DAFTAR PUSTAKA

- Abbas, A. K., Lichtman, A. H., & Pillai, S. (2019). Basic Immunology E-Book: Basic Immunology E-Book. Elsevier.
- Abdi, S., Khosravi, H., Sadiq, S., & Demartini, G. (2021). Evaluating the quality of learning resources: A learnersourcing approach. *IEEE Transactions on Learning Technologies*, 14(1), 81-92.
- Abdulrahaman, M. D., Faruk, N., Oloyede, A. A., Surajudeen-Bakinde, N. T., Olawoyin, L. A., Mejabi, O. V., Imam-Fulani, Y. O., Fahm, A. O., & Azeez, A. L. (2020). Multimedia tools in the teaching and learning processes: A systematic review. *Heliyon*, 6(11)
- Actor, J. K. (2014). Introductory Immunology: Basic Concepts for Interdisciplinary Applications. Academic Press.
- Adinugraha, F. (2021). Students' Creativity in Producing Biology Learning Media.

 Proceedings of the 2nd Annual Conference on Blended Learning,

 Educational Technology and Innovation (ACBLETI 2020), 228-233.
- Aguilar, M. A. A., Braganza, J. C., Guiwanas, G. D., Magpayo, E. C., & Patacsil, F. F. (2021). Design and Implementation of i-Inhs: A Learning Management System for Lananpin National High School. Indian Journal of Science and Technology, 14(39), 2982-2997.
- Aksu, G., & Eser, T. (2020). Development of analytical thinking tendency scale:

 Validity and reliability study. **Ilköğretim Online*, 2307–2321.
- AlKhatib, H. S., Brazeau, G., Akour, A., & Almuhaissen, S. A. (2020). Evaluation of the effect of items' format and type on psychometric properties of sixth year pharmacy students clinical clerkship assessment items. *BMC Medical Education*, 20, 1-8.
- All coat, D., & Evans, C. (2023). Meaningful game design: The methodology and psychology of tabletop games. CRC Press.
- Ambarwati, R., Febriana, A., Anggoro, B., & Putra, R. (2022). The Effectiveness of Problem Based Learning Aided by Gamification Teaching Materials on Students' Mathematical Problem Solving Ability. *Jurnal Pendidikan MIPA*, 23, 1279-1285.
- Amelia, R., Atmaja, D., & Rusdiana, D. (2024). Development of games-based learning media "Eco Quest: guardian of the element" on the subject of climate change and global warming for class X high school. *Jurnal Riset Dan Kajian Pendidikan Fisika*, 11, 61-70.
- Ardianti, R., Razak, A., Alberida, H., Fadilah, M., & Sari, M. (2024). Analytical Thinking Skill and Problem Solving Skills Instruments in Biology Learning

- Using Rasch Model. Journal of Education Research and Evaluation, 8(4), 785-795.
- Arends, D., & Kilcher, A. (2010). Teaching for Student Learning: Becoming an Accomplished Teacher. Taylor & Francis.
- Arends, R. (2012). Learning to Teach. In Connect, learn, succeed. McGraw-Hill.
- Asmara, J., Masitoh, S., & Nursalim, M. (2022). Development Of Learning Media For The Formation Of Characteristics Based On The Philosophy Of Science. Cendikia: Media Jurnal Ilmiah Pendidikan, 13(1), 182–187.
- Asrul, Ananda, R., & Rosnita (2014) Evaluasi Pembelajaran. Citapustaka Media, Bandung
- Assapun, S., & Thummaphan, P. (2023). Assessing the effectiveness of board game-based learning for enhancing problem-solving competency of lower secondary students. *International Journal of Instruction*, 16(2), 511-532.
- Aziz, A., & Isnaeni, W. (2023). The Effectiveness of Web-Based Comic Media to Train Students' Creative Thinking Skills in Learning Immune System. Materials. Journal of Biology Education, 12, 290-297.
- Bairagi, V., & munot, mousami. (2019). Research Methodology: A Practical and Scientific Approach. Taylor & Francis
- Bayeck, R. Y. (2020). Examining Board Gameplay and Learning: A. Multidisciplinary Review of Recent Research. Simulation & Gaming, 51(4), 411-431.
- Bedduside, N., Hadis, A., Jalal, I., Syamsiah, & Patongai, D. (2021). Inovation of Biology learning through the development of authentics assessment based on scientific literacy for student of senior high school. *Journal of Physics:* Conference Series, 1899, 012142.
- Bolstad, R., & McDowall, S. (2019). Games, Gamification, and Game Design for Learning: Innovative Practice and Possibilities in New Zealand Schools. ERIC.
- Botes, W. (2022). Pre-Service Teachers' Experiences on the Development of Educational Science Board Games. European Journal of STEM Education, 7, 02.
- Bounajim, D., Rachmatullah, A., Boulden, D., Mott, B., Lester, J., Lord, T., & Wiebe. (2020). Utilizing Cognitive Load Theory and Evidence-Centered Design to Inform the Design of Game-Based Learning Environments. In Proceedings of the Human Factors and Ergonomics Society Annual Meeting (Vol. 64, pp. 826-830). SAGE Publications.
- Branch, R., & Dousay, T. (2015). Survey of instructional design models.

 Association for Educational Communications and Technology, Bloomington

- Bressler, D., & Annetta, L. (2021). Using game design to increase teachers' familiarity with design thinking. *International Journal of Technology and Design Education*, 32, 1-13.
- Brown, A. H., & Green, T. D. (2015). The Essentials of Instructional Design: Connecting Fundamental Principles with Process and Practice, Third Edition. Taylor & Francis.
- BSKAP, K. (2024). Keputusan Kepala Badan Standar, Kurikulum, Dan Asesmen Pendidikan Kementerian Pendidikan, Kebudayaan, Riset, Dan Teknologi Nomor 032. Jakarta: Badan Standar, Kurikulum, Dan Asesmen Pendidikan. Diakses pada 13 Januari 2024 dari https://guru.kem.dikbud.go.id/dokumen/74r6Yln0zK?parentCategory=Implementasi%20Kurikulum%20Mer.deka.
- Bueno, V., & Pawelec, G. (2022). Healthy Longevity and Immune System. In Healthy Ageing and Longevity. Springer International Publishing.
- Buranasinvattanakul, K. (2024). The Development of Instruction Media in Board Game to Enhance the Capability in the Development of Thai Textbook and the Happiness in Learning for Undergraduate Students. *Journal of Education and Learning*, 13, 161.
- Burton, I. J. (2015). Cambridge IGCSE® Biology Revision Guide. In Cambridge International IGCSE. Cambridge University Press.
- Cai, M., Rebolledo Mendez, G., Arevalo, G., Tang, S. S., Abdullah, Y. A., & Demmans Epp, C. (2024). Toward Supporting Adaptation: Exploring Affect's Role in Cognitive Load when Using a Literacy Game. In Proceedings of the 2024 CHI Conference on Human Factors in Computing Systems (pp. 1-17).
- Calvo-Morata, A., Alonso-Fernandez, C., Freire, M., Martínez-Ortiz, I., & Fernandez-Manjon, B. (2021). Creating awareness on bullying and cyberbullying among young people: Validating the effectiveness and design of the serious game Conectado. Telematics and Informatics, 60, 101568.
- Capili, B., & Anastasi, J. K. (2024). An introduction to types of quasiexperimental designs. The American Journal of Nursing, 124(11), 50-52.
- Cardinot, A., McCauley, V., & Fairfield, J. A. (2022). Designing physics board games: a practical guide for educators. *Physics Education*, 57(3), 035006.
- Carenys, J. (2025). Competing to Learn: The Role of Competition in Students' Flow, Cognitive Load, and Learning Gains in Game-Based Learning. International Journal of Learning, Teaching and Educational Research, 5.
- Čerepinko, D., Štefanović, R., Hajdek, K., & Miljković, P. (2025). Less Is More in Digital Games Too: A Comparative Analysis of Visual Elements of

- Physical and Digital Versions for Two Tabletop Games. *Applied Sciences*, 15(2), 715.
- Chaeruman, U. (2019). *Instrumen Evaluasi Media Pembelajaran*. Jakarta: Pusat Teknologi Informasi dan Komunikasi Pendidikan.
- Cooke, L., Dusenberry, L., & Robinson, J. (2020). Gaming design thinking: Wicked problems, sufficient solutions, and the possibility space of games. Technical Communication Quarterly, 29(4), 327-340.
- Creswell, J. W., & Guetterman, T. C. (2019). Educational Research: Planning, Conducting, and Evaluating Quantitative and Qualitative Research. Pearson.
- Daniels, J. T. (2022) Make Your Own Board Game: Designing, Building, and Playing an Original Tabletop Game. Hachette UK.
- Dewantara, R. B., Suarsini, E., & Lestari, S. R. (2020). Analisis kebutuhan pengembangan multimedia interaktif berbasis problem based learning pada materi biologi SMA. *Jurnal Pendidikan (Online) (Malang)*, 5(6), 749. doi:10.17977/jptpp.v5i6.13587
- Dick, W., Carey, L., & Carey, J. O. (2015). The Systematic Design of Instruction.

 Vital Source (for Pearson) VST E+p.
- Eilam, B., & Omar, S. Y. (2022). Science Teachers' Construction of Knowledge About Simulations and Population Size Via Performing Inquiry with Simulations of Growing Vs. Descending Levels of Complexity. In O. Ben Zvi Assaraf & M.-C. P. J. Knippels (Eds.), Fostering Understanding of Complex Systems in Biology Education: Pedagogies, Guidelines and Insights from Classroom-based Research (pp. 205-226). Springer International Publishing.
- Eticha, M. D., Hunde, A. B., & Ketema, T. (2024). Designing a Context-Driven Problem-Solving Method with Metacognitive Scaffolding Experience Intervention for Biology Instruction. Journal of Science Education and Technology, 33(6), 811-822.
- Ezezika, O., Maria, F., James, R., & and Aslemand, A. (2023). The Pedagogical Impact of Board Games in Public Health Biology Education: The Bioracer Board Game. Journal of Biological Education, 57(2), 331-342.
- Fisch, S. M. (2000). A Capacity Model of Children's Comprehension of Educational Content on Television. *Media Psychology*, 2(1), 63-91.
- Fjællingsdal, K. S., & Klöckner, C. A. (2020). Green across the board: Board games as tools for dialogue and simplified environmental communication. Simulation & Gaming, 51(5), 632-652.
- Fraenkel, J. R., Wallen, N. E., & Hyun, H. H. (2018). How to Design and Evaluate Research in Education. McGraw-Hill Education.

- Frazier, C. A. (2022). Board Games: A Perfect Match for Reading Comprehension Liberty University
- Frey, B. B. (2022). The SAGE Encyclopedia of Research Design. SAGE Publications.
- Friesem, Y., Raman, U., Kanižaj, I., & Choi, G. Y. (2022). The Routledge Handbook of Media Education Futures Post-Pandemic. In Routledge Research in Media Literacy and Education. Taylor & Francis.
- Gargani, Y., Shiach, C., & Helbert, M. (2012). Crash Course Haematology and Immunology E-Book. In *Crash Course*. Elsevier Health Sciences.
- Gebremichael, M. W., Baraki, B., Mehari, M.-A., & Assalfew, B. (2025). Item analysis of multiple choice questions from assessment of health sciences students, Tigray, Ethiopia. BMC Medical Education, 25(1), 441.
- Gerónimo-López, K. M. (2023). Activist Board Games in Adult Education: Educational Philosophies, Learning Theories and Game Mechanics.
- Ghosh, S. (2022). Human Immune System. In Human Immune System. De Gruyter.
- Gliksman, S. (2015). Creating Media for Learning: Student-Centered Projects

 Across the Curriculum. SAGE Publications.
- Golightly, A. (2023). Problem-based learning and pedagogies of play: Active approaches towards Self-Directed Learning, vol. 11. AOSIS.
- Guigon, G., Vermeulen, M., Muratet, M., & Carron, T. (2024). Tangible or Digital? A Comparison Between Two Tools for Designing Asymmetric Role-Playing Games for Learning.
- Hake, R. R. (1998). Interactive-engagement versus traditional methods: A sixthousand-student survey of mechanics test data for introductory physics courses. American Journal of Physics, 66(1), 64-74.
- Hannafin, M. J., & Peck, K. L. (1988). The Design, Development, and Evaluation of Instructional Software. Macmillan.
- Hariyati, A., & Purwanto, R. (2023). Implementing the Contextual Approach in Mathematics Learning to Enhance Students' Problem Solving Abilities. In ASIAN: Indonesian Journal of Learning Development and Innovation (Vol. 1, Issue 1).
- Harvey, S., & Cope, E. (2025). Making Learning Happen in Teaching Games for Understanding with Cognitive Load Theory. Education Sciences, 15(5), 631.
- Hasruddin, H., Aryeni, A., Amrizal, A., & Aulia, R. (2024, February 9). The Analytical Thinking Skills of Biology Education Students Through the Implementation of Biology Planning Learning Books. Proceedings of the 5th

- International Conference on Innovation in Education, Science, and Culture, ICIESC 2023.
- Heron, M. J. (2024). Tabletop Game Accessibility: Meeple Centred Design. CRC Press
- Hinebaugh, J. P. (2019). More Board Game Education: Inspiring Students Through Board Games. Rowman & Littlefield.
- Illingworth, S., & Wake, P. (2021). Ten simple rules for designing analogue science games. PLOS Computational Biology, 17, e1009009.
- Ilyas, I., Kaynat, H., & Salisu, A. (2023). The Effect of Implementing the Contextual Teaching Learning (CTL) Approach on the Formation of Students' Physics Behavior. Schrödinger: Journal of Physics Education, 4(4), 92-97.
- Irwanto, I., Rohaeti, E., Wijayanti, E., & Suyanta. (2017). Students' science process skill and analytical thinking ability in chemistry learning. In AIP Conference Proceedings (Vol. 1868).
- Isnaeni, W., Rudyatmi, E., Ridlo, S., Ingesti, S., & Adiani, L. (2021). Improving students' communication skills and critical thinking ability with ICT-oriented problem-based learning and the assessment instruments with HOTS criteria on the immune system material. Journal of Physics: Conference Series, 1918, 052048.
- Jaiswal, K., Dudhgaonkar, S., Gharade, P., & Sharma, N. (2022). Post-valuation quality check of multiple-choice questions. International Journal of Basic & Clinical Pharmacology, 12, 43.
- Jiang, D. (2024). Cognitive load theory and foreign language listening comprehension. Springer.
- Kalmpourtzis, G. (2018). Educational Game Design Fundamentals: A journey to creating intrinsically motivating learning experiences. AK Peters/CRC Press.
- Kampourakis, K., & Reiss, M. (2018). Teaching Biology in Schools: Global Research, Issues, and Trends.
- Karenina, A., Widoretno, S., & Prayitno, B. A. (2020). Effectiveness of problem solving-based module to improve analytical thinking. In *Journal of Physics:* Conference Series (Vol. 1511). IOP Publishing.
- Kim, M., & Diong, C. H. (2012). Biology education for social and sustainable development. Springer Science & Business Media.
- King' ola, C. M., Embeywa, H. E., & Kibet, K. P. (2024). Teacher Preparedness in Use of Instructional Media and the Quality of Learning Outcomes in Biology Theory in Public Secondary Schools in Mwala Sub-County, Machakos

- County, Kenya. International Journal Of Novel Research And Development, 9(6), 824-833.
- Klepsch, M., & Seufert, T. (2020). Understanding instructional design effects by differentiated measurement of intrinsic, extraneous, and germane cognitive load. *Instructional Science*, 48(1), 45-77.
- Konstantara, K., & Xinogalos, S. (2018). Cells of War: A Serious Game for Familiarizing Players With the Immune System. Simulation & Gaming, 49, 567-589.
- Kumar, D., Jaipurkar, R., Shekhar, A., Sikri, G., & Srinivas, V. (2021). Item analysis of multiple choice questions: A quality assurance test for assessment tool. *Medical Journal Armed Forces India*, 77, S85-S89.
- Kwangmuang, P., Jarutkamolpong, S., Duangngern, P., Gessala, N., & Sarakan, P. (2024). Promoting analytical thinking skills development in elementary school students through animated cartoons. Computers in Human Behavior Reports, 15, 100467.
- Kwinram, S., Noisombut, T., & Worapun, W. (2022). The Development of Science Learning Achievement and Analytical Thinking of Grade 7 Students Using 5E Inquiry-Based Learning Cooperated with Graphic Organizers. Journal of Educational Issues, 8, 433.
- Land, S. M. (2024). Instructional Design For Dummies. John Wiley & Sons.
- Lane, C. A. (2021). Handbook of Research on Acquiring 21st Century Literacy Skills Through Game-Based Learning, VOL 1. In Advances in gamebased learning (AGBL) book series. IGI Global.
- Lane, R. (2020). Logic & Analytical Thinking: Solve Complex Problems, Become
 Smarter and Detect Fallacies by Improving Your Rational Thinking, Your
 Reasoning Skills and Your Brain Power, Independently Published.
- Le, T., Bhushan, V., Qiu, C., Chalise, A., Kaparaliotis, P., Coleman, C., Kallianos, K., & Evans, S. (2024). First aid for the USMLE Step 1 2024. McGraw-Hill.
- Lyu, F., Xi, R., & Liu, Y. (2021). Color design in application interfaces for children. Color Research & Application, 47.
- Ma'arif, N. (2023). Pengembangan E-Modul Bioteknologi Berbasis Studi AntiKanker Pada Porifera Secara In Silico Untuk Meningkatkan Kemampuan Berpikir Kritis Siswa SMA [Skripsi]. Jakarta: Fakultas Matematika dan Ilmu Pengetahuan Alam. Universitas Negeri Jakarta.
- Marwan, M., & Kway, E. H. (2017). Development of Learning Aids for Visually Impaired Students using Hannafin Peck Theory. *International Journal of Academic Research in Business and Social Sciences*, 7.

- Maurer, B., & Fuchsberger, V. (2019). Dislocated Boardgames: Design Potentials for Remote Tangible Play. Multimodal Technologies and Interaction, 3, 72.
- Mayer, R. E., & Moreno, R. (2003). Nine Ways to Reduce Cognitive Load in Multimedia Learning. Educational Psychologist, 38(1), 43-52.
- Mayer, R. E., & Moreno, R. (2003). Nine Ways to Reduce Cognitive Load in Multimedia Learning. Educational Psychologist, 38(1), 43-52.
- McKenney, S., & Reeves, T. C. (2021). Educational design research: Portraying, conducting, and enhancing productive scholarship. *Medical Education*, 55(1), 82-92.
- McMillan, J. H. (2023). Classroom Assessment: Principles and Practice That Enhance Student Learning and Motivation. Pears on Education, Incorporated.
- Mihardi, S., Derlina, D., Siregar, A. M., & Simanjuntak, Y. D. P. (2023). The Relationship Between Analytical Skills And The Stages Of The Case Method In Determining The Best Solution. *Jurnal Curere*, 7(2), 25-29.
- Moallem, M., Hung, W., & Dabbagh, N. (2019). The Wiley Handbook of Problem-Based Learning. John Wiley & Sons.
- Morrison, G. R., Ross, S. J., Morrison, J. R., & Kalman, H. K. (2019). Designing Effective Instruction. Wiley.
- Moust, J., Bouhuijs, P., & Schmidt, H. (2021). Introduction to Problem-based Learning: A guide for students. Taylor & Francis.
- Moya-Higueras, J., Solé-Puiggené, M., Vita-Barrull, N., Estrada, V., Guzmán, N., Arias, S., Garcia, X., Ayesa-Arriola, R., & March, J. (2023). Just Play Cognitive Modern Board and Card Games, It's Going to Be Good for Your Executive Functions: A Randomized Controlled Trial with Children at Risk of Social Exclusion. Children, 10.
- Murray, C., Dunstan, M., Heron, C., Holland, L., Palmer, S., Price, D., & Basham, M. (2022). Diamond: The Game a board game for secondary school students promoting scientific careers and experiences. Research for All, 6.
- Nakao, M. (2019). Special series on "effects of board games on health education and promotion" board games as a promising tool for health promotion: a review of recent literature. BioPsychoSocial Medicine, 13.
- Napal Fraile, M., Vázquez Bienzobas, L., Zudaire Ripa, I., & Uriz Doray, I. (2024). The Effect of Adult Intervention in the Development of Science Process Skills. In K. Korfiatis, M. Grace, & M. Hammann (Eds.), Shaping the Future of Biological Education Research: Selected Papers from the ERIDOB 2022 Conference (pp. 51-61). Springer International Publishing.
- Nasional, I. D. P., & (Indonesia), P. B. (2008). Kamus besar bahasa Indonesia Pusat Bahasa. Gramedia Pustaka Utama.

- Natividad, C. (2022). Fundamentals of the Immune System. Arcler Education Incorporated.
- Nautiyal, V. V, Silverio, S. A., & Salvador, E. E. P. (2024). Let's get on-board: a practical framework for designing and implementing educational board games in K-12 classrooms. Frontiers in Education, 9.
- Navarrete, J., Giaconi, V., Contador, G., & Vazquez, M. (2024). Another reason why normalized gain should continue to be used to analyze concept inventories (and estimate learning rates). arXiv Cornell University
- Novitasari, A., Mujianti, A., Solviana, M., Supriyadi, & Kesuma, A. (2024). Analysis of Difficulties Faced by High School Biology Teachers in Pringsewu Regency in Implementing Non-Test Assessments. E3S Web of Conferences, 482.
- Ntumi, S., Agbenyo, S., & Bulala, T. (2023) Estimating the Psychometric Properties ("Item Difficulty, Discrimination and Reliability Indices") of Test Items Using Kuder-Richardson Approach (KR-20). Shanlax International Journal of Education, 11(3), 18-28.
- Nur, F. A., Nuryasin, I., & Wibowo, H. (2024). Implementation of Enhanced Re-Engineering on Trivia Game to Improve Immersion. Game Art, and Gamification, 9, 75-83.
- O'Neill, D. K., & Holmes, P. E. (2022). The Power of Board Games for Multidomain Learning in Young Children. *American Journal of Play*, 14(1), 58-98.
- Obon, A., & Rey, K. A. (2019) Analysis of Multiple-Choice Questions (MCQs): Item and Test Statistics from the 2nd Year Nursing Qualifying Exam in a University in Cavite, Philippines. Abstract Proceedings International Scholars Conference, 7, 499-511.
- Ogawa, J., Olivarez, S., Omalin, J. G., Alva, G. P. N., Nemeño, I. J., & Tiam-Lee, T. J. (2024). Immune Survivors: A Serious Game for Raising Immune System Awareness. In Proceedings of Philippine Computing Science Congress (PCSC2024).
- Paas, F., & Sweller, J. (2014). Implications of cognitive load theory for multimedia learning. The Cambridge Handbook of Multimedia Learning, 27, 27-42.
- Paas, F., & Van Merrienboer, J. J. (2020). Cognitive-load theory: Methods to manage working memory load in the learning of complex tasks. Current Directions in Psychological Science, 29(4), 394-398.
- Padalkar, S., Ramchand, M., Shaikh, R., & Vijaysimha, I. (2022). Science Education: Developing Pedagogical Content Knowledge. Taylor & Francis.

- Perdana, R., Jumadi, J., & Rosana, D. (2019). Relationship between Analytical Thinking Skill and Scientific Argumentation Using PBL with Interactive CK 12 Simulation. *International Journal on Social and Education Sciences*, 1(1), 16-23.
- Pete, B., & Fogarty, R. (2017). Everyday Problem-Based Learning: Quick Projects to Build Problem-Solving Fluency. ASCD.
- Plass, J. L., Mayer, R. E., & Homer, B. D. (2020). Handbook of Game-Based Learning. MIT Press.
- Pradeu, T. (2019). Philosophy of Immunology. In Elements in the Philosophy of Biology. Cambridge University Press
- Prawita, W., Prayitno, B., & Sugiyarto, S. (2019). Effectiveness of a Generative Learning-Based Biology Module to Improve the Analytical Thinking Skills of the Students with High and Low Reading Motivation. *International Journal of Instruction*, 12, 1459-1476.
- Punyasettro, S., & Yasni, P. (2021). A Game-Based Learning Activity to Promote Conceptual Understanding of Chordates' Phylogeny and Self-Efficacy to Learn Evolutionary Biology. European Journal of Educational Research, 10, 1937-1951.
- Putri, I. I., Rahmat, A., & Riandi. (2024). Assessing Genetics Learning Media Effectiveness: Students Perspectives. Proceedings of the 2nd Annual International Conference on Mathematics, Science and Technology Education (AICMSTE 2023), 218-225.
- Quaigrain, K., & Arhin, A. K. (2017). Using reliability and item analysis to evaluate a teacher-developed test in educational measurement and evaluation. Cogent Education, 4(1), 1301013.
- Rahmah, S., & Risnani, L. Y. (2023). Development of educational game-based learning media to improve mastery of ecosystem material in high school students. Practice of The Science of Teaching Journal: Jurnal Praktisi Pendidikan, 2(2), 84-98.
- Ramachandran, K. M., & Tsokos, C. P. (2020). Mathematical Statistics with Applications in R. Academic Press.
- Rasheed, L. (2022). The Effects of a Psycholinguistic Approach to Multisensory Instruction on Psycholinguistic Abilities of Children with Learning Disabilities. PSYCHOLINGUISTICS, 32, 143-162.
- Reformas, I., & Nugrahani, R. (2022). Perancangan Board Game Tentang Ilmuwan Dunia sebagai Media Edukasi untuk Anak *Imajinasi: Jurnal Seni*, 16(2), 37–42.

- Reigeluth, C., & An, Y. (2020). Merging the Instructional Design Process with Learner-Centered Theory: The Holistic 4D Model. Routledge
- Rezigalla, A. A., Eleragi, A. M. E. S. A., Elhussein, A. B., Alfaifi, J., ALGhamdi, M. A., Al Ameer, A. Y., Yahia, A. I. O., Mohammed, O. A., & Adam, M. I. E. (2024). Item analysis: the impact of distractor efficiency on the difficulty index and discrimination power of multiple-choice items. BMC Medical Education, 24(1), 445.
- Ristanto, R., Rusdi, R., Mahardika, R., Ismirawati, N., & Darmawan, E. (2020). Digital Flipbook Imunopedia (DFI): A Development in Immune System e-Learning Media. *International Journal of Interactive Mobile Technologies* (IJIM), 14, 140-162.
- Rivard, R. S. (2024). Enhancing student engagement with introductory microbiology and immunology topics using a novel board game. Journal of Microbiology & Biology Education, 25(3).
- Rogers, S. (2023). Your Turn!: The Guide to Great Tabletop Game Design. Wiley.
- Rutherford, A. (2019). The Systems Thinker-Analytical Skills:Level Up Your Decision Making, Problem Solving, and Deduction Skills, Notice The Details Others Miss. Vdz.
- Samarasinghe, D., Barlow, M., Lakshika, E., Lynar, T., Moustafa, N., Townsend, T., & Turnbull, B. (2021). A Data Driven Review of Board Game Design and Interactions of Their Mechanics. IEEE Access, PP, 1.
- Santiago, J. M., & David, E. S. (2019). The use of two media of instruction in biology: a quasi-experimental study. International Journal of Advanced Engineering, Management and Science, 5(2), 111-115.
- Saro, J., Bello, J., Concon, L., Polache, M., Ayaton, M., Manlicayan, R., & Campomanes, J. (2023). Contextualized and Localized Science Teaching and Learning Materials and Its Characteristics to Improve Students' Learning Performance. 7, 77-84.
- Sartika, S. (2018). Teaching Models to Increase Students' Analytical Thinking Skills. Routledge
- Schaaf, D. (2013). The Instructional Design Knowledge Base: Theory, Research, and Practice. Performance Improvement, 52.
- Siani, M., Dubovi, I., Borushko, A., & Haskel-Ittah, M. (2024). Teaching immunology in the 21st century: a scoping review of emerging challenges and strategies. *International Journal of Science Education*, 46.
- Simamora, A. H., Agustini, K., Sudatha, I. G. W., & Suartama, I. K. (2024). Enhancing teaching materials development course with the ICARE learning

- model in e-learning. Journal of Education and Learning (EduLearn), 18(4), 1543-1552.
- Slack, J. (2017). The Board Game Designer's Guide: The Easy 4 Step Process to Create Amazing. Games that People Can't Stop Playing. Crazy Like a Box.
- Smaldino, S. E., Lowther, D. L., & Russell, J. D. (2014). Instructional Technology & Media For Learning: Teknologi Pembelajaran dan Media untuk Belajar.
- Snapir, Z., Eberbach, C., Ben-Zvi-Assaraf, O., Hmelo-Silver, C., & Tripto, J. (2017). Characterising the development of the understanding of human body systems in high-school biology students-a longitudinal study. *International Journal of Science Education*, 39(15), 2092-2127.
- Solis, D. (2024). Graphic Design for Board Games. CRC Press.
- Sompayrac, L. M. (2022). How the Immune System Works. Wiley.
- Spector, J., Merrill, M. D., Elen, J., & Bishop, M. J. (2014). Handbook of research on educational communications and technology: Fourth edition. In Handbook of Research on Educational Communications and Technology: Fourth Edition.
- Sternberg, R. J., Kaufman, J. C., & Karami, S. (2023). Intelligence, creativity, and wisdom: exploring their connections and distinctions. Palgrave Macmillan.
- Sternberg, R. J., Kaufman, J., & Grigorenko, E. L. (2008) *The Essential Sternberg: Essays on Intelligence, Psychology, and Education.* Springer Publishing Company
- Stevenson, A. (2010). Oxford Dictionary of English. In Oxford Dictionary of English. OUP Oxford.
- Stranford, S. A., Owen, J. A., Mercer, F., & Pollock, R. R. (2020). Active Learning and Technology Approaches for Teaching Immunology to Undergraduate Students. Frontiers in Public Health, 8
- Sugianto, A., & Others. (2020). Item analysis of English summative test: Efl teacher-made test. Indonesian EFL Research and Practices, 1(1), 35-54.
- Suwarno, R. N. (2019). Development of Bio-Monopoli of Human Musculoskeletal System as Learning Media for High School Students. In Journal of Physics: Conference Series (Vol. 1241). IOP Publishing.
- Suyatman, S., Saputro, S., Sunarno, W., & Sukarmin, S. (2021). Profile of Student Analytical Thinking Skills in the Natural Sciences by Implementing Problem-Based Learning Model. Journal of Educational, Cultural and Psychological Studies (ECPS Journal), 2021.

- Szilágyi, S., Palencsár, E., Körei, A., & Török, Z. (2024). Examining the Effectiveness of Non-Digital Game-Based Learning among University Computer Science Students on the Topic of Improper Integrals.
- Tahir, R., & Wang, A. I. (2024). Evaluating the effectiveness of game-based learning for teaching refugee children Arabic using the integrated LEAGUÊ-GQM approach. Behaviour & Information Technology, 43(1), 110-138.
- Tan, W. H. (2018). Design, Motivation, and Frameworks in Game-Based Learning. In Advances in Game-Based Learning (2327-1825). IGI Global.
- Ternieten, M., & Elster, D. (2024). Diagnosing of Valuing and Decision-Making Competencies in Biology Lessons. In K. Korfiatis, M. Grace, & M. Hammann (Eds.), Shaping the Future of Biological Education Research: Selected Papers from the ERIDOB 2022 Conference (pp. 163-175). Springer International Publishing.
- Toda, A., Cristea, A. I., & Isotani, S. (2023). Gamification Design for Educational Contexts: Theoretical and Practical Contributions. Springer International Publishing.
- Trowsdale, J. (2024). What the Body Knows: A Guide to the New Science of Our Immune System. Yale University Press.
- Tsai, Y.-L., & Tsai, C.-C. (2020) A meta-analysis of research on digital gamebased science learning. *Journal of Computer Assisted Learning*, 36.
- Uda, S. (2024). Development of Mobile Learning Application System for Environmental Science Material (SARITHA-Apps). International Journal of Information and Education Technology, 14, 452-463.
- Uddin, I., Uddin, I., Rehman, I. U., Siyar, M., & Mehboob, U. (2020). Item analysis of multiple choice questions in pharmacology. *Journal of Saidu Medical College, Swat*, 10(2).
- Udeozor, C., Toyoda, R., Russo Abegão, F., & Glassey, J. (2023). Digital games in engineering education: systematic review and future trends. European Journal of Engineering Education, 48(2), 321-339.
- Ummah, A. A. N., & Subiantoro, A. W. (2024). Efektivitas Website Pembelajaran Biologi Berbasis Socio-Scienific Issues (SSI) terhadap Keterampilan Argumentasi Peserta Didik: (The Effectiveness of Socio-Scientific Issues (SSI) Based Biology Learning Website toward Students. Argumentation Skill). BIODIK, 10(3), 347-357.
- Utomo, P. W., & Muna, I. A. (2024). Comparison effectiveness of e-booklets and videos based on SESD on students' analytical thinking skills. *JPBIO (Jurnal Pendidikan Biologi)*, 9(1), 74-84.

- Van den Akker, J., Plomp, T., Bannan, B., Nieveen, N., Kelly, A. E., Plomp, T., Gravemeijer, K., Cobb, P., Folmer, E., Nieveen, E., & Others. (2013). Educational Design Research: An Introduction. Netherlands Institute for Curriculum Development.
- Villias, G., & Winterbottom, M. (2024). Facilitating the practice of 4C skills in biology education through educational escape rooms. Shaping the Future of Biological Education Research, 63.
- Vita-Barrull, N., Estrada-Plana, V., March-Llanes, J., Sotoca-Orgaz, P., Guzmán, N., Ayesa, R., & Moya-Higueras, J. (2024). Do you play in class? Board games to promote cognitive and educational development in primary school: A cluster randomized controlled trial. Learning and Instruction, 93.
- Walker, A. E., Leary, H., Hmelo-Silver, C. E., & Ertmer, P. A. (2015). Essential Readings in Problem-based Learning. Purdue University Press.
- Wardani, A. D. P., Fadly, W., & Zayas, J. D. M. (2024). Improving 8th Grade Students' Contextualized Problem-Solving and Analytical Thinking Skills through Problem-Based Learning in the Digestive System: A Study Intervention Findings in the Complex Domain. Journal of Science Learning, 7(2), 165-177.
- Weng, C., Otanga, S., Christianto, S. M., & Chu, R. J.-C. (2020). Enhancing students' biology learning by using augmented reality as a learning supplement. Journal of Educational Computing Research, 58(4), 747-770.
- Wenzel, A., & Grotjohann, N. (2022). Students' Opinions About Interdisciplinary Lessons. In Current Research in Biology Education: Selected Papers from the ERIDOB Community (pp. 197-208). Springer.
- Work, K. A., Gibbs, M. A., & Friedman, E. J. (2015). The immune system game. The American Biology Teacher, 77(5), 382-390.
- Wright, J. D. (2015). International Encyclopedia of the Social & Behavioral Sciences. Elsevier Science.
- Wu, W. H., Hsiao, H. C., Wu, P. L., Lin, C. H., & Huang, S. H. (2012). Investigating the learning-theory foundations of game-based learning: a meta-analysis. Journal of Computer Assisted Learning, 28(3), 265-279.
- Yudistira, O. K., Syamsurizal, S., Helendra, H., & Attifah, Y. (2021). Analisis kebutuhan pengembangan booklet sistem imun manusia sebagai suplemen bahan ajar biologi kelas XI SMA. *Journal for Lesson and Learning Studies*, 4(1), 39-44.
- Yuliani, D. S., & Ramli, M. (2023). Differences of Students' Responses on using Card-Board Game and Mobile Game of Membrane Transport. In 6th International Conference on Learning Innovation and Quality Education (pp. 728-736). Atlantis Press.

- Yunita, D. C., & Martini, M. (2025). Efektivitas Inkuiri Terbimbing dalam Meningkatkan Keterampilan Proses Sains Siswa SMP. Jurnal Basicedu, 9(1), 258-265.
- Yusup, M., & Sakdiah, L. (2025). Implementation of Contextual Approach Based on Questioning in Biology Learning on Human Movement Material at MTs Assyafi'iyah NW Penangsak. Jurnal Ilmiah Profesi Pendidikan, 10(1), 474–482.
- Zedalis, J., & Eggebrecht, J. (2018). Biology for AP® Courses. OpenStax College, Rice University.
- Zhang, L., Bowman, D., & Jones, C. (2019). Enabling Immunology Learning in Virtual Reality Through Storytelling and Interactivity (pp. 410–425).

