

**INOVASI MEDIA PEMBELAJARAN BOLA BERSUARA DALAM
PENDIDIKAN JASMANI ADAPTIF BAGI TUNANETRA**

DISERTASI

Diajukan untuk memenuhi
salah satu syarat memperoleh gelar doktor
Program Studi Pendidikan Olahraga



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**PROGRAM STUDI PENDIDIKAN OLAHRAGA
SEKOLAH PASCASARJANA
UNIVERSITAS PENDIDIKAN INDONESIA
2020**

Febriana Pratiwi, 2021

*INOVASI MEDIA PEMBELAJARAN BOLA BERSUARA DALAM PENDIDIKAN JASMANI ADAPTIF BAGI
TUNANETRA*

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ABSTRAK

Febriana Pratiwi (NIM 1707176). **Disertasi: Inovasi Media Pembelajaran Bola Bersuara Dalam Pendidikan Jasmani Adaptif Bagi Tunanetra. Disertasi ini dibimbing oleh Prof. Dr. Amung Ma'Mun, M.Pd., Dr. Yudy Hendrayana, M.Kes. AIFO, Prof. Dr. Ade Gafar Abdullah, M.Si**

Banyak siswa dengan gangguan penglihatan aktif berolahraga menggunakan bola, namun keterbatasan media bola bersuara yang membuat permainan dapat diakses bertemu dengan tantangan yang signifikan. Tantangan-tantangan ini termasuk: kebutuhan akan bola bersuara yang dapat mengeluarkan suara secara terus-menerus untuk menandakan lokasi dan mendeteksi posisi bola meski dalam keadaan diam di lapangan. Penelitian ini bertujuan merancang desain serta menguji secara teknis dan mekanika hingga implementasi kepada pengguna terhadap inovasi bola bersuara berbasis audioelektronik dan permainannya. Metode campuran *exploratory sequential design* digunakan dalam penelitian ini. Hasil data kualitatif menunjukkan dalam merancang bola bersuara untuk tunanetra perlu memperhatikan analisis ergonomis, analisis system, analisis material, analisis bentuk, serta analisis warna. Sedangkan data kuantitatif dari pengukuran teknis dan material inovasi bola bersuara memiliki frekuensi suara maksimal yang dapat dipancarkan sebesar 51,49 dB dan ketahanan benturan 100 kali percobaan, selain itu dimensi lapangan permainan 13,4 m x 3 m telah teruji cocok untuk digunakan sebagai lapangan permainan menggunakan bola bersuara yang diberi nama oleh peneliti permainan loudball. Dalam implementasi pembelajaran pendidikan jasmani adaptif menunjukkan 17'32 menit waktu aktif belajar siswa menggunakan inovasi bola bersuara dari 35 menit waktu pengamatan, serta meningkatkan sebesar 35,15% terhadap keterampilan orientasi dan mobilitas siswa tunanetra. Kesimpulan, penelitian ini menghasilkan inovasi berupa bola bersuara serta permainan olahraga baru dan dapat dijadikan sebagai salah satu materi pembelajaran pendidikan jasmani adaptif bagi anak-anak tunanetra.

Kata kunci: bola bersuara, tunanetra, pendidikan jasmani adaptif

ABSTRACT

Febriana Pratiwi (NIM. 1707176). **Voice Ball Media Innovation in Learning Adapted Physical Education for the Visual Impairments**

Many visually impaired students are actively exercising, but the limitations of the media make accessible games a significant challenge. These challenges include: the need for a sound ball that can emit a continuous sound to signal the location and position of the ball even in the field. This study aims to design and test the technical and mechanics to the user implementation of the sound ball innovation based on audio-electronics and its games. The sequential mix exploratory design method was used in this study. The results of the qualitative data show that in designing sound balls for blind children it is necessary to pay attention to ergonomic analysis, system analysis, material analysis, shape analysis, and color analysis. Meanwhile, quantitative data from technical measurements and sound ball innovation materials have a maximum emitted sound frequency of 51.49 dB and impact resistance 100 times, besides that the 13.4 m x 3 m playing field has been tested suitable for use in games. The implementation of adaptive physical education learning shows 17'32 minutes of active learning time of students using sound ball innovation from 35 minutes of observation time, and an increase of 35.15% of student orientation and mobility skills during adaptive physical education learning. In conclusion, this study resulted in innovations in the form of sound balls and novel sports games for children with visual impairments.

Keyword: auditory ball, visual impairments, adapted physical education

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DAFTAR PUSTAKA

- Aljied, R. (2019). Visual impairment and the use of formal and informal home care in Canada : the Canadian Longitudinal Study on Aging, *54*(3), 367–373. <https://doi.org/10.1016/j.jcjo.2018.10.018>
- Ardito, M. (2016). Physical Activities for Visually Impaired Youth.
- Atkinson, J., Braddick, O., & Kingdom, U. (2019). *Vision Disorders and Visual Impairment. Encyclopedia of Infant and Early Childhood Development*. Elsevier. <https://doi.org/10.1016/B978-0-12-809324-5.23622-5>
- Atwa, O. S. E. (2019). Batteries 15.1. *Practical Power System and Protective Relays Commissioning*, 157–162. <https://doi.org/10.1016/B978-0-12-816858-5.00015-0>
- Aufderheide, S. (1983). ALT-PE in Mainstreamed Physical Education Classes, 22–26.
- Baidruel Hairiel Abd Rahim & Nurazzura Mohamad Diah. (2018). Raising Disabled Heroes in Sport: Challenges and Prospects. *International Journal for Studies on Children, Women, Elderly And Disabled*, *5*(October), 252–257.
- Bailey, R., Armour, K., Kirk, D., Jess, M., Pickup, I., & Sandford, R. (2009a). The educational benefits claimed for physical education and school sport: An academic review. *Research Papers in Education*, *24*(1), 1–27. <https://doi.org/10.1080/02671520701809817>
- Bailey, R., Armour, K., Kirk, D., Jess, M., Pickup, I., & Sandford, R. (2009b). The educational benefits claimed for physical education and school sport: An academic review. *Research Papers in Education*, *24*(1), 1–27. <https://doi.org/10.1080/02671520701809817>
- Baus, S. (2015). Commentary : Psychological Aspects Visual Impairment by

Sonja, 41–44.

Block, M. E., Taliaferro, A., Campbell, A. L., Harris, N., Taliaferro, A., & Tipton, J. (2011). Adapted Physical Education Class, (October 2014), 37–41.

<https://doi.org/10.1080/07303084.2011.10598614>

Cattaneo, Z., Fantino, M., Silvano, J., Tinti, C., Pascual-Leone, A., & Vecchi, T. (2010). Symmetry perception in the blind. *Acta Psychologica, 134*(3), 398–

402. <https://doi.org/10.1016/j.actpsy.2010.04.002>

Creswell, J. W. (2014). *Research Design Qualitative, Quantitative, and Mixed Methods Approaches* (4th ed). United States of America: SAGE

Publications, Inc.

Daniels, A. (2013). Adapted Physical Education, (February 2015).

<https://doi.org/10.1080/00221473.1969.10610508>

Derri, V., Emmanouilidou, K., Vassiliadou, O., Kioumourtzoglou, E., & Loza-Olave, E. (2007). Academic learning time in physical education (ALT-PE): is it related to fundamental movement skill acquisition and learning?

(Tiempo de aprendizaje académico en educación física(ALT-PE): ¿tiene que ver con la adquisición y aprendizaje de habilidades motri. *RICYDE. Revista Internacional de Ciencias Del Deporte, 3*(6), 12–23.

<https://doi.org/10.5232/ricyde2007.00602>

Elbes, M., & Al-Fuqaha, A. (2013). Design of a social collaboration and precise localization services for the blind and visually impaired. *Procedia Computer Science, 21*, 282–291. <https://doi.org/10.1016/j.procs.2013.09.037>

Elisa, F., José, L., Oreste, F. G., Claudia, A., Antonella, L., Sabrina, S., & Giovanni, L. (2002). Gross motor development and reach on sound as critical tools for the development of the blind child. *Brain and Development, 24*(5),

269–275. [https://doi.org/10.1016/S0387-7604\(02\)00021-9](https://doi.org/10.1016/S0387-7604(02)00021-9)

Elsman, E. B. M., Baaj, M. Al, Rens, G. H. M. B. Van, Sijbrandi, W., Broek, E.

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G. C. Van Den, Aa, H. P. A. Van Der, ... Nispen, R. M. A. Van. (2019). Interventions to improve functioning , participation , and quality of life in children with visual impairment : a systematic review. *Survey of Ophthalmology*, 64(4), 512–557.

<https://doi.org/10.1016/j.survophthal.2019.01.010>

Fines, A., & Block, M. (2020). Building collegiate adapted sports: goalball case study. *Sport, Education and Society*, 0(0), 1–13.

<https://doi.org/10.1080/13573322.2020.1729113>

Gao, Z. (2009). Students' motivation, engagement, satisfaction, and cardiorespiratory fitness in physical education. *Journal of Applied Sport Psychology*, 21(SUPPL.1), 102–115.

<https://doi.org/10.1080/10413200802582789>

Godbout, P., Brunelle, J., Tousignant, M., Godbout, P., Brunelle, J., & Tousignant, M. (2013). Research Quarterly for Exercise and Sport Academic Learning Time in Elementary and Secondary Physical Education Classes, (March 2015), 37–41. <https://doi.org/10.1080/02701367.1983.10605266>

Goldich, Y., Hahn, A., Kohen-raz, R., Kluttig, A., & Morad, Y. (2011). Postural control in subjects with visual impairment, 21(2), 303–309.

<https://doi.org/10.5301/EJO.2010.5504>

Gür, K., & Albayrak, S. (2015). Exposure to Violence of Secondary School Children with Visual Impairment.

<https://doi.org/10.1177/0886260515600162>

Gurdal, A. (2012). Information design and education for visually impaired and blind people, 46, 5568–5572. <https://doi.org/10.1016/j.sbspro.2012.06.477>

Haegle, J. A., Aigner, C. J., & Healy, S. (2018). Physical activity , body mass index , and health status among youth with severe visual impairments aged 13 e 17 years in the United States. *Disability and Health Journal*, 1–5.

<https://doi.org/10.1016/j.dhjo.2018.07.001>

Harrison, J. M. (1987). A Review of the Research on Teacher Effectiveness and Its Implications for Current Practice, *6297*(March), 36–55.

<https://doi.org/10.1080/00336297.1987.10483855>

Hazeltine, B. (2003). Household Technologies. *Field Guide to Appropriate Technology*, 665–729. <https://doi.org/10.1016/b978-012335185-2/50051-6>

Heath, D. E., & Cooper, S. L. (2013). Polyurethanes. *Biomaterials Science: An Introduction to Materials: Third Edition*, (1986), 79–82.

<https://doi.org/10.1016/B978-0-08-087780-8.00009-7>

Horrell, A., Sproule, J., Gray, S., Horrell, A., Sproule, J., & Gray, S. (2017).

Health and wellbeing : a policy context for physical education in Scotland

Health and wellbeing : a policy context for physical education in Scotland,

3322(October). <https://doi.org/10.1080/13573322.2011.607948>

Hurley, D., & Hurley, D. (2013). Guidelines for Adapted Physical Education For Adapted Physical Education, *1170*(1981), 43–47.

<https://doi.org/10.1080/07303084.1981.10629203>

Jin, J., & Yun, J. (2016). Evidence Based Practice in Adapted Physical Education, *3084*(March), 2–7. <https://doi.org/10.1080/07303084.2010.10598465>

Joshi, A., Ray, S., Odierna, D. H., & Smith, M. (2019). Tactile Teaching Methods Support Students with Visual Impairment in Training for a Career in

Chiropractic, *113*(6), 557–565. <https://doi.org/10.1177/0145482X19888323>

Jung, H., Pope, S., & Kirk, D. (2017). Policy for physical education and school sport in England , 2003 – 2010 : vested interests and dominant discourses,

8989(October), 2003–2010. <https://doi.org/10.1080/17408989.2015.1050661>

Krzak, J., Ślężyńska, M., & Ślężyński, J. (2015). Goalball as an effective means of physical improvement for blind and visually impaired players, (4), 383–

387. <https://doi.org/10.5604/20834543.1186910>

Lacey, G., & Dawson-Howe, K. M. (1998). The application of robotics to a mobility aid for the elderly blind. *Robotics and Autonomous Systems*, 23(4), 245–252. [https://doi.org/10.1016/S0921-8890\(98\)00011-6](https://doi.org/10.1016/S0921-8890(98)00011-6)

Lahav, O., Gedalevitz, H., Battersby, S., Brown, D., Evett, L., & Merritt, P. (2018). Virtual environment navigation with look-around mode to explore new real spaces by people who are blind. *Disability and Rehabilitation*, 40(9). <https://doi.org/10.1080/09638288.2017.1286391>

Lamichhane, K. (2016). Teaching students with visual impairments in an inclusive educational setting : a case from Nepal, 3116(May). <https://doi.org/10.1080/13603116.2016.1184323>

Laughlin, M. K., & Happel, K. (2016). Developing an Appropriate Goalball Unit for Secondary Physical Education. *Strategies*, 29(1), 16–23. <https://doi.org/10.1080/08924562.2015.1111784>

Liebrand-schurink, J. (n.d.). Motor Development in Visually Impaired Children The Use of Low Vision Aids.

Lima Scherer, R., Karasiak, F., Silva, S., & Petroski, E. (2012). Morphological profile of goalball athletes. *European Journal of Human Movement*, (28), 1–13.

Lytle, R., Lavay, B., Robinson, N., & Huettig, C. (2014). Teaching Collaboration and Consultation Skills to Preservice Adapted Physical Education Teachers, (November 2014), 37–41. <https://doi.org/10.1080/07303084.2003.10608486>

Majerova, H. (2016). Mentalese in Persons with Visual Impairment from a Qualitative Viewpoint, 217, 567–575. <https://doi.org/10.1016/j.sbspro.2016.02.048>

Majerova, H. (2017). The Person in a Situation of Visual Impairment and its

Perception and Imagination from the Qualitative Viewpoint. *Procedia - Social and Behavioral Sciences*, 237(June 2016), 751–757.

<https://doi.org/10.1016/j.sbspro.2017.02.117>

Malaysia, M. of H. (2003). Manual on the Management of Children with Visual Impairment, 03(September).

Manthiram, A. (2017). An Outlook on Lithium Ion Battery Technology. *ACS Central Science*, 3(10), 1063–1069.

<https://doi.org/10.1021/acscentsci.7b00288>

Martins, M. M., Santos, C. P., Frizera-Neto, A., & Ceres, R. (2012). Assistive mobility devices focusing on Smart Walkers: Classification and review. *Robotics and Autonomous Systems*, 60(4), 548–562.

<https://doi.org/10.1016/j.robot.2011.11.015>

Metell, M., & Stige, B. (2016). Blind spots in music therapy. Toward a critical notion of participation in context of children with visual impairment. *Nordic Journal of Music Therapy*, 25(4), 300–318.

<https://doi.org/10.1080/08098131.2015.1081265>

Morato, M. P., Menezes, R. P., Fonseca, S., & Furtado, O. L. P. da C. (2018). Faster balls increase the probability of scoring a goal in female and male elite goalball. *Revista Brasileira de Ciencias Do Esporte*, 40(4), 427–434.

<https://doi.org/10.1016/j.rbce.2018.03.027>

Mowling, C. M., Fittipaldi-Wert, J., & Favoretto, L. (2017). Soundball: Teaching Tennis to Students with Visual Impairments. *Strategies*, 30(4), 3–10.

<https://doi.org/10.1080/08924562.2017.1320245>

Naipal, S. (2019). Visual ability in adolescents with visual impairment.

<https://doi.org/10.1177/0264619619892993>

Nees, M. A., & Berry, L. F. (2013). Performance Enhancement & Health Audio assistive technology and accommodations for students with visual

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impairments : Potentials and problems for delivering curricula and educational assessments. *Performance Enhancement & Health*, 2(3), 101–109. <https://doi.org/10.1016/j.peh.2013.08.016>

Oliveira, O., Ribeiro, C., Simões, C., & Pereira, P. (2018). Quality of life of children and adolescents with visual impairment. <https://doi.org/10.1177/0264619617737123>

Papadopoulos, K., Koukourikos, P., Koustriava, E., Misiou, M., Varveris, A., & Elena, V. (2015). Audio-Haptic Map: An Orientation and Mobility Aid for Individuals with Blindness. *Procedia Computer Science*, 67(Dsai), 223–230. <https://doi.org/10.1016/j.procs.2015.09.266>

Pereira, A., Nunes, N., Vieira, D., Costa, N., Fernandes, H., & Barroso, J. (2015). Blind Guide: An Ultrasound Sensor-based Body Area Network for Guiding Blind People. *Procedia Computer Science*, 67(Dsai), 403–408. <https://doi.org/10.1016/j.procs.2015.09.285>

Phillpots, L., & Grix, J. (2014). Physical Education and Sport Pedagogy New governance and Physical Education and School Sport policy : A case study of School to Club Links, (November), 37–41. <https://doi.org/10.1080/17408989.2012.726981>

Poirier, C., Collignon, O., Scheiber, C., Renier, L., Vanlierde, A., Tranduy, D., ... De Volder, A. G. (2006). Auditory motion perception activates visual motion areas in early blind subjects. *NeuroImage*, 31(1), 279–285. <https://doi.org/10.1016/j.neuroimage.2005.11.036>

Randall, K., Lawrence, G. A., Sanford, L., Springfield, B., Charles, I. L., Thomas, C., & Ross, D. B. (2001). Visual Impairment in the Schools, 3rd edition, (April), 240–241.

Rodriguez-Sanchez, M. C., Moreno-Alvarez, M. A., Martin, E., Borromeo, S., & Hernandez-Tamames, J. A. (2014). Accessible smartphones for blind users:

A case study for a wayfinding system. *Expert Systems with Applications*, 41(16), 7210–7222. <https://doi.org/10.1016/j.eswa.2014.05.031>

Ross, J. (1977). Blind break through old barriers to sports. *Physician & Sportsmedicine*, 5(3), 98–102.
<https://doi.org/10.1080/00913847.1977.11710538>

Sandlund, M., Waterworth, E. L., & Häger, C. (2011). Using motion interactive games to promote physical activity and enhance motor performance in children with cerebral palsy. *Developmental Neurorehabilitation*, 14(1), 15–21. <https://doi.org/10.3109/17518423.2010.533329>

Seybold, D. (2005). The psychosocial impact of acquired vision loss-Particularly related to rehabilitation involving orientation and mobility. *International Congress Series*, 1282, 298–301. <https://doi.org/10.1016/j.ics.2005.05.008>

Shrestha, J. B., Gnyawali, S., & Upadhyay, M. P. (2012). Causes of blindness and visual impairment among students in integrated schools for the blind in Nepal. *Ophthalmic Epidemiology*, 19(6), 401–406.
<https://doi.org/10.3109/09286586.2012.722245>

Silverman, S., Dodds, P., Placek, J., Shute, S., Rife, F., Shute, S., & Rife, F. (1984). Research Quarterly for Exercise and Sport Academic Learning Time in Elementary School Physical Education (ALT-PE) for Student Subgroups and Instructional Activity Units Academic Learning Time in Elementary School Physical Education (ALT-PE) for Studen, (March 2015), 37–41.
<https://doi.org/10.1080/02701367.1984.10608416>

Siong, K. (2011). How Does Visual Impairment Affect Scene Perception and Object Recognition ?, 2, 6695. <https://doi.org/10.1068/ic225>

Society, M. (n.d.). Tips for teaching sport to visually impaired students.

Soffer, M. (2019). Culture , causal attributions to visual impairments , and stigma : A mediation model. *Disability and Health Journal*, 12(3), 437–442.

Febriana Pratiwi, 2021

INOVASI MEDIA PEMBELAJARAN BOLA BERSUARA DALAM PENDIDIKAN JASMANI ADAPTIF BAGI TUNANETRA

Universitas Pendidikan Indonesia | repository.upi.edu | perpustakaan.upi.edu

<https://doi.org/10.1016/j.dhjo.2019.01.006>

Street, M. (2013). The Administration of Physical Education, (December 2014), 37–41. <https://doi.org/10.1080/23267240.1935.10619698>

Tepfer, A. (2004). The Socialization of Elite Blind Athletes into Sport.

Uchino, K. (2010). The development of piezoelectric materials and the new perspective. *Advanced Piezoelectric Materials: Science and Technology*, 1–85. <https://doi.org/10.1533/9781845699758.1>

Vassileva, P., Gieser, S. C., Vitale, S., Cholakova, T., Katz, J., Sc, D., ... Ph, D. (1996). Blindness and visual impairment in Western Bulgaria Plovdiv Blagoevgrad, (3), 143–149.

Vecchi, T. (2012). Blind Vision: The Neuroscience of Visual Impairment. Zaira, (July). <https://doi.org/10.1177/0145482X1210600706>

Velten, M. C. C., Ugrinowitsch, H., Portes, L. L., Hermann, T., & Bläsing, B. (2016). Auditory spatial concepts in blind football experts. *Psychology of Sport and Exercise*, 22, 218–228. <https://doi.org/10.1016/j.psychsport.2015.08.010>

Verver, S. H., Vervloed, M. P. J., & Steenbergen, B. (2019). Research in Developmental Disabilities The use of augmented toys to facilitate play in school-aged children with visual impairments. *Research in Developmental Disabilities*, 85(September 2018), 70–81. <https://doi.org/10.1016/j.ridd.2018.11.006>

Wallaschek, J. (1995). Piezoelectric Ultrasonic Motors. *Journal of Intelligent Material Systems and Structures*, 6(1), 71–83. <https://doi.org/10.1177/1045389X9500600110>

Wolf, B. (2015). Visual Impairment Is Not Blindness, (December), 334–336.

Yao, P., Yu, H., Ding, Z., Liu, Y., Lu, J., Lavorgna, M., ... Liu, X. (2019).

Febriana Pratiwi, 2021

INOVASI MEDIA PEMBELAJARAN BOLA BERSUARA DALAM PENDIDIKAN JASMANI ADAPTIF BAGI TUNANETRA

Universitas Pendidikan Indonesia | repository.upi.edu | perpustakaan.upi.edu

Review on Polymer-Based Composite Electrolytes for Lithium Batteries.
Frontiers in Chemistry, 7(August), 1–17.
<https://doi.org/10.3389/fchem.2019.00522>

Yun, J., & Beamer, J. (2018). Promoting Physical Activity in Adapted Physical Education, 3084. <https://doi.org/10.1080/07303084.2018.1430628>

Zare, Alireza, McMuller, K., & Gardner-McCune, C. (2010). Design of an Accessible and Portable System for Soccer Players with Visual Impairments.