PENGARUH PENDEKATAN *STEM (SCIENCE, TECHNOLOGY ENGINEERING AND MATHEMATICS)* MELALUI AKTIVITAS FISIK TERHADAP *ACTIVE LIFESTYLE* DAN MOTIVASI BELAJAR

TESIS

Diajukan untuk memenuhi salah satu syarat memperoleh gelar Magister Pendidikan Sekolah Pascasarjana Universitas Pendidikan Indonesia

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ABSTRAK

Penelitian ini bertujuan untuk mengetahui pengaruh pendekatan STEM (*Science, Technology, Engineering, and Mathematics*) melalui aktivitas fisik terhadap *active lifestyle* dan motivasi belajar di SMP PGRI Cikembar Sukabumi. Metode penelitian yang digunakan yaitu metode eksperimen, dengan desain penelitian *The Matching-Only Pretest-Posttest Control Group Design*. Populasi dalam penelitian ini adalah peserta didik SMP PGRI Cikembar yang berada dikelas VIII. Pengambilan sampel dilakukan dengan teknik *random sampling* dan didapatkan 28 siswa kelompok kontrol dan 28 siswa kelompok eksperimen. Instrumen yang digunakan ada dua yaitu PAQ-C *(Physical Activity Questionnaire for Older Children)* dan IMI (*Intrinsic Motivation Inventory)*. Teknik pengumpulan data antara lain tatap muka dilakukan menggunkan aplikasi *googlemeet*, materi dan tugas gerak diupload di *google classroom*, dan untuk angket kuesioner menggunakan *google form*. Hasil penelitian ini menunjukkan bahwa (1) Terdapat pengaruh yang positif dan signifikan dari pendekatan STEM terhadap *active lifestyle*. (2) Terdapat pengaruh yang positif dan signifikan dari pendekatan STEM terhadap motivasi belajar. Hal itu menunjukkan bahwa terdapat pengaruh pendekatan STEM *(science, technology, engineering, and mathematics)* melalui aktivitas fisik terhadap *active lifestyle* dan motivasi belajar.

Kata Kunci: *STEM, Active Lifestyle,* Motivasi Belajar, Aktivitas Fisik

ABSTRACT

This study aims to determine the effect of the STEM approach (Science, Technology, Engineering, and Mathematics) through physical activity on active lifestyle and learning motivation at SMP PGRI Cikembar Sukabumi. The research method used is the experimental method, with a research design of The Matching-Only Pretest-Posttest Control Group Design. The population in this study were students of SMP PGRI Cikembar who were in class VIII. Sampling was done by random sampling technique and obtained 28 students in the control group and 28 students in the experimental group. There are two instruments used, namely PAQ-C (Physical Activity Questionnaire for Older Children) and IMI (Intrinsic Motivation Inventory). Data collection techniques include face-to-face meetings using the GoogleMeet application, motion materials and assignments uploaded in Google Classroom, and for questionnaires using Google Forms. The results of this study indicate that (1) There is a positive and significant effect of the STEM approach on active lifestyle. (2) There is a positive and significant effect of the STEM approach on learning motivation. This shows that there is an influence of the STEM approach (science, technology, engineering, and mathematics) through physical activity on active lifestyle and learning motivation.

Keywords*: *STEM, Active Lifestyle, Learning Motivation, Physical Activity

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DAFTAR PUSTAKA

Afriana, J. (2016). J*urnal Pendidikan IPA Indonesia Elementary School ' S Students Scientific Literacy*, *5*(2), 261–267. https://doi.org/10.15294/jpii.v5i2.5493

Aji, R. H. S. (2020). Dampak Covid-19 pada Pendidikan di Indonesia : https://doi.org/10.15408/sjsbs.v7i5.15314

Almatsier, S. (2003). *Prinsip Dasar Ilmu Gizi*. Jakarta: PT Gramedia Pustaka Utama.

Ames, C. (1992). Achievement goals, motivational climate, and motivational processes. In G. C. Roberts (Ed.), Motivation in spurt and exercise (pp. 161-177). Champaign, IL: Human Ki- netics.

Arends, Richard. (2008). Learning to Teach. Penerjemah: Helly Prajitno & Sri Mulyani. New York: McGraw Hill Company.

Barakos, L., Lujan, V., Strang, C. (2012). Science, Technology, Engineering, Mathematics (STEM) : Catalyzing Change Amid The Confusion. Portsmouth, NH: RMC Research Corporation, Center on Instruction. Pros. Semnas Pend. IPA Pascasarjana UM Vol. 1, 2016, ISBN: 978-602-9286-21-2

Biddle, S. J. H., & Ekkekakis, P. (2005). Physically active lifestyles and well-being. https://doi.org/10.1093/acprof

Bjoklund, A., & Dunnett, S. B. (2007). Dopamine neuron systems in the brain : an update, 30(5). https://doi.org/10.1016/j.tins.2007.03.006

Brennan, A. M., & Mantzoros, C. S. (2006). Drug Insight : the role of leptin in human physiology and pathophysiology — emerging clinical applications, 2(6), 318–327. https://doi.org/10.1038/ncpendmet0196

Brown, R., Brown, J., Reardon, K., dan Merrill, C. (2011). Understanding STEM : Current Perceptions. Technology and Engineering Teacher, 70(6), 5-9.

Bybee, R., & Landes, N. M. (1990). Science for life and living: An elementary school science program from Biological Sciences Improvement Study (BSCS). The American Biology Teacher, 52(2), 92-98

CDC. (2005). Physical activity for every- one: Recommendations: How active do adults need to be to gain some benefit? retrieved July 13, 2005 from http://www.cdc.gov/nccdphp/ dnpa/physical/recommendations/adults.htm.

CDC. (2014). General Physical Activities Defined by Level of Intensity. https://www.cdc.gov/nccdphp/dnpa/physical/pdf/pa_intensity_table_2_1.pdf Diakses pada 23 Februari 2020

Conradty, C., & Bogner, F. X. (2019). From STEM to STEAM : Cracking the Code ? How Creativity & Motivation Interacts with Inquiry- based Learning From STEM to STEAM : Cracking the Code ? How Creativity & Motivation Interacts with Inquiry-based Learning. Creativity Research Journal, 0(0), 1–12. https://doi.org/10.1080/10400419.2019.1641678

Csikszentmihalyi, M., & Rathunde, K. (1993). The measurement of flow in everyday life: Toward a theory of emergent motivation. In J. E. Jacobs (Ed.), Developmental perspectives on motivation (pp. 57-97). Lincoln: University of Nebraska Press.

Das, Suman Kumar. (2016). "Design And Methodology Of Line Follower Automated Guided Vehicle-A Review." 2(10): 9–13.

Desmita. (2009). Psikologi Perkembangan. Bandung: PT Remaja Rosdakarya.

Dorak, F., Life, S., & Behaviors, H. L. (2017). The Effect of a 12-Week Physical Exercise Program in Adults on Satisfaction with Life , Self-Esteem, Healthy Lifestyle Behaviors and Perceived Social Support The Effect of a 12 Week Physical Exercise Program in Adults on, 0073. https://doi.org/10.1080/09720073.2015.11891681

Elida P. (2003). Motivasi dalam Belajar. Jakarta: Depdikbud

Erwin, H. E., & Erwin, H. E. (2017). *Full STEAM Ahead in Physical Education*, *3084*(January). https://doi.org/10.1080/07303084.2016.1249759

Farr, S. A., Banks, W. A., & Morley, J. E. (2006). The effects of high fat diets on the blood – brain barrier transport of leptin : Failure or adaptation ?, 88, 244–248. https://doi.org/10.1016/j.physbeh.2006.05.037

Fraenkel, J. R., Wallen, N. E., & Hyun, H. H. (2012). *How to design and evaluate research in education*. New York: McGraw-Hill Humanities/Social Sciences/Languages..

Gonzalez, H.B. & Kuenzi, J. J. (2012). *Science, Technology, Engineering, and Mathematics (STEM) Education: A Primer*. Congressional Research Service.[di akses 5-2-2014].

Gunarsa S.D., (2008). Psikologi Perkembangan Anak Remaja. PT BPK Gunung Mulia, Jl. Kwitang 22-23, Jakarta.

Hani, R. dan Suwarma, I. R. (2018). *Profil Motivasi Belajar IPA Siswa Sekolah Menengah Pertama dalam Pembelajaran Ipa Berbasis STEM*. Jurnal Wahana Pendidikan Fisika, 3(1): 62-68.

Hannover (2011) Successful K-12 *STEM* Education: Identifying Effective Approaches in Science, Technology, Engineering, and Mathematics. National Academies Press. NW, Suite 300, P 202.756.2971 F 866.808.6585].

Hardman, A. and Stensel, D. (2003). *Physical activity and health*. 1st ed. London: Routledge. pp. 245-247

Healey, J. (2013). Physical activity and fitness. Thirroul: The Spinney Press, pp. 29-33. https://doi.org/10.1080/08924562.2007.10590724

Hinson, C. (1995). Fitness for Children. Leeds. England: Human Kinetics.

Irianto., P. D. (2000). Pendidikan Kebugaran Jasmani yang Efektif dan Aman. Yogyakarta: Lukman Offset.

Irwandani. (2019). Pengembangan Video Blog (Vlog) Channel Youtube Dengan Pendekatan *STEM* Sebagai Media Alternatif Pembelajaran Daring Channel Youtube Video Blog (Vlog) Development With *STEM* Approach As An Alternative Learning Media, *7*(2), 135–148.\

Irwandani, et. all. (2019).“Interactive Multimedia Lectora Inspire Based On Problem Based Learning : Development In The Optical Equipment.”*IOP Conference Series: Journal Of Physics*.

Jauhariyah, F. R., Suwono, H., & Ibrohim, I. (2017). Science , Technology , Engineering and Mathematics Project Based Learning (STEM-PjBL) pada Pembelajaran Sains. Pros. Seminar Pend. IPA Pascasarjana UM, 2: 432–436.

Jenny M. Hellgren & Stina Lindberg (2017): Memotivasi siswa dengan pengalaman ilmu otentik: perubahan motivasi sains sekolah, Research in Science & Teknologi Pendidikan, DOI: 10,1080 / otentik: perubahan motivasi sains sekolah, Research in Science & Teknologi Pendidikan, DOI: 10,1080 / 02635143.2017.1322572

Jensen, F. (2013). A norwegian out-of-school mathematics project ’ s influence on secondary students ’ stem motivation, (January), 1437–1461.

Jose, G., & Santos, T. M. (2021). The Relevance of a Physical Active Lifestyle and Physical Fitness on Immune Defense : Mitigating Disease Burden , With Focus on COVID-19 Consequences, 12 (February), 1–23. https://doi.org/10.3389/fimmu.2021.587146

Keating, G. (2008). Mecasermin. BioDrugs, 22(3), pp. 177-188.

Kelley, T. R dan Knowles, J. G. (2016). A Conceptual Framework for Integrated STEM Education. International Journal of STEM Education. Springer.

Kemdikbud. (2014). Materi pelatihan guru implementasi kurikulum 2013 tahun ajaran 2014/2015: Mata pelajaran IPA SMP/MTs. Jakarta: Kementerian Pendidikan dan Kebudayaan

Kemendikbud.(2016). *Permendikbud Nomor 22 Tahun 2016 Tentang Standar Proses Pendidikan Dan Menengah*, 1–15.

Kemendikbud.(2020). *Surat Edaran No 4 Tahun 2020 Tentang Pelaksanaan Kebijakan Pendidikan dalam Masa Darurat Penyebaran Coronavirus Disease (COVID-19*), 4–6.

Kerner, C., & Goodyear, V. A. (2017). The Motivational Impact of Wearable Healthy Lifestyle Technologies : A Self-determination Perspective on Fitbits With Adolescents The Motivational Impact of Wearable Healthy Lifestyle Technologies : A Self-determination Perspective on Fitbits With Adolescents. American Journal of Health Education, 00(00), 1–11. https://doi.org/10.1080/19325037.2017.1343161

Khaira, N. (2018). Pengaruh Pembelajaran STEM Terhadap Peserta Didik Pada Pembelajaran IPA., PROSIDING SEMINAR NASIONAL MIPA IV., ISBN 978-602-50939-0-6

Kowalski, K. C., Crocker, P. R., & Donen, R. M. (2004). The physical activity questionnaire for older children (PAQ-C) and adolescents (PAQ-A) manual. *College of Kinesiology, University of Saskatchewan*, *87*(1), 1-38.

Kristianti, M. (2002). Kondisi Fisik Kurang Gerak dan Instrumen Pengukuran. Media Litbang Kesehatan, XII, 1-5.

Kumano, Y. and Goto, M. (2015). Issues Concerning Scientific Processes in Science Lessns Involving Outdoor and Indoor Activities: a Comparative Study of Scientific Processes in Japanese Science Classes and the Cronological Development of Scientific Processes in the US through NGSS. Paper presented in USA, held in January, 2015.

Kumar, et. all. (2016). "Low Cost Line Follower Obstacle Detector And Dtmf Tone Robot." 6(6): 92–100.

Kyndt, E., Govaerts, N., Claes, T., Marche, J. D. La, & Dochy, F. (2013). Studies in Continuing Education What motivates low-qualified employees to participate in training and development ? A mixed-method study on their learning intentions, (December 2014), 37–41.

Laboy-Rush, D. (2010). Integrated STEM education through project-based learning. www.learning.com/stem/whitepaper/ integrated-STEM-through Project-based-Learning

Li, C., & Zhang, M. (2019). Physical Education Teachers ' Behaviors and Intentions of Integrating STEM Education in Teaching, (July 2018). https://doi.org/10.18666/TPE-2019-V76-I4-9104

Long, P.J. & Shanon, B. (1983). Nutrition an Inquiry Into The Isues. New Jersey: Prentice Hall, Inc.

McAuley, E., Duncan, T., & Tammen, V. V. (1987). Psychometric properties of the Intrinsic Motivation Inventory in a competitive sport setting: A confirmatory factor analysis. *Research Quarterly for Exercise and Sport, 60,* 48-58.

McGinnis, A.L. (1995). Kekuatan Optimisme. Jakarta: Mitra Utama.

Mechikoff, R. A. (2010). A History and Philosophi of Sport and Physichal Education. New York: McGraw Hill.

Mitchell, M., & Mitchell, B. M. (2013). Choosing a Physically Active Lifestyle Now. (January 2015), 37–41.

Mudjiono dan Dimyati . (2013). Belajar & Pembelajaran. Jakarta : Rineka Cipta.

Mulyasa, E, (2002). Manajemen Berbasis Sekolah, Bandung: PT. Remaja Rosdakarya.

National Association for Sport and Physical Education. (2004). *Moving into the future: National standards for physical education* (2nd ed.). Reston, VA: Author.

National STEM Education Center. 2014. STEM education network manual. The Instutute for the Promotion of Teaching Science and Technology. Bangkok.

Ostrow, K. S., & Heffernan, N. T. (2018). Testing the validity and reliability of intrinsic motivation inventory subscales within ASSISTments. In *Lecture Notes in Computer Science (including subseries Lecture Notes in Artificial Intelligence and Lecture Notes in Bioinformatics): Vol. 10947 LNAI*. Springer International Publishing. https://doi.org/10.1007/978-3-319-93843-1_28

Pfeiffer, H.D, Ignatov, D.I., & Poelmans, J (2013) Conceptual Structures for STEM Research and Education. 20th International Conference on Conceptual

Structures, ICCS 2013 Mumbai, India, January 10-12, 2013Proceedings. Springger. ISBN 978-3-642-35785-5.

Richardson, S, Q. (2008). Overtraining Athletes. Personal Journeys in Sport. Champaign U.S: Human Kinetics.

Romiszowski. (1988). The Selection and Use of Instructional Media. United States : Nichols Publishing.

Rustaman, N.Y. (2015). Basic Scientific Inquiry and its Assessment in relation to STEM education Movement. Paper presented in Graduate Science Education at Tsukuba University, February 6th , 2015, Tsukuba, Japan.

Ryan, R. M. (1995). Psychological needs and the facilitation of integrative processes. Journal of Personality, 63, 397-427.

Sa'adhah, E., Yuniarti, N., Pendidikan, S., & Mekatronika, T. (2019). The Implementation Of Science, Technology, Engineering And Matemathics Learning Model As An Basic In Improving Activity And Results Of Student Learning In Electrical And Electronic Study Subject Matter In Vocational Secondary School 1 Nanggulan. In Jurnal Pendidikan Teknik Mekatronika (Vol. 9, Issue 1). http://journal.student.uny.ac.id/ojs

Safri, K. (2015). Hubungan Gaya Hidup Dengan Prestasi Akademik Mahasiswa Keperawatan Universitas Riau, 2(2).

Sanders, M. 2009. STEM, STEM education, STEMmania. The Technology teacher, 68(4).20-26.

Sanjaya Wina. 2012. Strategi Pembelajaran Berorientasi Standar Proses Pendidikan. Rawamangun-jakarta: Kencana Perdana Media Group

Scanlon, M., & Buckingham, D. (2005). Motivating Maths ? Digital Games and Mathematical Learning, 14(1), 127–140.

Sherwood L. (2007). Human Physiology: From Cells to Systems. 6th ed. Jakarta: EGC; 2007. 973 p

Siagian. S.P, (2004). Teori Motivasi Dan Aplikasinya. Bina Aksara Jakarta.

Slameto. (2003). Belajar dan Faktor-faktor yang Mempengaruhinya. Jakarta: Rineka Cipta.

Sointu, E., Mäkitalo-siegl, K., Kärkkäinen, S., Valtonen, T., & Grandgenett, N. (2019). NE STEM 4U afterschool intervention leads to gains in STEM content knowledge for middle school youth. Cogent Education, 5(1), 1–12. https://doi.org/10.1080/2331186X.2018.1558915

Strath, S. J., Kaminsky, L. A., Ainsworth, B. E., Ekelund, U., Freedson, P. S., Gary, R. A., … Swartz, A. M. (2013). Guide to the Assessment of Physical Activity : Clinical and Research Applications A Scientific Statement From the American Heart Association, (February 2018). https://doi.org/10.1161/01.cir.0000435708.67487.da

Sugiyono. (2010). Metode Penelitian Pendidikan. Bandung : CV. Alfabeta.

Suharjana. (2012). Kebiasaan Berperilaku Hidup Sehat Dan Nilai-Nilai Pendidikan Karakter, 189–201.

Suherman, E. dkk. (2003). Strategi Pembelajaran Matematika Kontemporer. Bandung: UPI.

Sujadi, I. (2018). "Peran Pembelajaran Matematika Pada Penguatan Nilai Karakter Bangsa Di Era Revolusi Industri 4.0.": 1–13.

Sunyoto, D. 2009. Analisis Regresi dan Uji Hipotesis, edisi pertama, Media Pressindo, Yogyakarta

Suratun. (2018). *Pengembangan Video Pembelajaran Berbasis Problem Solving Terintegrasi Chanel Youtube Pembelajaran Fisika Kelas VIII*. (Skripsi). S1, Fakultas Tarbiyah dan Keguruan, Universitas Islam Negeri Raden Intan Lampung.

Struyven, K., Dochy, F., Janssens, S., Struyven, K., Dochy, F., & Janssens, S. (2010). Assessment & Evaluation in Higher and assessment in higher education : a review Students ' perceptions about evaluation and assessment in higher education : a review 1, (October 2013), 37–41. https://doi.org/10.1080/02602930500099102

Syah, M. (2003). Psikologi Belajar. Jakarta : PT Raja Grafindo.

The International Physical Activity Questionnaire, (2005). Available at http://www.ipaq.ki.se/

Theeboom, M., DeKnop, P., & Weiss,M.R (1995).Motivational climate, psychosocial responses, and motor skill develop- ment in children's sport: A field based- intervention study. Joumal of Sport & Exercise Psychology, 17, 294-311.

Thornburgh, N. (2006). Special Report - Dropout Nation, (April), 1–9.

Torlakson. T, (2014). Innovate: A Blueprint For Science, Technology, Engineering, and Mathematics in California Public Education. California: State Superintendent of Public Instruction..

Torres-aleman, I. (2010). Toward a Comprehensive Neurobiology of IGF-I, 384–396. https://doi.org/10.1002/dneu.20778

Turkmen, M., & Kul, M. (2013). Determination of the Relationship between Physical Activity Levels and Healthy Lifestyle Behaviors of University Students Determination of the Relationship between Physical Activity Levels and Healthy Lifestyle Behaviors of University Students, (December).

Uno, B. H. (2013). Teori Motivasi dan Pengukurannya. Jakarta: Bumi Aksara

Valjent. Z. (2008). Pokus o vymezení pojmu "aktivní •ivotnístyl". Czech Kinantropology, 12(2): 42–52.

Walker, S.N., & Hill-Polerecky, D.M. (1996). Psychometric evaluation of the HealthPromoting Lifestyle Profile II. Unpublished manuscript, University of Nebraska Medical Center.

Weiss, M. R, & Ebbeck, V. (1996). Self-esteem and perceptions of competence in youth sport: Theory, research, and en- hancement strategies. In O. Bar-Or (Ed.), Encyclopedia of sports medicine, Vol. 5: Thechildand adolescent athlete (pp. 364- 382). Oxford: Blackwell Scientific.

Welis, Wilda, Sazeli, Rifki, M. 2013. Buku Pentunjuk Gizi untuk Aktivitas Fisik. Sukabina Press: Padang. Diakses 1 September 2017. http:/repository.unp.ac.id/id/eprint/489

Winkel, W. S. (2004). Psikologi Pendidikan dan Evaluasi Belajar. Jakarta: PT. Gramedia Pustaka Utama

World Health Organisation. (2010). Global Recommendations On Physical Activity For Health.

Young, A. M., Wendel, P. J., Esson, J. M., Plank, K. M., Young, A. M., Wendel, P. J., Wendel, P. J. (2018). Motivational decline and recovery in higher education STEM courses courses. International Journal of Science Education, 0(0), 1–18. https://doi.org/10.1080/09500693.2018.1460773

Yuliarto, (2012). Aktivitas Antioksidan, Total Fenol, dan Antibakteri Minyak Atsiri Dan Oleoresin Kayu Manis (Cinnamomum burmannii). Jurnal Teknosains Pangan. 1 (1), 41–48.

Yusuf, A, M. (2005). Metodologi Penelitian (Dasar-Dasar Penyelidikan Ilmiah). Padang: UNP Press.

Zheng, J., Xing, W., Zhu, G., Chen, G., & Zhao, H. (2020). Computers & Education Pro fi ling self-regulation behaviors in STEM learning of engineering design. Computers & Education, 143 (April 2019), 103669. https://doi.org/10.1016/j.compedu.2019.103669.

Zuhri, M. (2019). Model-Model Pembelajaran STEM. [*Online*]. Diakses dari https://zuhriindonesia.blogspot.com/2019/06/model-model-pembelajaran-stem.html (30 Maret 2021).