

**RANCANG BANGUN MEDIA PEMBELAJARAN MEMBACA DAN  
BERHITUNG TERHADAP ANAK AUTIS DENGAN METODE ABA DAN  
PECS**

**SKRIPSI**

diajukan untuk memenuhi sebagian syarat untuk memperoleh gelar Sarjana  
Pendidikan Program Studi Pendidikan Ilmu Komputer FPMIPA UPI



oleh  
Veny Mahatmya Paramesti  
NIM 1504807

**PROGRAM STUDI PENDIDIKAN ILMU KOMPUTER  
DEPARTEMEN PENDIDIKAN ILMU KOMPUTER  
FAKULTAS PENDIDIKAN MATEMATIKA DAN ILMU PENGETAHUAN ALAM  
UNIVERSITAS PENDIDIKAN INDONESIA  
2019**

**RANCANG BANGUN MEDIA PEMBELAJARAN MEMBACA DAN  
BERHITUNG TERHADAP ANAK AUTIS DENGAN METODE ABA DAN  
PECS**

oleh  
Veny Mahatmya Paramesti  
NIM 1504807

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

© Veny Mahatmya Paramesti 2019  
Universitas Pendidikan Indonesia  
Agustus 2018

Hak Cipta dilindungi Undang-undang Skripsi ini tidak boleh diperbanyak  
seluruhnya atau sebagian, dengan dicetak ulang, difoto kopi atau cara lainnya  
tanpa ijin dari penulis.

**VENY MAHATMYA PARAMESTI**

**RANCANG BANGUN MEDIA PEMBELAJARAN MEMBACA DAN  
BERHITUNG TERHADAP ANAK AUTIS DENGAN METODE ABA DAN  
PECS**

disetujui dan disahkan oleh :

Pembimbing I



**Prof. Dr. Munir, M.IT**

NIP. 196603252001121001

Pembimbing II



**Lala Septem Riza, MT., Ph.D**

NIP. 197809262008121001

Mengetahui,  
Ketua Departemen Pendidikan Ilmu Komputer



**Lala Septem Riza, MT., Ph.D**

NIP. 197809262008121001

# **RANCANG BANGUN MEDIA PEMBELAJARAN MEMBACA DAN BERHITUNG TERHADAP ANAK AUTIS DENGAN METODE ABA DAN PECS**

## **ABSTRAK**

Oleh

Veny Mahatmya Paramesti, 1504807

venymahatmya@student.upi.edu

Diagnosis untuk mengetahui media pembelajaran yang disukai oleh anak autis adalah solusi supaya pembelajaran anak autis bisa berjalan dengan lancar. Tujuan dari penelitian ini adalah untuk merancang dan mengimplementasikan media pembelajaran sebagai alat bagi guru pendidikan khusus untuk mendiagnosis media pembelajaran yang disukai oleh anak autis. Dalam merancang media pembelajaran untuk anak autis harus memperhatikan karakteristik multimedia untuk anak autis, metode pembelajaran khusus untuk anak autis, serta alat peraga yang disukai oleh anak autis. Metode pembelajaran yang digunakan adalah metode *Applied Behavior Analysis* (ABA) dan *Picture Exchange Communication System* (PECS). Materi yang disajikan adalah materi membaca dan berhitung dengan alat peraga yang digunakan adalah hewan gajah dan buah pisang. Media yang dirancang merupakan media yang terdiri dari 4 jenis media yaitu media audio, video, animasi, dan gambar statis. Untuk mencapai tujuan tersebut maka metode *Decide, Design, Develop, and Evaluate* (DDD-E) sebagai acuan dalam pembangunan media pembelajaran. Eksperimen dilakukan di SLB Al-Hikmah dengan subjek penelitian sebanyak 3 orang siswa berusia 9 sampai 11 tahun. Kemudian hasil dari eksperimen diolah dan dianalisis berdasarkan metode kualitatif. Hasil menunjukkan bahwa respon dan rata-rata fokus siswa selama menggunakan media sangat baik di media video dan animasi, selain itu anak lebih suka dengan alat peraga buah pisang dibandingkan dengan hewan gajah. Media pembelajaran yang telah dibangun terbukti dapat mendiagnosis media yang disukai anak autis. Ada hal penting yang harus dilakukan sebelum mengimplementasikan media yaitu adanya pengenalan serta bimbingan terhadap media pembelajaran.

**Kata Kunci** : Anak Autis, ABA, PECS, Media Pembelajaran

# **DESIGN OF MEDIA LEARNING READING AND CALCULATING FOR CHILDREN WITH AUTISM DISORDER ON ABA AND PECS METHODS**

## **ABSTRACT**

By

Veny Mahatmya Paramesti, 1504807

venymahatmya@student.upi.edu

*The diagnosis to identify what kind of learning media favored by children with autism is the solution to better facilitate their learning process. The goal of this study is to design and implement learning media as a tool for special education teacher to diagnose what media is best favored by children with autism. Designing media for children with autism requires paying attention to multimedia characteristics for autistic children, learning method for autistic children, and learning props favored by autistic children. Learning methods used in this study are Applied Behavior Analysis (ABA) method and Picture Exchange Communication System (PECS). The lessons presented in the media are reading and counting lessons with figurative elephant and banana as learning props. The designed media consists of four types of media format, that is audio, video, animation, and static picture. In order to reach the goal, DDD-E (Decide, Design, Develop, Evaluate) method is used as a reference in developing the media. The experiment was conducted in Al-Hikmah Special School with subjects of three students between 9 and 11 years old. Subsequently, the outcome is processed and analyzed using qualitative method. The result shows that students demonstrate better response and focus to video and animation media, and that figurative banana prop is better favored over figurative elephants. The developed media proves to be able to diagnose learning media favored by children with autism. Implementation of the media requires preliminary introduction and careful guidance throughout the usage of the media.*

**Keywords:** *Children with autism, ABA, PECS, Learning Media*

## DAFTAR ISI

KATA PENGANTAR .....	i
UCAPAN TERIMA KASIH.....	ii
ABSTRAK.....	4
<i>ABSTRACT</i> .....	5
DAFTAR ISI.....	vi
DAFTAR TABEL.....	ix
DAFTAR GAMBAR .....	x
DAFTAR LAMPIRAN.....	xii
BAB I PENDAHULUAN .....	1
1.1 Latar Belakang Penelitian .....	1
1.2 Rumusan Masalah Penelitian .....	4
1.3 Batasan Masalah.....	5
1.4 Tujuan Penelitian.....	5
1.5 Manfaat Penelitian.....	5
1.6 Struktur dan Organisasi Skripsi.....	6
BAB II KAJIAN PUSTAKA .....	8
2.1 Autis .....	8
2.1.1 Pengertian Autis .....	8
2.1.2 Klasifikasi Autis.....	9
2.1.3 Karakteristik Autis .....	10
2.2 Media Pembelajaran .....	13
2.2.1 Pengertian Media Pembelajaran.....	13
2.2.2 Pengertian Multimedia .....	15
2.2.3 Komponen Multimedia .....	16

2.2.4	Karakteristik Multimedia Untuk Anak Autis .....	19
2.3	Membaca .....	22
2.4	Berhitung .....	23
2.5	Metode Pembelajaran Penderita Autis .....	24
2.6	Metode <i>Applied Behaviour Analysis</i> (ABA) .....	26
2.6.1	Pengertian Metode <i>Applied Behaviour Analysis</i> (ABA) .....	26
2.6.2	Tahapan Metode <i>Applied Behaviour Analysis</i> (ABA) .....	27
2.6.3	Kelebihan Metode <i>Applied Behaviour Analysis</i> (ABA) .....	28
2.7	Metode <i>Picture Exchange Communication System</i> (PECS) .....	28
2.7.1	Pengertian Metode <i>Picture Exchange Communication System</i> (PECS) .....	28
2.7.2	Tahapan Metode <i>Picture Exchange Communication System</i> (PECS)	28
2.7.3	Kelebihan Metode <i>Picture Exchange Communication System</i> (PECS) .....	30
<b>BAB III METODE PENELITIAN</b> .....		32
3.1	Tahapan Penelitian .....	32
3.2	Partisipan dan Tempat Penelitian .....	37
3.3	Populasi dan Sampel Penelitian .....	37
3.4	Instrumen Penelitian .....	38
3.5	Analisis Data .....	39
3.6	Pemeriksaan Keabsahan Data .....	41
<b>BAB IV HASIL DAN PEMBAHASAN</b> .....		42
4.1	Hasil .....	42
4.1.1	Tahap <i>Decide</i> .....	42
4.1.2	Tahap <i>Design</i> .....	47
4.1.3	Tahap <i>Develop</i> .....	54

4.1.4 Tahap <i>Evaluate</i> .....	82
4.2 Penemuan .....	85
4.2.1 Pengenalan Media .....	86
4.2.2 Durasi Rata-Rata Fokus Siswa Terhadap Media.....	88
4.2.3 Perasaan Emosional.....	91
4.2.4 Karakteristik Perilaku Siswa .....	94
4.2.5 Penggunaan Media Berdasarkan Karakteristik Setiap Individu.....	97
4.2.6 Tanggapan Guru.....	99
4.3 Pembahasan Hasil Penelitian .....	100
4.4 Perbandingan Hasil Penelitian Sebelumnya.....	105
BAB V SIMPULAN DAN REKOMENDASI .....	108
5.1 Simpulan.....	108
5.2 Rekomendasi .....	108

## DAFTAR PUSTAKA



## DAFTAR TABEL

Tabel 2. 1 Kelompok Media Pembelajaran.....	14
Tabel 3. 1 Penilaian LORI .....	35
Tabel 4. 1 Tahapan Metode PECS dalam Media .....	47
Tabel 4. 2 Identitas Siswa .....	52
Tabel 4. 3 Hasil validasi media oleh ahli media 1 .....	83
Tabel 4. 4 Hasil validasi media oleh ahli media 2 .....	83
Tabel 4. 5 Rata-rata validasi ahli media 1 dan 2 .....	84
Tabel 4. 6 Hasil validasi media oleh ahli materi.....	84
Tabel 4. 7 Pengenalan Media .....	86
Tabel 4. 8 Jumlah Pembelajaran Media .....	87
Tabel 4. 9 Pengenalan Media .....	88
Tabel 4. 10 Durasi rata-rata fokus siswa terhadap media audio .....	89
Tabel 4. 11 Durasi rata-rata fokus siswa terhadap media video .....	89
Tabel 4. 12 Durasi rata-rata fokus siswa terhadap media animasi.....	90
Tabel 4. 13 Durasi rata-rata fokus siswa terhadap media gambar statis .....	90
Tabel 4. 14 Perasaan emosional terhadap media audio.....	91
Tabel 4. 15 Perasaan emosional terhadap media video.....	92
Tabel 4. 16 Perasaan emosional terhadap media animasi .....	92
Tabel 4. 17 Perasaan emosional terhadap media gambar statis .....	93
Tabel 4. 18 Perilaku siswa terhadap media audio .....	94
Tabel 4. 19 Perilaku siswa terhadap media video .....	94
Tabel 4. 20 Perilaku siswa terhadap media animasi .....	95
Tabel 4. 21 Perilaku siswa terhadap media gambar statis.....	96
Tabel 4. 22 Karakteristik setiap individu terhadap media.....	97
Tabel 4. 23 Perbandingan dengan Hasil Penelitian Sebelumnya.....	105

## DAFTAR GAMBAR

Gambar 2. 1 Tahapan Metode ABA .....	27
Gambar 3. 1 Tahapan Penelitian .....	32
Gambar 3. 2 Tahapan Model DDD-E .....	34
Gambar 4. 1 Model Media Pembelajaran .....	42
Gambar 4. 2 Jenis Media Pembelajaran .....	44
Gambar 4. 3 Skenario Penelitian.....	52
Gambar 4. 4 Karakter Anak Laki-laki.....	53
Gambar 4. 5 Hewan Gajah .....	54
Gambar 4. 6 Buah Pisang.....	54
Gambar 4. 7 Antarmuka Halaman Awal.....	56
Gambar 4. 8 Antarmuka Halaman Menu Utama .....	56
Gambar 4. 9 Antarmuka Halaman Exit.....	57
Gambar 4. 10 Antarmuka Halaman Petunjuk 1 .....	58
Gambar 4. 11 Antarmuka Halaman Petunjuk 2 .....	58
Gambar 4. 12 Antarmuka Halaman Petunjuk 3 .....	59
Gambar 4. 13 Antarmuka Halaman Petunjuk 4 .....	59
Gambar 4. 14 Antarmuka Halaman Petunjuk 5 .....	59
Gambar 4. 15 Antarmuka Halaman Petunjuk 6 .....	60
Gambar 4. 16 Antarmuka Halaman Profil Pembuat .....	60
Gambar 4. 17 Antarmuka Halaman Menu Media Audio.....	61
Gambar 4. 18 Antarmuka Halaman Menu Materi Media Audio .....	61
Gambar 4. 19 Antarmuka Halaman Materi dan Soal .....	62
Gambar 4. 20 Antarmuka Halaman Menu Media Video .....	63
Gambar 4. 21 Antarmuka Halaman Materi Media Video.....	63
Gambar 4. 22 Antarmuka Halaman Soal Media Video .....	64
Gambar 4. 23 Antarmuka Halaman Menu Media Animasi .....	64
Gambar 4. 24 Judul Materi.....	65
Gambar 4. 25 Potongan Scene 1 Animasi.....	66
Gambar 4. 26 Potongan Scene 2 Animasi.....	66
Gambar 4. 27 Potongan Transisi Animasi .....	66

Gambar 4. 28 Potongan Scene 3 Animasi.....	67
Gambar 4. 29 Potongan Scene 4 Animasi.....	67
Gambar 4. 30 Potongan Scene 5 Animasi.....	67
Gambar 4. 31 Potongan Scene 6 Animasi.....	68
Gambar 4. 32 Potongan transisi Animasi.....	68
Gambar 4. 33 Potongan Scene 7 Animasi.....	68
Gambar 4. 34 Potongan Scene 8 Animasi.....	69
Gambar 4. 35 Potongan Scene 9 (terakhir) Animasi .....	69
Gambar 4. 36 Antarmuka Halaman Menu Mini Game Media Animasi .....	70
Gambar 4. 37 Antarmuka Halaman Soal Mini Game Menunjukkan Media Animasi .....	71
Gambar 4. 38 Antarmuka Halaman Soal Mini Game Menunjukkan Media Animasi .....	71
Gambar 4. 39 Antarmuka Halaman Pilihan Jawaban Mini Game Menunjukkan Media Animasi .....	72
Gambar 4. 40 Antarmuka Halaman Mini Game Mengidentifikasi Media Animasi .....	73
Gambar 4. 41 Antarmuka Halaman Mini Game Memasangkan Media Animasi .	74
Gambar 4. 42 Antarmuka Halaman Menu Media Gambar Statis .....	75
Gambar 4. 43 Antarmuka Halaman Materi Media Gambar Statis.....	76
Gambar 4. 44 Antarmuka Halaman Menu Minigame Gambar Statis.....	77
Gambar 4. 45 Antarmuka Halaman Mini Game Menunjukkan Media Gambar Statis .....	78
Gambar 4. 46 Antarmuka Halaman Mini Game Memasangkan Media Gambar Statis.....	79
Gambar 4. 47 Antarmuka Halaman Mini Game Menghitung Media Gambar Statis .....	80
Gambar 4. 48 Antarmuka Halaman Skor Diatas KKM .....	81
Gambar 4. 49 Antarmuka Halaman Skor Dibawah KKM .....	81
Gambar 4. 50 Antarmuka Halaman Jika Jawaban Benar.....	82
Gambar 4. 51 Antarmuka Halaman Jika Jawaban Salah .....	82

## DAFTAR LAMPIRAN

- Lampiran 1. Pedoman Wawancara
- Lampiran 2. *Flowchart*
- Lampiran 3. *Storyboard*
- Lampiran 4. Metode PECS
- Lampiran 5. Catatan Lapangan
- Lampiran 6. Silabus
- Lampiran 7. RPP
- Lampiran 8. Lembar Validasi Soal
- Lampiran 9. Lembar Validasi Media
- Lampiran 10. *Admin Guide*
- Lampiran 11. *User Guide*
- Lampiran 12. Surat Izin Observasi
- Lampiran 13. Surat Izin Penelitian
- Lampiran 14. Surat Keterangan Telah Melaksanakan Observasi dan Penelitian
- Lampiran 15. Dokumentasi Penelitian
- Lampiran 16. Riwayat Hidup

## DAFTAR PUSTAKA

- Adly, H., Noor, M., Shahbodin, F., Ananta, G. P., Ku, C., Che, N., & Mohd, K. (2017). *International Journal of Advanced and Applied Sciences A prototype development of visual perception diagnosis games for autism children*. 4(3), 68–72.
- American Psychiatric Association. (2013). *Diagnostic And Statistical Manual of Mental Disorder Edition “DSM-V”*. Washinton DC: American Psychiatric Publishing. Washinton DC.
- Anderson, R. H. (1976). *Selecting and developing media for instruction*. SERBIULA (Sistema Librum 2.0).
- Arini, T., & Syafrizal, M. (2012). Membaca Untuk Anak Autis Di Bimbingan Belajar Khusus, 13(3), 49–54.
- Bashash, L., Outhred, L., & Bochner, S. (n.d.). *International Journal of Disability , Counting Skills and Number Concepts of Students with Moderate Intellectual Disabilities Counting Skills and Number Concepts of Students with Moderate Intellectual Disabilities*. (October 2014), 37–41. <https://doi.org/10.1080/1034912032000120480>
- Bimantara, A., Suyanto, M., & Eko Boedijanto. (2015). *IMPLEMENTASI APLIKASI GAME AUTISME “ AHADA ” DI SLB BINA ANGGITA YOGYAKARTA*. 16(02), 1-11.
- Castillo, T. A., Celis, C. P. De, Lara, C., Somodevilla, M. J., Pineda, I. H., Alba, K. F. De, & Romero, E. (2016). *Authic : Computational Tool for Children with Autistic Spectrum Disorder*.
- Christinaki, E., Vidakis, N., & Triantafyllidis, G. (n.d.). *A Novel Educational Game for teaching Emotion Identification Skills to Preschoolers with Autism Diagnosis*. 11(2), 723–743. <https://doi.org/10.2298/CSIS140215039C>
- Cocks, A. (2008). Researching the lives of disabled children: The process of participant observation in seeking inclusivity. *Qualitative Social Work*, 7(2),

163–180. <https://doi.org/10.1177/1473325008089628>.

- Creswell, J. W. (2012). Educational research: Planning, conducting, and evaluating quantitative and qualitative research. *Educational Research* (Vol. 4). <https://doi.org/10.1017/CBO9781107415324.004>.
- Cridland, E. K., Jones, S. C., Caputi, P., & Magee, C. (2015). Qualitative research with families living with autism spectrum disorder\_ Recommendations for conducting semistructured interviews\_ *Journal of Intellectual & Developmental Disability*\_ Vol 40, No 1, 40, 78–91.
- D. W. Massaro and A. Bosseler, “Development and evaluation of computer animated tutor for vocabulary and language learning in children with autism,” *Journal of Autism and Developmental Disorders*, vol. 33, pp. 653–672, 2003.
- Dockett, S., Einarsdottir, J., & Perry, B. (2009). Researching with children: Ethical tensions. *Journal of Early Childhood Research*, 7(3), 283–298. <https://doi.org/10.1177/1476718X09336971>.
- Depdiknas. (2000). *Permainan Berhitung di Taman Kanak-Kanak*. Jakarta: Depdiknas
- Eitel, A., & Scheiter, K. (2014). *Picture or Text First ? Explaining Sequence Effects when Learning with Pictures and Text*. <https://doi.org/10.1007/s10648-014-9264-4>
- Fairus, M., Mohd, N., & Nor, H. (2016). *Developing user interface design application for children with autism*. 217, 887–894. <https://doi.org/10.1016/j.sbspro.2016.02.022>
- Frost, L., & Bondy, A. (2002). *The Picture Exchange Communication System training manual*. (2nd ed.). Cherry Hill, NJ: Pyramid Educational Consultants
- Geary, D. C., Hoard, M. K., Nugent, L., & Bailey, D. H. (2013). *Adolescents ’ Functional Numeracy Is Predicted by Their School Entry Number System Knowledge*. 8(1). <https://doi.org/10.1371/journal.pone.0054651>
- Greer, C. W., & Erickson, K. A. (2019). *Teaching Students With Significant*

*Cognitive Disabilities to Count Routine for Achieving Early Counting*. 1–8.  
<https://doi.org/10.1177/0040059919836451>

Grynszpan, O., Martin, J. C., & Nadel, J. (2008). Multimedia interfaces for users with high functioning autism: An empirical investigation. *International Journal of Human Computer Studies*, 66(8), 628–639.  
<https://doi.org/10.1016/j.ijhcs.2008.04.001>.

Handojo. 2008. *Autisma*. Jakarta: PT. Bhuana Ilmu Populer.

Hasnah Toran, S. B., Fadliana Chiri. (2013). *Siri Pendidikan Autisme: Pengajaran Berstruktur*: UKM Press.

Hulusic, V., & Pistoljevic, N. (2012). “ *LeFCA* ”: *Learning framework for children with autism*. 15(0), 4–16. <https://doi.org/10.1016/j.procs.2012.10.052>

Ivers, Karen S, and Ann E Barron. 2002. *Multimedia Projects in Education : Designing, Producing, and Assessing*.

Jusoh, W., Majid, R. A., Chepa, P., & Bharu, K. (2017). Using Picture Exchange Communication System To Improve, 1(1), 46–49.

Kamaruzaman, N. N. (2015). *Digital Game-Based Learning for Low Functioning Autism Children in Learning Al-Quran*.  
<https://doi.org/10.1109/NOORIC.2013.46>

Khan, T. M. (2010). *The effects of multimedia learning on children with different special education needs*. 2, 4341–4345.  
<https://doi.org/10.1016/j.sbspro.2010.03.690>

Kittel, P. R. (2013). *Predictors of Basic Reading Skills in High-Functioning Children with Autism Spectrum Disorder : The Role of Cognitive Flexibility* by.

Kurniawan, R., & Kunci, K. (2013). *Aplikasi Multimedia Pembelajaran Metode PECS ( Picture Exchange Communication System ) untuk Membantu Perkembangan Komunikasi dan Interaksi Anak Autis*. 16–25.

Leacock, T. L., & Nesbit, J. C. (2007). A framework for evaluating the quality of multimedia learning resources. *Journal of Educational Technology &*

*Society*, 10(2).

- Lin, C., Chang, S., Liou, W., & Tsai, Y. (2013). Research in Developmental Disabilities The development of a multimedia online language assessment tool for young children with autism. *Research in Developmental Disabilities*, 34(10), 3553–3565. <https://doi.org/10.1016/j.ridd.2013.06.042>
- Mahnun, O. N. (2012). *MEDIA PEMBELAJARAN ( Kajian terhadap Langkah-langkah Pemilihan Media dan Implementasinya dalam Pembelajaran )*. 37(1).
- Marchi, E., Baron-cohen, S., Golan, O., Sven, B., Arora, P., & Reinhold, H. (2015). *Typicality and Emotion in the Voice of Children with Autism Spectrum Condition : Evidence Across Three Languages Machine Intelligence & Signal Processing Group , MMK , Technische Universit ¨ Chair of Complex & Intelligent Systems , University of Passau , Germany*. 115–119.
- Marchi, E., Baron-cohen, S., Lassalle, A., & Reilly, H. O. (n.d.). *Voice Emotion Games : Language and Emotion in the Voice of Children with Autism Spectrum Condition*.
- Min, W. K., Theng, L. B., & Ann, O. C. (2015). *acquisition through animated social stories*. 9(December), 157–164.
- Mower, E., Black, M. P., Flores, E., Williams, M., Narayanan, S., Analysis, S., & Angeles, L. (2011). *RACHEL : DESIGN OF AN EMOTIONALLY TARGETED INTERACTIVE AGENT FOR CHILDREN WITH AUTISM* University of Southern California ( USC ) USC University Center for Excellence in Developmental Disabilities at Children ' s Hospital Los Angeles Keck School of Medicine , USC , Los Angeles , California , USA.
- Mulyono Abdurrahman, 2003. Pendidikan Inklusi . Surakarta : Depdikbud.
- Munir. (2014). Multimedia Konsep & Aplikasi Dalam Pendidikan. In *Antimicrobial agents and chemotherapy* (Vol. 58). <https://doi.org/10.1128/AAC.03728-14>
- Mustika, M., Kao, C., Cheng, C., Heh, J., & Lin, C. (2014). *A Multimedia Distance Language Assessment System for Preschoolers with A System Design*. <https://doi.org/10.1109/U-MEDIA.2014.10>



- Nation, K., Clarke, P., Wright, B., & Williams, C. (2006). Patterns of reading ability in children with autism spectrum disorder. *Journal of Autism and Developmental Disorders*, 36(7), 911–919. <https://doi.org/10.1007/s10803-006-0130-1>
- Nur, I., Ahmad, N., Fatimah, W., Ahmad, W., Jamaludin, Z., Hashim, A. S., & Hashim, S. (2016). *The Design of Mobile Social Application for Children with Autism The Design of Mobile Social Application for Ahmad Autism*. 547–552.
- Omar, S., & Bidin, A. (2015). *The Impact of Multimedia Graphic and Text with Autistic Learners in Reading*. 3(12), 989–996. <https://doi.org/10.13189/ujer.2015.031206>
- Pavlov, N. (2014). *User Interface for People with Autism Spectrum Disorders*. 2014(February), 128–134.
- Plutchik, R. (2003). *Emotion and Life, Perspectives from Psychology, Biology, and Evolution*. Washington, DC: American Psychological Association.
- Rahman, R., Naha, S., Roy, P. C., Ahmed, I., Samrose, S., Rahman, M., & Ahmed, S. I. (2011). *A-Class : A Classroom Software with the Support for Diversity in Aptitudes of Autistic Children*. 727–731.
- Rahmawati, Yeni P. (2017). *peningkatan Kemampuan Membaca Permulaan Melalui Media Lectora Inspire Pada Siswa Autis Kelas V di SLB Tegar Harapan Sleman*. Skripsi: Universitas Negeri Yogyakarta.
- Raja, P., Saringat, M. Z., Mustapha, A., & Zainal, A. (2017). *Prospect : A Picture Exchange Communication System ( PECS ) -based Instant Messaging Application for Autism Spectrum Condition Prospect : A Picture Exchange Communication System ( PECS ) -based Instant Messaging Application for Autism Spectrum Condition*. <https://doi.org/10.1088/1757899X/226/1/012088>.
- Roudlotul, Dwi. 2013. *Terapi Bermain Untuk Meningkatkan Konsentrasi Pada Anak Autis di SD Al-Firdaus Surakarta*. Skripsi: IAIN Surakarta.
- Reddi, U.V.2003.*Multimedia as an educational tool*. In *Educational multimedia: A*

handbook for teacher-developers. New Delhi:CEMCA

- Remington, A., & Fairnie, J. (2017). A sound advantage : Increased auditory capacity in autism. *Cognition*. <https://doi.org/10.1016/j.cognition.2017.04.002>
- Series, C. (2018). *Survey on How to Select and Develop Learning Media Conducted by Teacher Professional Education Participants Survey on How to Select and Develop Learning Media Conducted by Teacher Professional Education Participants*. <https://doi.org/10.1088/1742-6596/1140/1/012014>
- Shukla-Mehta, S., Miller, T., & Callahan, K. J. (2010). Evaluating the effectiveness of video instruction on social and communication skills training for children with autism spectrum disorders: A review of the literature. *Focus on Autism and Other Developmental Disabilities*, 25(1), 23–36. <https://doi.org/10.1177/1088357609352901>.
- Solari, E. J., Grimm, R., McIntyre, N. S., Lerro, L. S., Zajic, M., & Mundy, P. C. (2017). Research in Autism Spectrum Disorders The relation between text reading fluency and reading comprehension for students with autism spectrum disorders. *Research in Autism Spectrum Disorders*, 41–42(July), 8–19. <https://doi.org/10.1016/j.rasd.2017.07.002>
- Solihat, Syifa. 2018. *Konsep dan Pembangunan Media Interaktif Membaca dan Berhitung Untuk Anak Autis Dengan Metode PECS*. Skripsi: UPI.
- Somadayo, Samsu. (2011). *Strategi dan Teknik Pembelajaran Membaca*. Yogyakarta: Graha Ilmu.
- Suheri, A. (2006). Animasi Pembelajaran. *Jurusan Teknik Informatika*, 2, 27–33.
- Sugiyono. (2015). *Metode Penelitian Pendidikan (Pendekatan Kuantitatif, Kualitatif dan R&D)*. Penerbit CV. Alfabeta: Bandung.
- Urturi, Z. S. De, Zorrilla, A. M., & Z, B. G. (2011). *Serious Game based on First Aid Education for individuals with Autism Spectrum Disorder (ASD) using Android Mobile Devices*. 223–227.
- Utami, D. (2011). Efektifitas Animasi Dalam Pembelajaran. *Majalah Ilmiah*

*Pembelajaran*, 7(1), 44–52.

Yuwono, Joko. (2009). *Memahami Anak Autistik*. Bandung: Alfabeta.