THE IMPROVEMENT OF STUDENTS' CRITICAL THINKING ABILITY BY IMPLEMENTING 5E-LEARNING CYCLE MODEL IN EXCRETORY SYSTEM IN HUMAN TOPIC

RESEARCH PAPER

Submitted as Requirement to Obtain Degree of *Sarjana Pendidikan* in
International Program on Science Education (IPSE) Study Program

Arranged by:
Anisya Dwi Agustin
1807908

INTERNATIONAL PROGRAM ON SCIENCE EDUCATION
FACULTY OF MATHEMATICS AND SCIENCE EDUCATION
UNIVERSITAS PENDIDIKAN INDONESIA
2023

The Improvement of Students' Critical Thinking Ability by Implementing 5E-Learning Cycle Model in Excretory System in Human Topic

Oleh

Anisya Dwi Agustin

Sebuah skripsi yang diajukan untuk memenuhi salah satu syarat memperoleh gelar Sarjana Pendidikan pada Fakultas Pendidikan Matematika dan Ilmu Pengetahuan Alam

Universitas Pendidikan Indonesia

Agustus 2023

APPROVAL SHEET

THE IMPROVEMENT OF STUDENTS' CRITICAL THINKING ABILITY BY IMPLEMENTING 5E-LEARNING CYCLE MODEL IN EXCRETORY SYSTEM IN HUMAN TOPIC

By:

Anisya Dwi Agustin

1807908

Approved and Confirmed by Supervisor:

Supervisor I

Dr. Rika Rafikah Agustin, M. Pd.
NIP. 198308032012122001

Supervisor II

Dr. Lilit Rusyati, M. Pd.
NIP. 198704202012122001

Perceived by,

Head of International Program on Science Education Study Program

Prof. Dr. Ida Kaniawati, M. Si.
NIP. 196807031992032001

DECLARATION

I do hereby declare that every aspect was written in this paper entitled "The Improvement of Students' Critical Thinking Ability by Implementing 5E-Learning Cycle Model in Excretory System in Human Topic" the results is original based from my idea, efforts, work without plagiarizing from other papers. The theories, opinions, instrument of questions, and others information that are contained in this paper have been quoted and referenced based on scientific code of UPI, and accord with scientific ethics that applies in academic society. This declaration created honestly and consciously. If this research considered to be violates of scientific ethics, or there is a claim by the other to the authenticity of this research paper, I am will accept the authorization of scholars or copyright. I am willing to take responsible and accepted the academic sanctions correspond to the rules.

Bandung, August 2023

Declarant,

Anisya Dwi Agustin

NIM. 1807908

ACKNOWLEDGEMENT

The author praise and gratitude to Allah SWT for his mercy and blessing, so the author can completed this research paper. Therefore, in this occasion the author would like to express the sincere gratitude because without the support from all people the author can't made it, the author would like to appreciation to the following persons :

1. Dr. Rika Rafikah Agustin, M.Pd. as my first supervisor who always guides me to complete this research paper and encourages also motivate the author to finish this research paper until the end.
2. Dr. Lilit Rusyati, M.Pd. as my second supervisor, thank you for always being by my side, for all the encouragement, guidance and motivation to the author from the first until the end. Thank you for being so supportive all the time.
3. Prof. Dr. Ida Kaniawati, M.Si. as the Head of International Program on Science Education (IPSE) Department. Thank you for your support, dedication and giving the best for our study program.
4. Dr. Lilit Rusyati, M.Pd and Mr. Ikmanda Nugraha, M.Pd. as academic supervisors who always take care and motivate IPSE 2018 batch in every situations, and always patiently for guiding us since our first day.
5. All the IPSE lecturers, laboratory assistant, and administration staff. Thank you for all your help, support, motivation, guidance, knowledge and patience during the academic process when the author study in IPSE.
6. Ar Rafi Drajat Junior High School, for the headmaster and all the teacher. Thank you for letting the author to conduct this research and also helping the author to learn so many lesson to become a good teacher, that author cannot get from a college
7. My beloved parents, Mama and Ayah who always give me a lot of support and love for me, thank you for patiently guiding and support the author to finding the journey

8. My dearest brothers and sister, Ade, Abang, Aa, who giving me a lot of love and support, thank you for always listening my random story in my life
9. All IPSE 2018 Students' thank you for all the memories, supports and experiences during the college life, thank you for always make authors college life more colorful
10. My dearest friends from "Nut Squad Girls" and also Saskia, thank you for always become my comfort place, for emotional support, and always there if I have some trouble, and need some healing when writing this research paper
11. Bu Apo squad, Teh Rossy, Teh Sofi, Teh Ia, and also Ica, Thank you for giving me comfort zone like in my home, when my family is not around when the author in college
12. Last but not least, for myself thank you for not giving up!

THE IMPROVEMENT OF STUDENTS' CRITICAL THINKING ABILITY BY IMPLEMENTING 5E-LEARNING CYCLE MODEL IN EXCRETORY SYSTEM IN HUMAN TOPIC

Anisya Dwi Agustin

International Program on Science Education

anisyadagstn@upi.edu

ABSTRACT

Critical thinking ability are one of the ability that students need in their education life. In Indonesia, the development method for students' critical thinking ability is still low. This study aims to investigate students' critical thinking ability in excretory system in human topic, by implementing 5E-learning cycle. This research used pre-experimental method with one group pretest-posttest design. 21 students' on the 8th grade participated in this study from one of the junior high schools in Bandung, Indonesia. In this study, the researcher used ACTA (Assessment of Critical Thinking Ability) to measure students' critical thinking ability, and also there were objective instrument tests to analyze the improvement. The data result from the instrument was analyzed using SPSS 24 version software and used parametric test because that data was distributed normally. The result of students' critical thinking ability with paired t-test is sig 2-Tailed 0.000, with hypothesis (sig < 0.05) and it is significant different. The critical thinking level also improves from the challenged thinker to the beginning thinker. According to all the results, there is an improvement in students' critical thinking ability. Even though the improvement is still low, the 5E-learning cycle model can be implemented to improve students' critical thinking ability in science learning.

Keywords: 5E-Learning Cycle Model, ACTA, Critical Thinking Ability, Excretory System in Human

PENINGKATAN KEMAMPUAN BERPIKIR KRITIS SISWA DENGAN MENGIMPLEMENTASIKAN MODEL SIKLUS PEMBELAJARAN 5E PADA TOPIK SISTEM EKSKRESI PADA MANUSIA

Anisya Dwi Agustin

International Program on Science Education

anisyadagstn@upi.edu

ABSTRAK

Kemampuan berpikir kritis merupakan salah satu kemampuan yang dibutuhkan siswa dalam kehidupan pendidikannya. Di Indonesia, metode pengembangan kemampuan berpikir kritis siswa masih rendah. Penelitian ini bertujuan untuk mengetahui kemampuan berpikir kritis siswa pada sistem ekskresi pada materi manusia, dengan menerapkan *5E-Learning Cycle Model.* Penelitian ini menggunakan metode *pre-experimental* dengan desain *one group pretest-posttest design.* Studi ini diikuti oleh 21 siswa kelas 8 dari salah satu sekolah menengah pertama di Bandung, Indonesia. Dalam penelitian ini, peneliti menggunakan ACTA *(Assessment of Critical Thinking Ability)* untuk mengukur kemampuan berpikir kritis siswa, dan juga terdapat tes instrumen objektif untuk menganalisis peningkatannya. Data hasil instrumen dianalisis menggunakan software SPSS versi 24 dan menggunakan uji parametrik karena data terdistribusi normal. Hasil kemampuan berpikir kritis siswa dengan uji paired t-test adalah sig 2-Tailed 0,000, dengan hipotesis (sig < 0.05) dan berbeda signifikan. Tingkat berpikir kritis juga meningkat dari *challenged thinker* menjadi *beginning thinker*. Menurut semua hasil, ada peningkatan kemampuan berpikir kritis siswa. Meskipun peningkatannya masih rendah, *5E-Learning Cycle Model* dapat diimplementasikan untuk meningkatkan kemampuan berpikir kritis siswa dalam pembelajaran *science*.

Keywords: Model Siklus Pembelajaran 5E, ACTA, Kemampuan Berpikir Kritis, Sistem Ekskresi pada Manusia.

TABLE OF CONTENT

LIST OF TABLES

LIST OF FIGURES

LIST OF APPENDICES

REFERENCES

Ahmatika, D. (2017). Peningkatan Kemampuan Berpikir Kritis Siswa Dengan Pendekatan Inquiry/Discovery. *Euclid*, *3*(1), 394–403. https://doi.org/10.33603/e.v3i1.324

Aktamis, H., & Yenice, N. (2010). *Determine of The Science Process Skills and Critical Thinking Skill Levels.* Procedia Social and Behavioral Science 2.

Amaliyah, T., Supeno, & Rusdianto. (2021). The Effect of the Application of the 5E Learning Cycle Model on Mathematical Communication Skills in Junior High School Students. *Journal of Educational Sciences*, *5*(2), 257. https://doi.org/10.31258/jes.5.2.p.257-266

Ariyana, Y., Pudjiastuti, A., & Bestary, R. (2018). *Buku pegangan pembelajaran berorientasi pada keterampilan berpikir tingkat tinggi : prigram peningkatan kompetensi pembelajaran berbasis zonasi.* Direktorat Jenderal Guru dan Tenaga Kependidikan.

Azizah, M., Sulianto, J., & Cintang, N. (2018). Analysis of Critical Thinking Skills of Elementary School Students in Learning Mathematics Curriculum 2013. *Jurnal Penelitian Pendidikan*, *35*(1), 61–70.

Bahr, N. (2010). Thinking Critically about Critical Thinking in Higher Education. *International Journal for the Scholarship of Teaching and Learning*, *4*(2). https://doi.org/10.20429/ijsotl.2010.040209

Bergfelt, D. R. (2008). Anatomy and Physiology of the Mare. *Equine Breeding Management and Artificial Insemination, Second Edition*, 113–131. https://doi.org/10.1016/B978-1-4160-5234-0.00011-8

Billah, A., Masykuri, M., Sarwanto, & Sajidan. (2021). Analysis of critical thinking in junior high school students through science learning in Indonesia: A systematic review. *IOP Conference Series: Earth and Environmental Science*, *1796*(1). https://doi.org/10.1088/1742-6596/1796/1/012013

Biruni, I. B., Suwono, H., & Sueb. (2020). Fostering student' critical thinking skills in respiratory and excretory system classroom through 5E learning cycle in 11th grade SMAN 2 Malang. *AIP Conference Proceedings*, *2215*. https://doi.org/10.1063/5.0000567

Bransford, J. D., Brown, A. L., & Cocking, R. R. (1999). *How people learn: Brain, mind, experience, and school.* National Academy Press.

Burke, A. (2011). How To Use Groups Effectivley. *The Journal of Effective Teaching*, *11*(2), 87–95.

Bybee, R. W. (2014). *The BSCS 5E Instructional Model: Personal Reflections and Contemporary Implications.* (51(8)). Science and Children.

Bybee, R. W., Powell, J. C., & Trowbridge., L. W. (2008). *Teaching secondary school science : strategies for developing scientific literacy* (9th ed).

Bybee, R. W., Taylor, J. A., Gardner, A., Scotter, P. Van, Powell, J. C., Westbrook, A., & Landes, N. (2006). *The BSCS 5E Inst*. *719*, 531–5550.

Cahyono, B. (2017). Analisis Ketrampilan Berfikir Kritis Dalam Memecahkan Masalah Ditinjau Perbedaan Gender. *Aksioma*, *8*(1), 50. https://doi.org/10.26877/aks.v8i1.1510

Choowong, K., & Worapun, W. (2021). The Development of Scientific Reasoning Ability on Concept of Light and Image of Grade 9 Students by Using Inquiry-Based Learning 5E with Prediction Observation and Explanation Strategy. *Journal of Education and Learning*, *10*(5), 152. https://doi.org/10.5539/jel.v10n5p152

Choy, S. C., & Phaik Kin Cheah. (2020). Teacher Perceptions of Critical Thinking among Students and Its Influence on Higher Education. *International Journal of Research in Science and Technology*, *10*(4), 198–206. https://doi.org/10.37648/ijrst.v10i04.002

Coletta, V. P., & Steinert, J. J. (2020). Why normalized gain should continue to be used in analyzing preinstruction and postinstruction scores on concept inventories. *Physical Review Physics Education Research*, *16*(1), 10108. https://doi.org/10.1103/PhysRevPhysEducRes.16.010108

Dehghani, M., Mirdoraghi, F., & Pakmehr, H. (2011). The role of graduate students' achievement goals in their critical thinking disposition. *Procedia - Social and Behavioral Sciences*, *15*, 2426–2430. https://doi.org/10.1016/j.sbspro.2011.04.121

Dörnyei, Z., & Dewaele, J.-M. (2022). *Questionnaires in Second Language Research. Construction, Administration and Processing* (3rd editio). New York: Routledge - Taylor & Francis.

Duron, R., Limbach, B., & Waugh, W. (2006). Critical Thinking Framework For Any Discipline. *International Journal of Teaching and Learning in Higher Education*, *17*(2), 160–166.

Ergin, İ. (2012). Constructivist approach based 5E model and usability instructional physics. *Am. J. Phys. Educ*, *6*(1), 14.

Facione, P. A. (2000). The Disposition Toward Critical Thinking: Its Character, Measurement, and Relationship to Critical Thinking Skill. *Informal Logic*, *20*(1). https://doi.org/10.22329/il.v20i1.2254

Fatmawati, A., Zubaidah, S., Mahanal, S., & Sutopo. (2019). Critical Thinking, Creative Thinking, and Learning Achievement: How They are Related. *Journal of Physics: Conference Series*, *1417*(1). https://doi.org/10.1088/1742-6596/1417/1/012070

Fin, L. S., & Ishak, Z. (2012). A Priori Model of Students' Academic Achievement: The Effect of Gender as Moderator. *Procedia - Social and Behavioral Sciences*, *65*(December 2012), 1092–1100. https://doi.org/10.1016/j.sbspro.2013.02.122

Forbes, D., Fosbery, R., Fullick, A., Newman, V., Noris, R., & Ryan, L. (2018). *Oxford Education 8 Grades ; Amazing Science* (pp. 102–114).

Fraenkel, J. R., Wallen, N. E., &, & Hyun, H. H. (2011). How to desIgn and evaluate research In educatIon (8th ed.). In *8th ed.* (8th ed). Mc Graw HIll.

Fraenkel, J. R., & Wallen, N. E. (2012). *How to Design and Evaluate Research in Education* (6th ed.). McGraw-Hill.

Glaze, A. L. (2018). Teaching and learning science in the 21st century: Challenging critical assumptions in post-secondary science. *Education Sciences*, *8*(1), 1–8. https://doi.org/10.3390/educsci8010012

Greenstein, L. M. (2012). *Assessing 21st Century Skills: A Guide to Evaluating Mastery and Authentic Learning.* Corwin Press.

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. https://doi.org/10.1119/1.18809

Hanuscin, D. L. (2008). *Using the Learning Cycle as a Model for Teaching the Learning Cycle to Preservice Elementary Teachers*. *20*(2), 51–66.

Haseli, Z., & Rezaii, F. (2013). The Effect of Teaching Critical thinking on Educational Achievement and Test Anxiety among Junior High School Students in Saveh. *European Online Journal of Natural and Social Sciences*, *2*(2), 168–175. http://www.european-science.com168

Hattie, John, Gan, Mark, A., & Brooks, C. (2017). Instruction based on feedback. In R. E. M. and P. A. Alexander (Ed.), *Handbook of research on learning and instruction* (2nd ed.). Taylor and Francis. https://doi.org/https://doi.org/10.4324/9781315736419-23

Irhamna, H. R., & Murdani, E. (2017). *Penerapan Model Learning Cycle 5E untuk Meningkatkan Keterampilan Jurnal Fisika FLUX Penerapan Model Learning Cycle 5E untuk Meningkatkan Keterampilan Berpikir Kritis Siswa Pada Materi Fluida Statis Kelas VIII*. *March*. https://doi.org/10.20527/flux.v14i1.3839

Jackson, J., Dukerich, L., & Hestenes, D. (2005). Modeling Instruction : An Effective Model for Science Education. *Science Educator*, *17*(1), 10–17.

Jobrack, B. (2013). The 5E Instructional Model. *Science, Technology, Engineering and Mathematics*, 1–11.

Jones, J. M. (2014). Discussion group effectiveness is related to critical thinking through interest and engagement. *Psychology Learning and Teaching*, *13*(1), 12–24. https://doi.org/10.2304/plat.2014.13.1.12

Joshi, A., Kale, S., Chandel, S., & Pal, D. (2015). Likert Scale: Explored and Explained. *British Journal of Applied Science & Technology*, *7*(4), 396–403. https://doi.org/10.9734/bjast/2015/14975

Kalina, C. J., & Powell, K. C. (2009). *Cognitive and social constructivism: Developing tools for an effective classroom*. 10. http://www.projectinnovation.biz/education_2006.html

Kelly, A. V. (2009). *The Curriculum: Theory and Practice* (6th ed.). Sage publications.

Kuhn, D. (1999). A developmental model of critical thinking. *Educational Researcher*, *28*(2), 16–46. https://doi.org/10.3102/0013189X028002016

Kumar, P. (2016). Excretory System : A System of Our Body. *International Journal of Appl Ied Research*, *2*(5), 1110–1112.

Lawshe, C. H. (1975). *A quantitative approach to content validity*. *28(4)*, 563–575. https://doi.org/https://doi.org/10.1111/j.1744-6570.1975.tb01393

Levene, H. (1960). *Robust Tests for Equality of Variances* (2th ed.). Palo Alto, CA: Stanford University Press.

Lin, J. L., Cheng, M. F., Chang, Y. C., Li, H. W., Chang, J. Y., & Lin, D. M. (2014). Learning activities that combine science magic activities with the 5E instructional model to influence secondary-school students' attitudes to science. *Eurasia Journal of Mathematics, Science and Technology Education*, *10*(5), 415–426. https://doi.org/10.12973/eurasia.2014.1103a

Mackean, D. G., & Hayward, D. (2014). *Biology* (Third Edit). Hodder Education.

Mahanal, S., Tendrita, M., Ramadhan, F., Ismirawati, N., & Zubaidah, S. (2019). The Analysis of Students' Critical Thinking Skills on Biology Subject. *Anatolian Journal of Education*, *2*(2). https://doi.org/10.29333/aje.2017.223a

Marin, L. M., & Halpern, D. F. (2011). Pedagogy for developing critical thinking in adolescents: Explicit instruction produces greatest gains. *Thinking Skills and Creativity*, *6*(1), 1–13. https://doi.org/10.1016/j.tsc.2010.08.002

Mbato, C. L. (2019). Indonesian EFL Learners' Critical Thinking in Reading: Bridging the Gap between Declarative, Procedural and Conditional Knowledge. *Jurnal Humaniora*, *31*(1), 92. https://doi.org/10.22146/jh.v31i1.37295

Miarti, E., Hasnunidah, N., & Abdurrahman, A. (2021). The Effect of Learning Cycle 5E on Critical Thinking Skills for Junior High School Students.

Scientiae Educatia, *10*(2), 177. https://doi.org/10.24235/sc.educatia.v10i2.9127

Minium, E. W., King, B. M., & Bear, G. (1993). *Statistical Reasoning in Psychology and Education* (K. Dubno (ed.); 3rd ed.). John Wiley & Sons, Inc.

Mishra, P., Pandey, C. M., Singh, U., Gupta, A., Sahu, C., & Keshri, A. (2019). Descriptive statistics and normality tests for statistical data. *Annals of Cardiac Anaesthesia*, *22*(1), 67–72. https://doi.org/10.4103/aca.ACA_157_18

Nieveen, N. (1999). Prototyping to Reach Product Quality. *Design Approaches and Tools in Education and Training*, 125–135. https://doi.org/10.1007/978-94-011-4255-7_10

Nugraheni, D., Suyanto, S., & Harjana, T. (2017). Pengaruh siklus belajar 5E terhadap kemampuan literasi sains pada materi sistem saraf manusia. *Jurnal Prodi Pendidikan Biologi*, *6*(4), 178–188.

Ören, F. Ş., & Tezcan, R. (2009). İlköğretim 7. Sınıf Fen Bilgisi Dersinde Öğrenme Halkası Yaklaşımının Öğrencilerin Tutumları Üzerine Etkisi. *Elementary Education Online*, *8*(1), 103–118.

Paul, R., & Elder, L. (2006). Critical Thinking: The Nature of Critical and Creative Thought. In *Journal of Developmental Education: Vol. 30(2)* (pp. 34-35.).

Paul, R., & Elder, L. (2019). *The Miniature Guide to Critical Thinking Concepts and Tools Thinker's Guide Library* (8th ed.). Rowman & Littlefield.

Price, G., & Group, D. (2006). *Biology: An Illustrated Guide to Science Science visual resources*. Chelsea House Publishers.

Puspaningsih, A. R., Tjahjadarmawan, E., & Krisdianti, N. R. (2021). *Ilmu Pengetahuan Alam*.

Rodriguez, S., Allen, K., Harron, J., & Qadri, S. A. (2019). Making and the 5E Learning Cycle. *The Science Teacher*, *086*(05). https://doi.org/10.2505/4/tst18_086_05_48

Royhana, U., Sumiharsono, R., & Septory, B. J. (2021). Analysis of students' mathematical critical thinking ability on the problem of algebraic factorization and implementation of cooperative learning in the type of student teams achievement divisions to improve students' critical thinking ability. *Journal of Physics: Conference Series*, *1836*(1). https://doi.org/10.1088/1742-6596/1836/1/012054

Salyani, R., Nurmaliah, C., & Mahidin, M. (2020). Application of the 5E learning cycle model to overcome misconception and increase student learning activities in learning chemical bonding. *Journal of Physics: Conference Series*, *1460*(1). https://doi.org/10.1088/1742-6596/1460/1/012102

Silviariza, W., Yunia, Sumarmi, Handoyo, & Budi. (2021). Improving critical thinking skills of geography students with spatial-problem based learning (SPBL). *International Journal of Instruction*, *14*(3), 133–152. https://doi.org/10.29333/iji.2021.1438a

Simanullang, M. C. (2018). *The Implementation of 5E Learning Cycle Model by Using Virtual Manipulatives to Improve Students ' Understanding Toward Mathematical Objects*. *9*(6), 60–64.

Subiantoro, A. W., & Mutiarani, Y. P. (2021). Promoting health education through biology: The effectivity of a 5E-learning scenario on nutrition and digestive system topic towards high school students' health literacy. *Journal of Physics: Conference Series*, *1806*(1), 0–7. https://doi.org/10.1088/1742-6596/1806/1/012156

Sugiarti, A. C., Suyatno, S., & Sanjaya, I. G. M. (2018). The development of learning material using learning cycle 5E model based stem to improve students' learning outcomes in Thermochemistry. *Journal of Physics: Conference Series*, *1006*(1), 0–7. https://doi.org/10.1088/1742-6596/1006/1/012039

Suryawati, E., Natalina, M., Nadia, & Deswati. (2018). *The Implementation of 5E Learning Cycle Model on The Topic 'Structure and Function of Plants' to Improve the Scientific Literacy of the Second Year Students of a Junior High School in Pekanbaru*. *2*(2), 26–33.

Susilawati, E., Agustinasari, A., Samsudin, A., & Siahaan, P. (2020). Analisis Tingkat Keterampilan Berpikir Kritis Siswa SMA. *Jurnal Pendidikan Fisika Dan Teknologi*, *6*(1), 11–16. https://doi.org/10.29303/jpft.v6i1.1453

Suwito, Budijanto, Handoyo, B., & Susilo, S. (2020). The effects of 5E learning cycle assisted with spatial based population geography textbook on students' achievement. *International Journal of Instruction*, *13*(1), 315–324. https://doi.org/10.29333/iji.2020.13121a

Syabila, R. D. (2021). *Lack of Literacy and Critical Thinking Ability in Indonesia Society*. *November*. https://www.researchgate.net/publication/355926497

Syofni. (2018). *The Implementation of Learning Cycle 5E to Improve Learning Outcomes of Number Theory of Mathematics Education Study Program Students of Riau University*. 978–979.

Taghva, F., Rezaei, N., Ghaderi, J., & Taghva, R. (2014). Studying the Relationship between Critical Thinking Skills and Students' Educational Achievement (Eghlid Universities as Case Study). *International Letters of Social and Humanistic Sciences*, *25*, 18–25. https://doi.org/10.18052/www.scipress.com/ilshs.25.18

Taylor, B. M., & Pearson, P. D. (2004). Research on learning to read-at school, at

home, and in the community. *Elementary School Journal*, *105*(2), 167–181. https://doi.org/10.1086/428863

Thompson, C. (2011). Critical Thinking across the Curriculum: Process over Output. *International Journal of Humanities and Social Science*, *1*(9), p4.

Tiruneh, D. T., Verburgh, A., & Elen, J. (2014). Effectiveness of Critical Thinking Instruction in Higher Education: A Systematic Review of Intervention Studies. *Higher Education Studies*, *4*(1). https://doi.org/10.5539/hes.v4n1p1

Trimawati, K., Kirana, T., & Raharjo, R. (2020). PENGEMBANGAN INSTRUMEN PENILAIAN IPA TERPADU DALAM PEMBELAJARAN MODEL PROJECT BASED LEARNING (PjBL) UNTUK MENINGKATKAN KEMAMPUAN BERPIKIR KRITIS DAN KREATIF SISWA SMP. *Quantum: Jurnal Inovasi Pendidikan Sains*, *11*(1), 36. https://doi.org/10.20527/quantum.v11i1.7606

Turda, E. S. (2021). *The Impact of Teacher's Feedback in Increasing Student's Self-Efficacy and Motivation*. 507–519. https://doi.org/10.15405/epsbs.2021.03.02.52

Ulaş, A. H., Sevim, O., & Tan, E. (2012). The effect of worksheets based upon 5e learning cycle model on student success in teaching of adjectives as grammatical components. *Procedia - Social and Behavioral Sciences*, *31*(2011), 391–398. https://doi.org/10.1016/j.sbspro.2011.12.072

Wati, I., Koeshandayanto, S., & Ibrohim, I. (2021). Pengaruh Model Pembelajaran Learning Cycle 5E terhadap Keterampilan Berpikir Kritis dan Penguasaan Konsep. *Jurnal Pendidikan: Teori, Penelitian, Dan Pengembangan*, *6*(8), 1218. https://doi.org/10.17977/jptpp.v6i8.14949

White, B. B., Stains, M., Escriu-sune, M., Medaglia, E., & Rostamnjad, L. (2011). A Novel Instrument for Assessing. *Journal of College Science Teaching*, *40*, 102–107.

William D. James, Elston, D. M., Treat, J. R., & Rosenbach, M. A. (2019). *Andrews' Diseases of the Skin: Clinical Dermatology* (13th editi). Elsevier; 13th edition (April 24, 2019).

Yeni, N., Suryabayu, E. P., & Handayani, T. (2017). *The Effect of Teaching Model 'Learning Cycles 5E' toward Students' Achievement in Learning Mathematic at X Years Class SMA Negeri 1 Banuhampu 2013/2014 Academic Year*. https://doi.org/10.1088/1742-6596/755/1/011001

York, T. T., Gibson, C., & Rankin, S. (2015). Defining and measuring academic success. *Practical Assessment, Research and Evaluation*, *20*(5), 1–20.

Zeh, E. (2006). *YILDIRIM , Ali ve ŞİMŞEK , Hasan Sosyal Bilimlerde Nitel Araştırma Yöntemleri*. *2*(2), 113–118.

Zubaidah, S. (2020). *Keterampilan Abad Ke-21: Keterampilan yang Diajarkan Melalui Pembelajaran. Online*. *December 2016*.

Zubaidah, S., Corebima, A. D., & Mistianah. (2015). Asesmen Berpikir Kritis Terintegrasi Tes Essay. *Symbion*, *April 2015*, 200–213.

.