

***PROJECT-BASED BLENDED LEARNING* PADA MATERI KOLOID
UNTUK MENINGKATKAN PENGUASAAN KONSEP DAN
KREATIVITAS SISWA SMA**

TESIS

diajukan untuk memenuhi syarat memperoleh gelar Magister Pendidikan Program Studi
Pendidikan Kimia



Oleh:

Rosi Oktiani

2010298

**PROGRAM STUDI S2 PENDIDIKAN KIMIA
DEPARTEMEN PENDIDIKAN KIMIA
FAKULTAS PENDIDIKAN MATEMATIKA DAN ILMU PENGETAHUAN
ALAM
UNIVERSITAS PENDIDIKAN INDONESIA
2022**

***PROJECT-BASED BLENDED LEARNING PADA MATERI KOLOID
UNTUK MENINGKATKAN PENGUASAAN KONSEP DAN
KREATIVITAS SISWA SMA***

**Oleh
Rosi Oktiani
2010298**

Sebuah tesis yang diajukan untuk memenuhi salah satu syarat untuk memperoleh gelar Magister Pendidikan pada Departemen Pendidikan Kimia Fakultas Matematika dan Ilmu Pengetahuan Alam

© Rosi Oktiani 2022
Universitas Pendidikan Indonesia

Hak cipta dilindungi undang-undang.
Tesis ini tidak boleh diperbanyak seluruhnya atau sebagian,
dengan dicetak ulang, difoto kopi, atau cara lainnya tanpa ijin dari penulis.

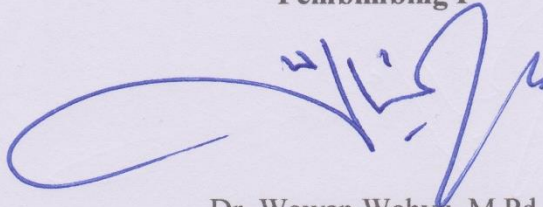
LEMBAR PENGESAHAN TESIS

ROSI OKTIANI

**PROJECT-BASED BLENDED LEARNING PADA MATERI KOLOID
UNTUK MENINGKATKAN PENGUASAAN KONSEP DAN
KREATIVITAS SISWA SMA**

Disetujui dan disahkan oleh:

Pembimbing I



Dr. Wawan Wahyu, M.Pd
NIP. 197111201998021001

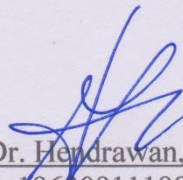
Pembimbing II



Dr. Eng. Asep Bayu Dani Nandiyanto, M.Eng.
NIP. 198309192012121002

Mengetahui,

Ketua Program Studi Magister Pendidikan Kimia



Dr. Hendrawan, M.Si.
NIP. 196809111989011001

ABSTRAK

Penelitian ini bertujuan untuk menghasilkan rancangan model *Project-Based Blended Learning* pada materi koloid untuk meningkatkan penguasaan konsep dan kreativitas siswa SMA. Pendekatan *embedded mixed-methods* digunakan dalam penelitian ini. Pendekatan kualitatif dilakukan dengan metode *design research* tipe Plomp untuk menganalisis model *Project-Based Blended Learning* dan uji kelayakan dari model tersebut, kreativitas siswa, penilaian aspek kreatif dari produk koloid siswa, dan respon siswa terhadap model pembelajaran tersebut. Pendekatan kuantitatif dilakukan menggunakan metode pra-eksperimen dengan *one-group pretest-posttest design*. Penelitian ini melibatkan dua orang ahli pendidikan kimia, satu orang ahli kimia, dua orang guru kimia lulusan Magister serta dua puluh orang siswa SMA kelas sebelas. Hasil penelitian ini menunjukkan bahwa berdasarkan uji kelayakan internal, eksternal, dan TCOF, model *Project-Based Blended Learning* layak digunakan pada materi koloid untuk meningkatkan penguasaan konsep dan kreativitas siswa. Rata-rata skor pretes dan postes siswa masing-masing mencapai 51,8 dan 75,50. Hasil tersebut menunjukkan adanya peningkatan skor penguasaan konsep siswa dengan N-gain sebesar 0,49 (kategori sedang). Hasil observasi aktivitas siswa selama pembelajaran menunjukkan bahwa siswa memiliki kreativitas yang tinggi. Selain itu, hasil penilaian aspek kreatif pada produk koloid siswa menunjukkan bahwa produk-produk yang dibuat siswa memiliki aspek kreatif yang tinggi. Data angket respon siswa terhadap model *Project-Based Blended Learning* pada materi koloid menunjukkan siswa setuju bahwa model pembelajaran tersebut dapat membantu mereka untuk memahami materi koloid secara lebih mudah sekaligus meningkatkan kreativitas mereka. Hal ini menunjukkan bahwa model *Project-Based Blended Learning* dapat diterapkan dalam pembelajaran koloid sebagai upaya untuk meningkatkan penguasaan konsep dan kreativitas siswa.

Kata kunci: Koloid, Kreativitas, Penguasaan Konsep, *Project-Based Blended Learning*

ABSTRACT

This study aims to produce a design of Project-Based Blended Learning model on colloidal material to improve concept mastery and creativity of high school students. The embedded mixed-methods approach was used in this study. The qualitative approach was carried out using the Plomp type of design-research method to analyze the Project-Based Blended Learning model and test the feasibility of the model, the creative aspects of students' colloidal products, and students' responses to the learning model. The quantitative approach was carried out using a pre-experimental method with a one-group pretest-posttest design. This study involved two chemistry education experts, one chemist, two master's degree teachers and twenty eleventh-grade high school students. The results of this study indicated that based on internal, external, and TCOF feasibility tests, the Project-Based Blended Learning model is feasible to use on colloidal materials to improve students' concept mastery and creativity. The students' average pretest and posttest scores reached 51.8 and 75.50, respectively. These results indicated an increase in the student's concept mastery score with an N-gain of 0.49 (medium category). The results of observing student activities during learning showed that students have high creativity. In addition, the results of the assessment of the creative aspects of colloidal products showed that the products made by students have a high creative aspect. Students' responses to the Project-Based Blended Learning model on colloidal material indicated that they agree that the learning model can help them understand colloidal material more easily while increasing their creativity. It shows that the Project-Based Blended Learning model can be applied in colloidal learning as an effort to improve students' concept mastery and creativity.

Keywords: *Colloid, Concept Mastery, Creativity, Project-Based Blended Learning*

DAFTAR ISI

KATA PENGANTAR	Error! Bookmark not defined.
UCAPAN TERIMAKASIH	Error! Bookmark not defined.
ABSTRAK	4
ABSTRACT	5
DAFTAR ISI	6
DAFTAR TABEL	Error! Bookmark not defined.
DAFTAR GAMBAR	Error! Bookmark not defined.
DAFTAR LAMPIRAN	Error! Bookmark not defined.
BAB I PENDAHULUAN	Error! Bookmark not defined.
1.1. Latar Belakang Penelitian	Error! Bookmark not defined.
1.2. Rumusan Masalah Penelitian	Error! Bookmark not defined.
1.3. Pembatasan Penelitian	Error! Bookmark not defined.
1.4. Tujuan Penelitian	Error! Bookmark not defined.
1.5. Manfaat Penelitian	Error! Bookmark not defined.
1.6. Struktur Organisasi Tesis	Error! Bookmark not defined.
BAB II KAJIAN PUSTAKA	Error! Bookmark not defined.
2.1. <i>Project-Based Blended Learning (PjB2L)</i>	Error! Bookmark not defined.
2.2. Koloid	Error! Bookmark not defined.
2.3. Penguasaan Konsep	Error! Bookmark not defined.
2.4. Kreativitas	Error! Bookmark not defined.
BAB III METODE PENELITIAN	Error! Bookmark not defined.
3.1. Desain Penelitian	Error! Bookmark not defined.
3.2. Partisipan dan Lokasi Penelitian	Error! Bookmark not defined.
3.3. Definisi Operasional	Error! Bookmark not defined.
3.4. Prosedur Penelitian	Error! Bookmark not defined.
3.5. Instrumen Penelitian	Error! Bookmark not defined.

3.6. Analisis Data..... **Error! Bookmark not defined.**

BAB IV HASIL DAN PEMBAHASAN Error! Bookmark not defined.

4.1. Desain model PjB2L Pada Materi Koloid**Error! Bookmark not defined.**

4.2. Kelayakan Model PjB2L Pada Materi Koloid**Error! Bookmark not defined.**

4.3. Penguasaan Konsep Koloid Siswa..... **Error! Bookmark not defined.**

4.4. Kreativitas Siswa Berdasarkan Indikator Williams**Error! Bookmark not defined.**

4.5. Penilaian Aspek Kreatif Produk Koloid Siswa**Error! Bookmark not defined.**

4.6. Respon Siswa Terhadap Model PjB2L Pada Materi Koloid**Error! Bookmark not defined.**

BAB V SIMPULAN, IMPLIKASI, DAN REKOMENDASIError! Bookmark not defined.

5.1. Simpulan **Error! Bookmark not defined.**

5.2. Implikasi **Error! Bookmark not defined.**

5.3. Rekomendasi..... **Error! Bookmark not defined.**

DAFTAR PUSTAKA8

LAMPIRAN 1..... Error! Bookmark not defined.

LAMPIRAN 2..... Error! Bookmark not defined.

LAMPIRAN 3..... Error! Bookmark not defined.

LAMPIRAN 4..... Error! Bookmark not defined.

DAFTAR PUSTAKA

- Aini, F. N. Q., & Ismono, I. (2020). Implementation of guided inquiry learning model based blended learning to train creative thinking skill of eleventh grade students in the factors that affect of chemical equilibrium. *Jurnal Pendidikan dan Pembelajaran Kimia*, 9(3), 67-78.
- Ajoke, A. A., & Nna, P. J. (2012). Creativity and process skills for self- reliance using demonstration approach of teaching chemistry. *Procedia - Social and Behavioral Sciences*, 3(1), 51–54.
- Al-Abdali, N. S., & Al-Balushi, S. M. (2016). Teaching for creativity by science teachers in grades 5–10. *International Journal of Science and Mathematics Education*, 14(2), 251–268.
- Alamri, M. M. (2021). Using blended project-based learning for students' behavioral intention to use and academic achievement in higher education. *Education Sciences*, 11(5), 1-11.
- Anderson, L. W., & Krathwohl, D. R. (2001). *A Taxonomy For Learning, Teaching, and Assesing: A revision of Bloom's taxonomy of educational objectives*. United States: Addison Wesley Longman Inc.
- Ashraf, M. A., Tsegay, S. M., & Meijia, Y. (2021). Blended learning for diverse classrooms: Qualitative experimental study with in-service teachers. *Sage Open*, 11(3), 1-11.
- Atmaka, W., Af'idatusholikhah, A., Prabawa, S., & Yudhistira, B. (2021). Pengaruh Variasi Konsentrasi Kappa Karagenan terhadap Karakteristik Fisik dan Kimia Gel Cincau Hijau (*Cyclea barbata* L. Miers). *Warta Industri Hasil Pertanian*, 38(1), 25-35.
- Bada, S. O., & Olusegun, S. (2015). Constructivism learning theory: A paradigm for teaching and learning. *Journal of Research & Method in Education*, 5(6), 66-70.
- Barhouni, C. (2015). The Effectiveness of WhatsApp mobile learning activities guided by activity theory on students' knowledge management. *Contemporary educational technology*, 6(3), 221-238.

- 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.
- Bell, S. (2010). Project-Based Learning for the 21st Century: Skills for the Future. *The Clearing House: A Journal of Educational Strategies, Issues and Ideas*, 83(2), 39–43.
- Besemer, S. P., & Treffinger, D. J. (1981). Analysis of creative products: review and synthesis. *The Journal of Creative Behavior*, 15(3), 158-178.
- Boss, S. (2011). *Project-Based Learning: A Short History*. [Online]. Diakses dari <https://www.edutopia.org/project-based-learning-history>.
- Burlbaw, L. M., Ortwein, M. J., & Williams, J. K. (2013). The project method in historical context. *STEM Project-Based Learning, 2nd edition* (pp. 7-14). The Netherlands: Sense Publishers.
- Cahyani, N. K. C. (2021). The Effectiveness of Project-Based Learning models in improving students' creativity (A literature review). *The Art of Teaching English as a Foreign Language*, 2(1), 73-77.
- Cattaneo, K. H. (2017). Telling active learning pedagogies apart: From theory to practice. *Journal of New Approaches in Educational Research (NAER Journal)*, 6(2), 144-152.
- Christensen, C. M., Horn, M. B., & Staker, H. (2013). Is K -12 blended-learning disruptive? An introduction to the theory of hybrids. [Online]. Diakses dari <https://www.christenseninstitute.org/publications/hybrids/>.
- Cortez, C. P. (2020). Blended, distance, electronic and virtual-learning for the new normal of mathematics education: A senior high school student's perception. *European Journal of Interactive Multimedia and Education*, 1(1), 1-6.
- Creswell, J. W. (2014). *Research Design: Qualitative, Quantitative, and Mixed Methods Approaches (4th edition)*. London: Sage Publications.
- Dai, N. V., Trung, V. Q., Tiem, C. V., Hao, K. P., & Anh, D. T. V. (2021). Project-Based Teaching in Organic Chemistry through Blended Learning Model to Develop Self-Study Capacity of High School Students in Vietnam. *Education Sciences*, 11(7), 1-17.

- Danielson, C., Ashcraft, P., Bruckner, M., Ellen Freeley, M., Hanzelka, R. L., Harris, D. E., Huey, M., Kerns, S., Nicely Jr, R., Tayler, J., Tolbert, A., Wegner, S. K., & Dorler Wilson, J. (2002). *Enhancing Student Achievement A Framework for School Improvement*. USA: Association for Supervision and Curriculum Development (ASCD).
- Dewey, J. (1953). *Democracy and Education: An introduction to the philosophy of education*. New York: The Macmillan Company.
- Dewey, J. (1986, September). Experience and education. *The educational forum*, 50(3), 241-252.
- Dewey, J. (2001). The educational situation: As concerns the elementary school. *Journal of Curriculum Studies*, 33(4), 387–403.
- Dewi, C. A. (2019). Improving creativity of prospective chemistry teacher through chemoentrepreneurship oriented inquiry module on colloid topics. *Journal of Physics: Conference Series*, 1156(1), 1–7.
- Dewi, L., & Sutisna, M. R. (2019). Designing Project-Based Learning To Develop Students' Creativity In The Fourth Industrial Revolution. *Advances in Social Science, Education and Humanities Research*, 239, 119-125.
- Duke, N. K., Halvorsen, A. L., & Strachan, S. L. (2016). Project-based learning not just for STEM anymore. *Phi Delta Kappan*, 98(1), 14–19.
- Efstratia, D. (2014). Experiential Education through Project Based Learning. *Procedia - Social and Behavioral Sciences*, 152, 1256–1260.
- Fahdini, R., Mulyadi, E., Suhandani, D., & Julia, J. (2014). Identifikasi Kompetensi Guru sebagai Cerminan Profesionalisme Tenaga Pendidik di Kabupaten Sumedang. *Mimbar Sekolah Dasar*, 1(1), 33-42.
- Fauzi, A., Wandira, R., Sepri, D., & Hafid, A. (2021). Exploring students' acceptance of google classroom during the covid-19 pandemic by using the technology acceptance model in West Sumatera Universities. *Electronic Journal of e-Learning*, 19(4), 233-240.
- George Lucas Educational Foundation. (2007). *How Does Project-Based Learning Work?*. [Online]. Diakses dari <https://www.edutopia.org/project-based-learning-guide-implementation>.

- Ghizlane, M., Hicham, B., & Reda, F. H. (2019). A new model of automatic and continuous online exam monitoring. *International Conference on Systems of Collaboration Big Data, Internet of Things & Security (SysCoBIoTS)*, 1-5.
- Giyanto, G., Rubini, B., & Heliawati, L. (2020). Characteristics of Chemistry Teaching Material Voltaic Cells on Students' Creativity and Concept Mastery. *Jurnal Pendidikan Sains Indonesia*, 8(2), 218–227.
- Glaveanu, V. P., & Kaufman, J. C. (2019). A historical perspective. *The Cambridge handbook of creativity, 2nd edition* (pp.9-26). United Kingdom: Cambridge University Press.
- Habók, A., & Nagy, J. (2016). In-service teachers' perceptions of project-based learning. *SpringerPlus*, 5(1), 1–14.
- Hake, R. R. (1998). Interactive-engagement versus traditional methods: A six thousand-student survey of mechanics test data for introductory physics courses. *American Journal of Physics*, 66(1), 64–74.
- Hong, J. C. (2007). The comparison of problem-based learning (P_mBL) model and project-based learning (P_iBL) model. *International Conference on Engineering Education (ICEE)*, 1-7.
- Imaduddin, M., Praptaningrum, D. N. W., & Safitri, D. A. (2020). Students' Attitude toward STEM Project-Based Learning in the Fun Cooking Activity to Learn about the Colloid System. *International Journal of Contemporary Educational Research*, 8(1), 14–26.
- Jalinus, N., Nabawi, R. A., & Mardin, A. (2017). The seven steps of project based learning model to enhance productive competences of vocational students. In *International Conference on Technology and Vocational Teachers (ICTVT 2017)*, 251-256.
- Jasmine, E. P., Aisyah, R., Irwansyah, F. S., & Subarkah, C. Z. (2021). The Development of Students' Creativity in the Making of Scrapbook Media in Learning the Properties of Colloids. *BINUS Joint International Conference*, 105, 577–579.
- Kaufman, J. C., Plucker, J. A., & Baer, J. (2008). *Essentials of creativity assessment*. Canada: John Wiley & Sons.
- Kaufman, J. C. (2016). *Creativity 101*. New York: Springer.

- Kemendikbud. (2016). *Peraturan Menteri Pendidikan dan Kebudayaan Republik Indonesia Nomor 20 Tahun 2016 Tentang Standar Kompetensi Lulusan Pendidikan Dasar Dan Menengah*. Jakarta: Kemendikbud.
- Kemendikbud. (2022). *Panduan Pengembangan Proyek Penguatan Profil Pelajar Pancasila*. Jakarta: Kemendikbud.
- Krahenbuhl, K. S. (2016). Student-centered education and constructivism: Challenges, concerns, and clarity for teachers. *The Clearing House: A Journal of Educational Strategies, Issues and Ideas*, 89(3), 97-105.
- Krajcik, J. S., & Blumenfeld, P. C. (2006). Project-Based Learning. *The Cambridge Handbook of The Learning Sciences* (pp. 317–333). United Kingdom: Cambridge University Press.
- Kundu, A., & Bej, T. (2021). COVID 19 response: An analysis of teachers' perception on pedagogical successes and challenges of digital teaching practice during new normal. *Education and information technologies*, 26, 1-24.
- Lawshe, C. H. (1975). A quantitative approach to content validity. *Personnel psychology*, 28(4), 563-575.
- Lou, S. J., Chung, C. C., Dzan, W. Y., & Shih, R. C. (2012). Construction of a creative instructional design model using blended, project-based learning for college students. *Creative Education*, 3(07), 1281-1290.
- Merdekawati, K. (2018). Skill development on designing chemistry learning. *AIP Conference Proceedings*, 2026(1), 1-5.
- Minarni, M., Epinur, E., Fuldiaratman, F., Yusnidar, Y., & Wardiah, R. (2022). Application of Project Based Learning Model on Basic Chemical Colloidal Materials to Improve Science Process Skills and Student Learning Outcomes. *Budapest International Research and Critics Institute (BIRCI-Journal): Humanities and Social Sciences*, 5(2), 17224-17232.
- Moskal, P., Dziuban, C., & Hartman, J. (2013). Blended learning: A dangerous idea?. *The Internet and Higher Education*, 18, 15-23.
- Munandar, S. U. (1992). *Mengembangkan Bakat dan Kreativitas Anak Sekolah: Penuntun Bagi Guru Dan Orang Tua*. Jakarta: Gramedia.

- Mursid, R., Saragih, A. H., & Hartono, R. (2022). The effect of the blended project-based learning model and creative thinking ability on engineering students' learning outcomes. *International Journal of Education in Mathematics, Science, and Technology (IJEMST)*, 10(1), 218-235.
- Ningsih, D. A., & Novita, D. (2022). Guided inquiry learning-based blended learning on chemical equilibrium material to improve senior high school student learning outcomes. *Jurnal Pijar Mipa*, 17(1), 28-33.
- Nugraheni, A. R. E., Adita, A., & Srisawasdi, N. (2020). Blended learning supported chemistry course: A systematic review from 2010 to 2019. *Proceedings of the 28th International Conference on Computers in Education (ICCE2020)*, Asia-Pacific Society for Computers in Education, 444-450.
- Nurhayati, E., Rizaldi, D., & Fatimah, Z. (2021). The Effectiveness of Project-Based Learning with the Blended Learning System to Improve 21st Century Skills during the COVID-19 Pandemic. *Jurnal Scientia*, 9(2), 46-52.
- Nurmaliah, C., Azmi, T. N., & Artika, W. (2021). The impact of implementation of STEM integrating project-based learning on students' problem-solving abilities. *Journal of Physics: Conference Series*, 1882(1), 1-6.
- Palupi, H. T. (2015). Pengaruh Konsentrasi Ekstrak Daun Cincau Hijau (Cycle barbata L. Miers) dan Suhu Ekstraksi Terhadap Karakteristik Mie Basah. *Teknologi Pangan: Media Informasi dan Komunikasi Ilmiah Teknologi Pertanian*, 6(1), 27-35.
- Petrucci, R. H., Herring, F. G., Madura, J. D., & Bissonnette, C. (2017). *General Chemistry: principles and modern applications*, 11th edition. Canada: Pearson.
- Pitojo, Setijo. 2008. *Khasiat Cincau Perdu*. Yogyakarta: Penerbit Kanisius.
- Plomp, T. (2013). Educational Design Research: An Introduction. *Educational Design Research* (pp. 10–51). The Netherlands: Netherlands Institute for Curriculum Development (SLO).
- 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*, 4(1), 89–96.
- Puccio, G. J. (2017). From the dawn of humanity to the 21st century: Creativity as an enduring survival skill. *The Journal of Creative Behavior*, 51(4), 330-334.
- Putra, A. K., Deffinika, I., & Islam, M. N. (2021). The Effect of Blended Project-Based Learning with STEM Approach to Spatial Thinking Ability and Geographic Skill. *International Journal of Instruction*, 14(3), 685-704.
- Riduwan & Kuncoro, E. A. (2010). *Cara Menggunakan dan Memaknai Path Analysis (Analisis Jalur)*. Bandung: Alfabeta.
- Robinson, J. K. (2013). Project-based learning: improving student engagement and performance in the laboratory. *Analytical and Bioanalytical Chemistry*, 405, 7–13.
- Saboowala, R., & Manghirmalani-Mishra, P. (2020). Perception of In-Service Teachers Towards Blended Learning as the New Normal in Teaching-Learning Process Post COVID-19 Pandemic. *Research Square*, preprint (Versi 1), 1-13.
- Salsabillah, S., Sudarti, & Supeno. (2018). Analisis Penguasaan Konsep-Konsep Fisika Pokok Bahasan Gelombang Elektromagnetik Pada Siswa Kelas XII SMA. *Seminar Nasional Pendidikan Fisika 2018*, 3, 259-267.
- 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.
- Sari, D. I. (2021). *Analisis Kelayakan Model RADEC untuk Mengembangkan Keterampilan Kolaborasi dan Kreativitas Peserta Didik Pada Penentuan Trayek pH Indikator Asam Basa Alami* (Tesis, Universitas Pendidikan Indonesia).
- Silva, L. H., Castro, R. X., & Guimaraes, M. C. (2021). Supporting real demands in software engineering with a four steps project-based learning approach. In *2021 IEEE/ACM 43rd International Conference on Software Engineering: Software Engineering Education and Training (ICSE-SEET)*, 50-59
- Singh, J., Steele, K., & Singh, L. (2021). Combining the best of online and face-to-face learning: Hybrid and blended learning approach for COVID-19, post

- vaccine, & post-pandemic world. *Journal of Educational Technology Systems*, 50(2), 140-171.
- Sloman, M. (2007). Making sense of blended learning. *Industrial and Commercial Training*, 39(6), 315-318.
- Sumarni, W., Sudarmin, S., & Kadarwati, S. (2021, June). Creative skill improvement of the teacher candidates in designing learning programs through a project-based blended learning. *Journal of Physics: Conference Series*, 1918(3), 1-5.
- Sunarya, Y. (2012). *Kimia Dasar 2*. Bandung: CV. Yrama Widya.
- Sunasee, R. (2020). Challenges of teaching organic chemistry during COVID-19 pandemic at a primarily undergraduate institution. *Journal of Chemical Education*, 97(9), 3176-3181.
- Tayebnik, M., & Puteh, M. (2013). Blended Learning or E-learning? *International Magazine on Advances in Computer Science and Telecommunications*, 3(1), 103-110.
- Terrón-López, M. J., Velasco-Quintana, P. J., García-García, M. J., & Ocampo, J. R. (2017). Students' and teachers' perceptions: initial achievements of a Project-Based Engineering School. *European Journal of Engineering Education*, 42(6), 1113-1127.
- Thompson, R. B. (2008). *Illustrated Guide to Home Chemistry Experiments, 1st edition*. USA: Dale Dougherty.
- Thorne, K. (2003). *Blended Learning: How to Integrate Online and Traditional Learning*. London: Kogan page publisher.
- Tigaa, R. A., & Sonawane, S. L. (2020). An international perspective: teaching chemistry and engaging students during the COVID-19 pandemic. *Journal of Chemical Education*, 97(9), 3318-3321.
- Tran, T. B. L., Ho, T. N., Mackenzie, S. V., & Le, L. K. (2017). Developing assessment criteria of a lesson for creativity to promote teaching for creativity. *Thinking Skills and Creativity*, 25, 10–26.
- Trilling, B., & Fadel, C. (2009). *21st Century Skills, Enhanced Edition: Learning for Life in Our Times*. Jossey-Bass.

- Whitten, K. W., Davis, R. e., PeCK, m. L., & StanLey, G. G. (2014). *Chemistry*. USA: Mary Finch.
- Widoyoko, Eko Putro. (2009). *Evaluasi Program Pembelajaran: Panduan Praktis Bagi Pendidik dan Calon Pendidik*. Yogyakarta: Pustaka Pelajar.
- Williams, F. E. (1968). Workshop On The Use and Adaptation Of New Media For Developing Creativity: *National Schools Project*. Saint Paul: Macalester College.
- Zejnlagić-Hajrić, M., & Ānes, N. U. Ā. Ā. (2015). Demonstration in teaching chemistry: The case of two high-schools from Sarajevo Canton. *Celal Bayar University Journal of Science*, 11(3), 325-328.