry Education Research*, 3(1), 29-34.
- Amilyana, A. S., Kirana, T., Noer, M. S., Raharjo, A teaching material based on science, environment, technology, and society to improve student's critical thinking skills: synchronous and asynchronous learning during covid-19 pandemic, *International Journal of Recent Educational Research*, 2(4), 372-391, doi : 10.46245/ijorer.v2i4.109
- Anderson, L. W. & Krathwohl, D. R. (2001). *A Taxonomy fo Learning, Teaching, and Assesing; A revision of Bloom's Taxonomy od Education Objectives*. New York: Addison Wesley Lonman Inc.
- Anggraini, N.P., Budiyono, & Pratiwi, H. (2018). Cognitive Difference Between Male and Female Students in Higher Order Thinking Skills. *Journal of Physics: Conf. Series* 1188. doi:10.1088/1742-6596/1188/1/012006.
- Asmuni, Sarwanto, & Masykuri,M. (2019). Pengembangan modul IPA terpadu SMP/MTS kelas VIII berbasis SETS untuk meningkatkan kemampuan berpikir kritis siswa pada tema makanan dan kesehatan tubuh, *SPEKTRA: Jurnal Kajian Pendidikan Sains*, 5(1), 30-43.
- Asyhar, N., Yusuf, I., & Widyaningsih, S. W. (2017). Pengembangan Media Pembelajaran Fisika Berbasis Multimedia Interaktif Pada Materi Gerak Parabola di SMA. *Prosiding Seminar Nasional*, 3(1).
- Asyhar, R., Afrida, & Widiastiningsih, R. (2015). Pengembangan e-modul menggunakan software 3D Pageflip Professional untuk Pembelajaran Ikatan Kimia Kelas X SMA Islam Al Falah Kota Jambi. *Journal of Indonesian Society of Integrated Chemistry*, 7(1), 18-24.
- Baeti, S. N., Binadja, A., & Susilaningsih, E. (2014). Pembelajaran Berbasis Praktikum Bervisi SETS untuk Meningkatkan Keterampilan Laboratorium

- dan Penguasaan Kompetensi. *Jurnal Inovasi Pendidikan Kimia*, 8(1), 1260-1270.
- Ballard, J., & Mooring, S. R., (2021). Cleaning our world through green chemistry: introducing high school student to the principles of green chemistry using a case based learning module. *Journal of Chemical Education*, 98, 1290-129, doi : 10.1021/acs.jchemed.9b0312
- Bencze, L., Pouliot, C., Pedretti, E., Simonneaux, L., Simonneaux, J. & Zeidler, D. (2019). SAQ, SSI and STSE Education: Defending And Extending “Science-In-Context”. *Cultural Studies of Science Education*, doi: 10.1007/s11422-019-09962-7.
- Binadja, A. (1999). Pendidikan SETS (Science, Environment, Technology, and Society) Penerapannya pada Pengajaran (SETS) Education Coverage Science and Non Science.
- Borg and Gall. (1983). Educational Research; An Introduction. *Longman Inc*, New York & London.
- Carson, S. (2015). Targeting Critical Thinking Skills in a First-Year UndergraduateResearch Course. *Journal of Microbiology & Biology Education*, 16(2), 148-156.
- Chiang, C. L., & Lee, H. (2016). The Effect of Project-Based Learning on Learning Motivation and Problem-Solving Ability of Vocational High School Students. *International Journal of Information and Education Technology*, 6 (9), 709-712.
- Chowdhury, M. A. (2016).The integration of science-technology-society/science-technology-society-environment and socio-scientific-issues for effective science education and science teaching. *Electronic Journal of Science Education*, 20(5), 20-38.
- Creswell, J. W. (2012). *Educational Research: Planning, conducting, and evaluating quantitative and qualitative research*. New York : Pearson.
- Daryanto. 2013. *Menyusun Modul: Bahan Ajar Untuk Persiapan Guru Dalam Mengajar*. Yogyakarta: Gava Media.
- Depdiknas. 2008. *Penulisan Modul*. Jakarta: Depdiknas.
- Dietrich, N., Kentheswaran, K., Ahmadi, A., Teychene, J., Bessiere, Y., Alfenore, S., ...Hebard, G. (2020). Attempts, successes, and failures of distance learning in the time of covid-19. *Journal of Chemical Education*, 97(9), 2448-2457.
- Durak, G. (2017). Using social learning networks (SLNs) in higher education: Edmodo through the lenses of academics. *International Review of Research*

- in Open and Distributed Learning*, 18(1), 84-109. doi: 10.19173/irrodl.v18i1.2623
- Duwiri, Y. I. & Siregar, T. (2016). Pengembangan Modul Kimia Topik Sifat Larutan Asam Basa Kelas XI IPA dalam Meningkatkan Kemampuan Belajar Mandiri Siswa di SMA Negeri 1 Teminabuan Kabupaten Sorong Selatan. *Jurnal Ilmu Pendidikan Indonesia*, 4(1), 54-64. Doi: 10.31957/jipi.v4i1.368
- Facione, (2013). *Critical Thinking: What It Is and Why It Counts*. Millbrae CA : Measured Reasons and The California Academic Press.
- Ghazivakili, Z., Nia, R. N., Panahi, F., Karimi, M., Gholsorkhi, H., & Ahmadi, Z. (2014). The role of critical thinking skill and learning styles of university students in their academic performance. *Journal of Advances in Medical Education & Professionalism*, 2(3), 95-102.
- Hamutoglu, N. B., Gemikonakli, O., & Gezgin D. M. (2019). A study of the effectiveness of edmodo on preservice classroom teachers' views of web-assisted collaborative learning environments, sense of classroom community, and perceived learning. *Science Education International*. 30(2), 128-137. doi : 10.33828/sei.v30.i2.6
- Harefa, N., Sanga, L., & Purba, L. (2019). The development of chemistry practicum e-module based on simple-practice. *Jurnal Pendidikan Kimia*, 11(3), 107-115. doi:10.24114/jpkim.v11i3.15739
- Harta, J., Rasuh, N. T., Seriang, A. (2020). Using HOTS-Based Chemistry National Exam Questions to Map the Analytical Abilities of Senior High School Students. *International Journal of Instruction*, 3(3), 143-148.
- Hasibuan, V. R., Simorangkir, M., & Sudrajat, A. (2020). The development of E-module biomolecules for enzyme integration of project based learning models in accordance with the KKNI curriculum. *Proceeding of the 5th Annual International Seminar on Transformative Education and Educational Leadership* (pp. 36-41).
- Hendryadi. (2014). Conten Validity (Validitas Isi). *Teorionline Personal Paper*, 1(1), 1-5.
- Holme, T. A. (2020), Journal of chemical education call for papers: Special issue on insights gained while teaching chemistry in the time of covid-19. *Journal of Chemical Education*, 97, 1226-1227. doi:10.1021/acs.jchemed.0c00378.
- Huriaty, D. (2015). Metode Kalibrasi dan Desain Tes Berdasarkan Teori Respons Butir (IRT). *Math Didactic: Jurnal Pendidikan Matematika*, 1(3), 191-199.

- Ilmiyati, N., Maladona A., Rahmawati, D. & Rahman, N. A. (2020). Effort to facilitate environmental awareness through science, environment, technology, and society (SETS). *International Journal of scientific & Technology Research*, 9(3), 1-3.
- Indah, P. (2020). Development of HOTS (High Order Thinking Skill) oriented learning through discovery learning model to increase the critical thinking skill of high school student. *International Journal of Chemistry Education Research*, 4(1), 26-32. Doi: 10.20885/ijcer.vol4.iss1.art4
- Irwansyah, F. S., Lubab, I., Farida, I., & Ramdhani, M. A. (2017). Designing interactive electronic module in chemistry lesson. *Internasional Conferense on Mathematics and Science Educations Series 895* (pp:1-8). Doi:10.1088/1742-6596/895/1/012009.
- Istarani. (2012). *58 Model Pembelajaran Inovatif*. Medan: Penerbit Media Persada.
- Juliandini, G., Situmorang, M., & Muchtar Z. (2020). An innovative chemistry learning material with project and multimedia to developed students thinking skill on the teaching of anion analysis. *AISTELL 5<sup>th</sup>*. (pp. 97-103).
- Juniar, A., Siregar, J., Silalahi, A., Suyanti, R.D., & Mistryanto, P. (2019). Pengembangan bahan ajar reaksi redoks berorientasi PBL (Problem Based Learning), *Talenta Conference Series 02 2019*, doi:10.32734/st.v2i1.354.
- Kemendikbud. (2013). *Modul Pelatihan Implementasi Kurikulum 2013*. Jakarta: Kementerian Pendidikan dan Kebudayaan RI.
- Lee T. & Osman K. Interactive multimedia module in the learning of electrochemistry: Effects on students' understanding and motivation. *SciVerse Science Direct*. 2012; 46, 1323-1327. doi:10/1016/j.sbspro.2012.05.295
- Lee, A., & Griffin, C. C., (2021). Exploring online learning modules for teaching universal design for learning (UDL): preservice teachers' lesson plan development and implementation. *Journal of Education for Teaching*, 47(3), 411-425, doi : 10.1080/02607476.2021.1884494
- Lee, S. M. (2014). The relationships between higher order thinking skill, cognitive density, and social presence in online learning. *Internet and Higher Education*, 21, 41-52. doi : 10.1016/j.iheduc.2013.12.002
- Mahmud, Silalahi, A., Komisia, F., & Marpongahtun. (2021). Kesan Minat Kewirausahaan Siswa SMA pada Pembelajaran Sistem Koloid Melalui Pendekatan Model Hubungan Antara Pengetahuan dan Pengajaran (CTL) Dengan Metode Eksperimen dan Demonstrasi. *Research in Chemistry and Chemistry Education*, 1-16.

- Maknun, J., Busono, T. & Surasetja, I. (2017). Envisioning science environment technology and society. *Paper presented ICEVE 306*. doi:10.1088/1757-899X/306/1/012064
- Martalina, D. S., Situmorang, M., & Sudrajat, A. The Development of Innovative Learning Material with Integration of Project and Multimedia for the Teaching of Gravimetry. *AISTEEL CONFERENCE*, 735-740.
- Mazidah, Erna, M., & Anwar, L. (2020). Developing an interactive chemistry e-module for salt hydrolysis material to face the Covid-19 pandemic, *Journal of Physics: Conference Series* 1655 (pp. 1-8). doi:10.1088/1742-6596/1655/1/012051
- Mudlofar, A. (2012). *Applikasi Pengembangan Kurikulum Tingkat Satuan Pendidikan dan Bahan Ajar dalam Pendidikan Islam*, Rajawali Pers: Jakarta.
- Mudlofar, Ali. 2012. *Applikasi Pengembangan Kurikulum Tingkat Satuan Pendidikan dan Bahan Ajar dalam Pendidikan Islam*. Jakarta: Rajawali Pers
- Mulyasa. 2010. *Menjadi Guru Profesional (Menciptakan Pembelajaran Kreatif dan Menyenangkan)*. Bandung Rosda.
- Munadi, Yudhi. 2013. *Media Pembelajaran (Sebuah Pendekatan Baru)*. Jakarta: Referensi.
- Ningsih, N. L. E., I. W. Karyasa & I. N. Suardana. (2015). Pengembangan Perangkat Pembelajaran Kimia dengan Pemahaman Konsep Kimia Siswa. *E-Journal Program Pasccasarjana Universitas Pendidikan Ganesha Program*
- Novilia, L., Iskandar, S. M., & Fajaroh, F. (2016) The effectiveness of colloid module based on guided inquiry approach to increase students' cognitive learning outcomes. *International Journal of Education*, 9(1), doi : 10.17509/ije.v9i1.3713
- Nurina, D.L., & Retnawati, H. (2015). Keefektifan Pembelajaran Menggunakan Pendekatan Problem Posing dan Pendekatan Open Ended Ditinjau dari HOTS. *Phytagoras. Jurnal Pendidikan Matematika*, 10(2), 129 – 136.
- Nuvitalia, D., Novita, M., Suciati, S., & Cholifah, N. (2020). Teaching-learning of phosphor-based LEDs using science, environment, technology and society (SETs) approach. *International Conference on Education and Technology (ICETECH)*. doi:10.1088/1742-6596/1464/1/012007
- Oktari, B., Susilawati, & Copriady J. (2020). Implementation of Oriented literated science-module to improve critical skills thinking about in hydrocarbon material. *Journal of Educational Sciences*, 4(2), 347-356, doi : 10.31258/jes.4.2.p347-356

- Özdemir, A. S., Yıldız, F., & Yıldız, S. G. (2015). The Effect of Project Based Learning In Ratio Propurtion and Percentage Unit on Mathematics Succes and Attitude. *Europen Journal Of Science And Mathematics Education*, 3 (1), 1-13
- Padmanaba, I. K. G., Kirna, I. M. & Sudria, I. B. Ny. (2018). Pengembangan media pembelajaran interaktif kimia koloid berbantuan computer untuk siswa SMA. *Jurnal Pendidikan Kimia Indonesia*, 2(1). 1-10.
- Pedretti, E. & Nazir, J. (2011). Currents in STSE education: Mapping a complex field, 40 years. *Science Education*, 95, 601-626. doi:10.1002/sce.20435.
- Pedretti, E. & Nazir, J. (2015). Science, Technology and Society (STS). In R. Gunstone (Ed.). *Encyclopedia of science education* (pp. 932-935). Dordrect: Springer, doi : 10.1007/978-94-007. 2150-0.
- Pereira, M.A.C., Baretto, M.A.M., & Pazeti, M. (2017). Application of Project-Based Learning in The First Year of an Industrial Enginnering Program: Lesson Learned and Challanges". Production, 27 (spe), e20162238, doi:10.1590/0103-6513.223816.
- Pradita Y., Mulyani, B., & Redjeki, T. (2015). Penerapan Model Pembelajaran Project Based Learning Untuk Meningkatkan Prestasi Belajar dan Kreativitas Siswa pada Materi Pokok Sistem Koloid Kelas XI IPA Semester Genap Madrasah Aliyah Negeri Klaten Tahun Pelajaran 2013/2014. *Jurnal Pendidikan Kimia*, 1 (4), 89-96.
- Prasojo, P., Prastowo, T. & Ibrahim M. (2020). SETS based science teaching materials with guided inquiry learning model to improve learning outcomes in optical geometry materials. *International Journal of Multicultural and Multireligious Understanding*, 7 (6), 10-18. doi : 10.18415/ijmmu.v7i6.1651
- Prastowo, A. (2015). *Panduan Kreatif Membuat Bahan Ajar Inovatif*. Yogyakarta: DIVA Press.
- Puriwat, W. &Tripopsakul, S. (2020). Preparing for industry 4.0-will youths have enough essential skills?: An Evidence from Thailand. *International Journal of Instruction*, 13(3), 89-104, doi:10.29333/iji.2020.1337a
- Rahayu, W. (2015). *Model Pembelajaran Kompleks*. Yogyakarta: Deepublish.
- Rahmansyah, R., Darmana, A. & Silalahi, A. (2020). Edmodo-based e-learning media development in the field of science. *Journal of Physics:Conf.Series* 1485(2020)012033. doi:10.1088/1742-6596/1485/1/012033.
- Retnawati, H., Hadi, S., & Nugraha, A. C. (2016). Vocational High School Teachers' Difficulties in Implementing the Assessment in Curriculum 2013 in Yogyakarta Province of Indonesia. *International Journal of Instruction*, 9(1), 33-48.

- Romayanti, C., Sundaryono, A. & Handayani, D. (2020). Pengembangan E-Modul Kimia Berbasis Kemampuan Berpikir Kreatif dengan Menggunakan Kvisoft Flipbook Maker. *Jurnal Pendidikan dan Ilmu Kimia*, 4(1), 51-58.
- Rosana, D., Kadarisman, N. & Suryadarma, I. G. P. (2019). SETS best practice model: growth optimization and productivity of organic food plants through IASMUCPEC application. *Jurnal Pendidikan IPA Indonesia*, 8(2), 267-278. Doi: 10.15294/jpii.v8i2.19248.
- Rufii, R. 2015. Developing Module on Constructivist Learning Strategies to Promote Students' Independence and Performance. *International Journal of Education*, 7(1), 18-28.
- Ruseffendi. 1998. *Statistika Dasar untuk Penelitian Pendidikan*. Bandung : Andira Bandung
- Sahoo, S., & Mohammed, C. A. (2018). Fostering critical thinking and collaborative learning skills among medical students through a research protocol writing activity in the curriculum. *J Med Educ*, 30(2), 109–118. doi: 10.3946/kjme.2018.86.
- Santyasa, I.W., Agustini, K., & Pratiwi, N. W. E. (2021). Project based e-learning and academic procrastination of student in learning chemistry. *International Journal of Instruction*, 14(3), 909-928, doi : 10.29333/iji.2021.14353a
- Sari, Y. Cahyaningtyas, A. P., Maharani, M. M., Yustiana, S., & Kusumadewi, R. F. (2019). Meningkatkan kemampuan menyusun soal IPA berorientasi HOTS bagi guru sekolah dasar gugus pandanaran dabin IV UPTD Semarang Tengah. *Indonesian Journal of Community Services*, 1(2), 175-183.
- Setiawan, J., Sudrajat, A., Aman, & Kumalasari, D. (2021). Development of higher order thinking skill assessment instruments in learning. *International Journal of Evaluation and Research in Education (IJERE)*, 10(2), 545-552, doi : 10.11591/ijere.v10i2.20796
- Setiawati, Wiwik dkk. (2018). *Buku Penilaian Beroerorientasi Higher Order Thinking Skills*. Jakarta: Direktorat Jendral Guru dan Tenaga Kependidikan Kementerian Pendidikan dan Kebudayaan.
- Sinaga, M., Situmorang, M. & Hutabarat, W. (2019). Implementation of Innovative Learning Material to Improve Students Competence on Chemistry. *Indian Journal of Pharmaceutical Education and Research*, 53(1), 28-41. Doi: 10.5530/ijper.53.1.5
- Sinaga, M., Situmorangm M. & Hutabarat, W. (2019). Implementation of innovative learning material to improve students competence on chemistry.

- Indian Journal of Pharmaceutical Education*, 53 (1), 28-41. doi : 10.5530/ijper.53.1.5
- Sitorus, M., Sudrajat, A., & Lestari, M. (2015). Pengembangan bahan ajar inovatif dan interaktif melalui pendekatan saintifik pada materi redoks dan elektrokimia. *Jurnal Pendidikan Kimia*, 7(2), 61-71.
- Situmorang, M., Sinaga, M., Purba, J., Daulay S.I., Simorangkir, M., Sitorus, M., & Sudrajat, A. (2018). Implementation of innovative chemistry learning material with gided tasks to improve students' competence. *Journal of Baltic Science Education*, 17(4), 535-550. doi:10.33225/jbse/18.17.535.
- Sofan, A. & Ahmadi, L. K. (2010). *Konstruksi Pengembangan Pembelajaran*. Jakarta: Prestasi Pustaka.
- Stoetzel, L., & Shedrow, S. (2020). Coaching our coaches: How online learning can address the gap in preparing K-12 instructional coaches. *Teaching and Teacher Education*, 88, 1-11.
- Sudjana, N. & Rivai. A. (2013). *Media Pengajaran*. Bandung: Sinar Baru Algesindo.
- Sugiyono. (2017). *Metode Penelitian Pendidikan Pendekatan Kuantitatif, Kualitatif, dan R&D*. Bandung: Alfabeta.
- Sukiman. 2011. *Pengembangan Media Pembelajaran*. Yogyakarta : Pedagogia.
- Sumarmi, Bachri, S., Irawan, L. Y., Aliman, M. (2021). E-modul in blended learning: its impact on students' disaster preparedness and innovation in developing learning media, 14(4), 187 – 208, doi : 10.2933/iji.2021.14412a
- Sumarti, S. S., Nuswowitz, M. & Kurniawati, E. (2018). Meningkatkan keterampilan proses sains melalui pembelajaran koloid dengan lembar kerja praktikum berorientasi chemo-entrepreneurship. *Jurnal Phenomenon*, 8(2), 175-184
- Sumintono, B., & Widhiarso, W. (2015). *Aplikasi Model Rasch untuk Penelitian Ilmu-Ilmu Sosial*. Cimahi: Trim Komunikata Publishing House.
- Supendi, A. & Nurjanah. (2020). Society 5.0: is it high-order thinking?. The 2<sup>nd</sup> International Conference on Elementary Education, 2(1), 1054-1059.
- Susilana, R. & Riyana, C. (2009). *Media Pembelajaran: Hakikat, Pengembangan, Pemanfaatan, dan Penilaian*. Bandung: CV. Wacana Prima.
- Sutiani, A., Silalahi, A. & Situmorang, M. (2017). The development of innovative learning material with problem based approach to imrove students competence in the teaching of physical chemistry. *AISTEEL 2<sup>nd</sup>*. (pp.378-382).

- Sutrio, Gunawan, Harjono, A., & Sahidu, H. 2018. Pengembangan Bahan Ajar Fisika Eksperimen Berbasis Proyek Untuk Meningkatkan Keterampilan Berpikir Kritis Calon Guru Fisika. *Jurnal Pendidikan Fisika dan Teknologi*, 4(1), 131-140.
- Suyanto., & Jihad, A. (2013). Menjadi *Guru Profesional: Strategi Meningkatkan Kualifikasi dan Kualitas Guru di Era Global*. Jakarta: Erlangga.
- Syuru, A. U., Indriyanti, D. R., & Retnoningsih, A. (2015). Keefektifan Pembelajaran Bervisi SETS Melalui Praktikum Identifikasi Bioindikator Sungai Cimanuk Terhadap Ketuntasan Hasil Belajar Aspek Keterampilan Siswa. *Lembaran Ilmu Kependidikan*, 44(2), 123 - 129.
- Tasci, B. G., (2015), Project Based Learning From Elementary School to Collage, Tool: Archictecture, *Procedia-Social and Bahavioral Science*, 186, 770-775.
- Turgut, H. (2008). Prospective Science Teachers'Conceptualizations About Project Based Learning. *International Journal of Instruction*, 1(2), 61-79.
- Ungur, S., & Meiran, W.R. (2020). Student attitudes towards online education during the covid 19 viral outbreak of 2020: distance learning in a time of social distance. *International Journal of Technology in Education and Science*, 4(4), 256-266.
- UZ, LM. Z., Haryono & Wardani, The development of chemical e-module based on problem of learning to improve the concept of student understanding. *Innovative journal of curriculum and educational technology*, 8(2), 59-66.
- Visser, T. C., Coenders, F. G. M., Terlouw, C., & Pieters J. M. (2010). Essential Characterictics for a professional development program for promoting the implementation of a multidisciplinary science module. *Journal Science Teacher Education*, 21, 623-642, doi : 10.1007/s10972-010-9212-1
- Widyaningsih, S.R., Yusuf, I., Prasetyo, Z.K., Istiyono, E., (2021). The development of the HOTS test of physics based on modern test theory: question modeling through e-learning of moodle LMS. *International Journal of Instruction*, 14 (4), 51 – 68, doi : 10.29333/iji.2021.1444a
- Xie, M., Inguva, P., Chen. W., Prasetya, N., Macey, A., Dimaggio, P., Shah, U., & Brechtelsbauer, C. (2020). Accelerating students' learning of chromatography with an experiential module on process development and scaleup. *Journal of Chemical Education*, doi : 10.1021/acs.jchemed.9b01076.
- Zha, S., Jin, Y., Moore, P., & Joe Gaston. (2020). A cross-institutional investigation of a flipped module on preservice teachers' interest in teaching computational thinking. *Journal of digital learning in Teacher Education*, 36(1), 32-45.

Zoller. (2013). Science, technology, environment, society (sets) literacy for sustainability: what should it take in chem/science education?. *Educ.quim*, 24(2), 207-214.

