

PENGEMBANGAN INSTRUMEN *FOUR-TIER TEST SIMPLE HARMONIC MOTION* (FTT-SHM) UNTUK MENGIDENTIFIKASI MISKONSEPSI PESERTA DIDIK PADA MATERI GERAK HARMONIK SEDERHANA

SKRIPSI

*Diajukan untuk memenuhi sebagai syarat dalam memperoleh gelar Sarjana
Pendidikan pada Program Studi Pendidikan Fisika*



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Sebuah skripsi yang diajukan untuk memenuhi salah satu syarat memperoleh gelar Sarjana
Pendidikan pada Program Studi Pendidikan Fisika

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ABSTRAK

Penelitian ini bertujuan untuk mengembangkan instrumen *four-tier* dan mengidentifikasi miskonsepsi peserta didik pada materi gerak harmonik sederhana. Partisipan yang terlibat dalam pengukuran instrumen *Four-Tier Test Simple Harmonic Motion* (FTT-SHM) adalah 31 peserta didik SMA. Desain penelitian menggunakan model 3D + 1I (*Defining, Designing, Developing, & Implementing*). Instrumen terdiri dari 10 butir soal yang telah dianalisis menggunakan model *Rasch*. Hasil analisis *item fit* menyatakan bahwa instrumen sudah memenuhi kriteria sehingga tidak perlu ada soal yang diganti dengan nilai realibilitas *item* 0.79 termasuk kategori cukup. Hasil penggunaan instrumen menyatakan bahwa persentase miskonsepsi terbesar adalah 64.52% peserta didik yang mengalami miskonsepsi mengenai besaran fisika periode. Sedangkan persentase miskonsepsi yang terrendah adalah 12.90% peserta didik yang mengalami miskonsepsi mengenai gaya pemulih.

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DAFTAR PUSTAKA

- Afif, Nur F., Nugraha, Muhammad G., Samsudin, A. (2016). Developing Energy and Momentum Conceptual Survey (EMCS) with Four-Tier Diagnostic Test Items. *Mathematics, Science, and Computer Science Education* (MSCEIS 2016).
- Aiken, Lewis R. (1985). Three Coefficients for Analyzing The Reliability and Validity of Ratings. *Educational and Psychological Measurement*.
- Aminudin, A. H., Suhendi, E., Samsudin, A., Adimayuda, R. (2019). Rasch Analysis of Multitier Open-ended Light-Wave Instrument (MOLWI): Developing and Assesing Second Years Sundanese-Scholars Alternative Conceptions. *Journal for The Education of Gifted Young*.
- Ammase, A., Siahaan, P., Fitriani, A. (2019). Identification of Junior High School Students' Misconceptions on Solid Matter and Pressure Liquid Substances with Four-Tier Test. *International Conference on Mathematics and Science Education* (ICMScE 2018).
- Anderson, J., Barnett, M. (2011). Using Video Games to Support Pre-Service Elementary Teachers Learning of Basic Physics Principles. *Journal of Science Education and Technology*.
- Artdej, R., Ratanaroutai, T., Coll, Richard K., Thongpanchang, T. (2010). Thai Grade 11 Students' Alternative Conceptions for Acid-Base Chemistry. *Research in Science & Technological Education*, 28(2), hlm. 167-183.
- Bal, Mehmet S. (2011). Misconceptions of High School Students Related to The Conceptions of Absolutism and Constitutionalism in History Courses. *Educational Research and Reviews*, 6(3), hlm. 283-291.
- Basson, I. (2002). Physics and Mathematics as Interrelated Fields of Thought Development Using Acceleration as An Example. *International Journal of Mathematical Education in Science and Technology*, 33(5), hlm. 679-690.
- Beichner, Robert J. (1994). Testing Student Interpretation of Kinematics Graphs. *American Association of Physics Teachers*, 62(8), hlm. 750-762.
- Bransford, John D., Brown, Ann L., Cocking, Rodney R. (2000). *How People Learn: Brain, Mind, Experience, And School*. National Academy Press: Washington DC.
- Caleon, Imelda S., Sumbramaniam, R. (2010). Do Students Know What They Know and What They Don't Know? Using a Four-Tier Diagnostic Test to Assess the Nature of Students' Alternative Conceptions. *Research Science Education*, hlm. 313-337.

- Diella, D., Ardiansyah, R. Pengembangan Four-Tier Diagnostic Test Konsep Ekosistem: Validitas dan Reliabilitas Instrumen. *Jurnal Ilmiah Pendidikan Biologi*, 6(1), hlm. 1-11.
- Dimas, A., Suparmi, A., Sarwanto, Nugraha, Dewanta A. (2018). Analysis Multiple Representation Skills of High School students on Simple Harmonic Motion. *International Conference on Science and Applied Science (ICSAS)*.
- Liu, Gang & Fang, Ning. (2016). Student Misconceptions about Force and Acceleration in Physics and Engineering Mechanics Education. *International Journal of Engineering Education*, 32(1), hlm. 19-29.
- Fariyani, Q., Rusilowati, A., Sugianto. (2015). Pengembangan Four-Tier Diagnostic Test untuk Mengungkap Miskonsepsi Fisika Siswa SMA Kelas X. *Journal of Innovative Science Education*, 4(2) hlm. 41-49.
- Gilbert, John K., Osborne, Roger J., Fensham, Peter J. (1982). Children's Science and Its Consequences for Teaching. *Science Education*, 66(4), hlm. 623-633.
- Gurel, Derya K., Eryilmaz, A., McDermott, Lillian C. (2015). A Review and Comparison of Diagnostic Instruments to Identify Students' Misconceptions in Science. *Eurasia Journal of Mathematics, Science & Technology Education*, 11(5), hlm. 989-1008.
- Gurel, Derya K., Eryilmaz, A., McDermott, Lillian C. (2017). Development and Application of a Four-Tier Test to Assess Preservice Physics Teachers' Misconceptions About Geometrical Optics. *Research in Science & Technological Education*.
- Hasan, S., Bagayoko, D., Kelley, Ella L. (1999). Misconceptios and the Certainty of Response Index (CRI). *Teaching Physics*, 34(5), hlm 294-299.
- Hesti, R., Maknun, J., Feranie, S. (2018). Text Based Analogy (TBA) Dalam Mengubah Konsepsi Rangkaian Listrik Paralel. *Prosiding Seminar Nasional Fisika (SINAFI)*.
- Jubaedah, Dedah S., Kaniawati, I., Suyana I., Samsudin, A., Suhendi, E. (2017). Pengembangan Tes Diagnostik Berformat *Four-Tier* Untuk Mengidentifikasi Miskonsepsi Siswa Pada Topik Usaha dan Energi. *Prosiding Seminar Nasional Fisika (E-Journal)*.
- Kaniawati, I., Fratiwi, Nuzulira J., Danawan, A., Suyana, I., Samsudin, A., Suhendi, E. (2019). Analyzing Students' Misconceptions about Newton's Laws through Four-Tier Newtonian Test (FTNT). *Turkish Science Education*, 16(1), hlm. 110-122.

- Kaltacki, D., Didis, N. Identification of Pre-Service Physics Teachers' Misconceptions on Gravity Concept: A Study with a 3-Tier Misconceptions. *American Institute of Physical Union*.
- Kiray, Seyit A., Simsek, S. (2020). Determination and Evaluation of the Science Teacher Candidates' Misconceptions About Density by Using Four-Tier Diagnostic Test. *International Journal of Science and Mathematics Education*.
- Nakhleh, Mary B. (1992). Why some Students Don't Learn Chemistry. *Journal of Chemical Education*, 69(3), hlm. 191-196.
- Nugraha, Dewanta A., Cari, c., Suparmi, A., Sunarno, W. Physics Students' Answer on Simple Harmonic Motion. *International Conference on Physics and Its Applications* (ICOPIA).
- Planinic, M., Ivanjek, L., Susac A. (2010). Rasch Model Based Analysis of the Force Concept Inventory. *The American Physical Society*, 6(1).
- Ropandi. (2017). *Pengembangan Instrumen three-tier test untuk mengidentifikasi miskONSEP siswa SMA pada pokok bahasan Gerak Harmonik Sederhana*. (Skripsi). Universitas Pendidikan Indonesia, Bandung.
- Soeharto, Csapo, B., Sarimanah, E., Dewi, F. I., Sabri, T. (2019). A Review of Students' Common Misconceptions in Science and Their Diagnostic Assessment Tools. *Jurnal Pendidikan IPA Indonesia*, 8(2), hlm. 247-266.
- Somroob, S., Wattanakasiwich, P. (2017). Investigating Student Understandingof Simple Harmonic Motion. *Siam Physics Congress 2017* (SPC2017).
- Streveler, Ruth A., Litzinger, Thomas A., Miller, Ronald L., Steif, Paul S. (2008). Learning Conceptual Knowledge in the Engineering Sciences: Overview and Future Research Directions. *Journal of Engineering Education*, hlm. 279-294.
- Sumintono, B. & Widhiarso, W. (2015). *Aplikasi Pemodelan Rasch Pada Assessment Pendidikan*. Trim Komunikata: Cimahi.
- Taslidere, E. (2016). Development and Use of a Three-Tier Diagnostic Test to Assess High School Students' Misconceptions About The Photoelectric Effect. *Research in Science & Technological Education*.
- Treagust, D. (1986). Evaluating Students' Misconceptions by Means of Diagnostic Multiple Choice Items. *Research in Science Education*, hlm. 199-207.
- Tipler, Paul A. (1998). *Fisika Untuk Sains dan Teknik*. Erlangga: Jakarta.

- Tumanggor, A. M. R., Supahar, Kuswanto, H., Ringo, E. S. (2020). Using Four Tier Diagnostic Test Instrument to Detect Physics Teacher Candidates' Misconceptions: Case of Mechanical Wave Concepts. *The 5th International Seminal on Science Education*.
- Wang, Jing-Ru. (2004). Development and Validation of A Two-Tier Instrument to Examine Understanding of Internal Transport in Plants and the Human Circulatory System. *International Journal of Science and Mathematics Education*, hlm. 131-157.
- Zulfiani, Juanengsih, N., Suwarna, Iwan P., Milama, B. (2014). Analysis of Student's Misconceptions on Basic Concepts of Natural Science Through CRI (Certainly of Response Index), Clinical Interview and Concept Maps. *Proceeding of International Conference on Research, Implementation And Education of Mathematics And Sciences*.