

**Πρόγραμμα Μεταπτυχιακών Σπουδών Εξειδίκευσης
του Τμήματος Ελληνικής Φιλολογίας του Δημοκριτείου Πανεπιστημίου Θράκης
σε συνεργασία με το
ΕΚΕΦΕ Δημόκριτος – Ινστιτούτο Πληροφορικής και Τηλεπικοινωνιών
με τίτλο: «Εξειδίκευση στις Τ.Π.Ε. και Ειδική Αγωγή – Ψυχοπαιδαγωγική της ένταξης»**

Τίτλος Μεταπτυχιακής Διπλωματικής Εργασίας

**“Εικονική Πραγματικότητα για τον Αυτισμό και την Διαταραχή ελλειμματικής
Προσοχής”**

“VR for ADHD AND Autism Spectrum Disorders”

του Δημήτριου Τόγια

Επιβλέπων Καθηγητής : Αθανάσιος Δρίγκας

Μεταπτυχιακή διατριβή που υποβάλλεται
Στην τριμελή επιτροπή για την απόκτηση του μεταπτυχιακού τίτλου του
Προγράμματος Μεταπτυχιακών Σπουδών Εξειδίκευσης
Του Τ.Ε.Φ. – Δ.Π.Θ. σε συνεργασία με το Ε.Κ.Ε.Φ.Ε. Δημόκριτος – Ινστιτούτο
Πληροφορικής και Τηλεπικοινωνιών
Με τίτλο: «Εξειδίκευση στις Τ.Π.Ε. και Ειδική Αγωγή – Ψυχοπαιδαγωγική της Ένταξης»

Εγκεκριμένο από την τριμελή επιτροπή:

1^{ος} Επιβλέπων: Ονοματεπώνυμο, Βαθμίδα, Ίδρυμα

2^{ος} Επιβλέπων: Ονοματεπώνυμο, Βαθμίδα, Ίδρυμα

3^{ος} Επιβλέπων: Ονοματεπώνυμο, Βαθμίδα, Ίδρυμα

Κομοτηνή/Αθήνα

2021

ΠΕΡΙΛΗΨΗ

Το αντικείμενο της συγκεκριμένης διπλωματικής εργασίας έχει ως θέμα τον βοηθητικό ρόλο που μπορεί να παρέχει η εικονική πραγματικότητα στα παιδιά με ΔΕΠΥ(διαταραχή ελλειμματικής προσοχής υπερκινητικότητας) και αυτισμό ,την εφαρμογή τους στην εκπαίδευση και συγκεκριμένα στην ειδική αγωγή. Πως οι συγκεκριμένες λειτουργίες της βιοηθούν στην μεταγνωση . Αρχικά θα κάνουμε μια εισαγωγή και θα επεξηγήσουμε περιληπτικά τον εγκέφαλο και διάφορες λειτουργίες του. Εν συνεχείᾳ , θα κάνουμε μια εκτενή αναφορά για την ΔΕΠΥ και τον Αυτισμό αναλύοντας τι είναι ώστε να αποκτήσουμε κάποιες βασικές γνώσεις, μια ιστορική αναδρομή για το πότε ουσιαστικά έχουμε τις πρώτες αναφορές και ποιος είναι ο πατέρας της εικονικής πραγματικότητας και την συμβολή του στην σημερινή κατάσταση. Θα προσπαθήσουμε να επεξηγήσουμε αναλυτικά για το πως μπορούμε ουσιαστικά να έχουμε ενεργό ρόλο και με ποιο τρόπο. Τις μεγάλες εταιρίες που προσπαθούν να καινοτομήσουν με διάφορες εφαρμογές τους και να χτίσουν διάφορες εφαρμογές και να συμβάλλουν με τον συγκεκριμένο τρόπο. Τέλος θα αναφερθούμε στην πρακτική τους εφαρμογή στα σχολεία και στις εκπαιδευτικές εφαρμογές που διαδραματίζουν σημαντικό ρόλο στο να προσπαθήσουμε να εκπαιδεύουμε τα παιδιά με διαφορετικότητα σε πραγματικές καταστάσεις ώστε να έχουν ενεργό και δια δραστική συμμετοχή στην καθημερινή ζωή.

Βιβλιογραφία

ΞΕΝΗ

- Arráez Vera, G., Lorenzo-Lledó, A., Gómez-Puerta, M., & Lorenzo, G. (2018). La clase invertida en la educación superior: percepciones del alumnado.
- Anderson, C. A., & Bushman, B. J. (2001). Effects of violent video games on aggressive behavior, aggressive cognition, aggressive affect, physiological arousal, and prosocial behavior: A meta-analytic review of the scientific literature. *Psychological science*, 12(5), 353-359.
- Bacca Acosta, J. L., Baldiris Navarro, S. M., Fabregat Gesa, R., & Graf, S. (2014). Augmented reality trends in education: a systematic review of research and applications. *Journal of Educational Technology and Society*, 2014, vol. 17, núm. 4, p. 133-149.
- Benner-Davis, S., & Heaton, P. C. (2007). Attention deficit and hyperactivity disorder: controversies of diagnosis and safety of pharmacological and nonpharmacological treatment. *Current Drug Safety*, 2(1), 33-42.
- Bujak, K. R., Radu, I., Catrambone, R., MacIntyre, B., Zheng, R., & Golubski, G. (2013). A psychological perspective on augmented reality in the mathematics classroom. *Computers & Education*, 68, 536-544.
- Bölte, S., Golan, O., Goodwin, M. S., & Zwaigenbaum, L. (2010). What can innovative technologies do for autism spectrum disorders?.
- Cerrillo-Urbina, A. J., García-Hermoso, A., Martínez-Vizcaíno, V., Pardo-Guijarro, M. J., Ruiz-Hermosa, A., & Sánchez-López, M. (2018). Prevalence of probable attention-deficit/hyperactivity disorder symptoms: result from a Spanish sample of children. *BMC pediatrics*, 18(1), 1-7.
- Chaddock, L., Pontifex, M. B., Hillman, C. H., & Kramer, A. F. (2011). A review of the relation of aerobic fitness and physical activity to brain structure and function in children. *Journal of the international Neuropsychological Society*, 17(6), 975-985.

- Cho, K., & Yoon, D. (2002). On the general BER expression of one-and two-dimensional amplitude modulations. *IEEE Transactions on Communications*, 50(7), 1074-1080.
- Colcombe, S., & Kramer, A. F. (2003). Fitness effects on the cognitive function of older adults: a meta-analytic study. *Psychological science*, 14(2), 125-130.
- Desman, C., Petermann, F., & Hampel, P. (2008). Deficit in response inhibition in children with attention deficit/hyperactivity disorder (ADHD): Impact of motivation?. *Child Neuropsychology*, 14(6), 483-503.
- Deterding, S., Khaled, R., Nacke, L. E., & Dixon, D. (2011, May). Gamification: Toward a definition. In *CHI 2011 gamification workshop proceedings* (Vol. 12, pp. 12-15). Vancouver BC, Canada.
- Donnelly, J. E., & Lambourne, K. (2011). Classroom-based physical activity, cognition, and academic achievement. *Preventive medicine*, 52, S36-S42.
- Dowson, J. H., Blackwell, A. D., Turner, D. C., Harvey, E., Malhotra, T., Robbins, T. W., & Sahakian, B. J. (2007). Questionnaire ratings of attention-deficit/hyperactivity disorder (ADHD) in adults are associated with spatial working memory. *European Psychiatry*, 22(4), 256-263.
- Elia, J., & Vetter, V. L. (2010). Cardiovascular effects of medications for the treatment of attention-deficit hyperactivity disorder.
- Faras, H., Al Ateeqi, N., & Tidmarsh, L. (2010). Autism spectrum disorders. *Annals of Saudi medicine*, 30(4), 295-300.
- Herrera, G., Alcantud, F., Jordan, R., Blanquer, A., Labajo, G., & De Pablo, C. (2008). Development of symbolic play through the use of virtual reality tools in children with autistic spectrum disorders: Two case studies. *Autism*, 12(2), 143-157.
- Hillman, C. H., Erickson, K. I., & Kramer, A. F. (2008). Be smart, exercise your heart: exercise effects on brain and cognition. *Nature reviews neuroscience*, 9(1), 58-65.
- Gapin, J., & Etnier, J. L. (2010). The relationship between physical activity and executive function performance in children with attention-deficit hyperactivity disorder. *Journal of Sport and Exercise Psychology*, 32(6), 753-763.

- Jung, T., Chung, N., & Leue, M. C. (2015). The determinants of recommendations to use augmented reality technologies: The case of a Korean theme park. *Tourism management*, 49, 75-86.
- Kamińska, D., Sapiński, T., Wiak, S., Tikk, T., Haamer, R. E., Avots, E., ... & Anbarjafari, G. (2019). Virtual reality and its applications in education: Survey. *Information*, 10(10), 318.
- Kyaw, B. M., Saxena, N., Posadzki, P., Vseteckova, J., Nikolaou, C. K., George, P. P., ... & Car, L. T. (2019). Virtual reality for health professions education: systematic review and meta-analysis by the digital health education collaboration. *Journal of medical Internet research*, 21(1), e12959.
- Lien, Y. T., Yeh, H. H., Soong, W. T., Jeng, S. F., Huang, N., & Chen, C. Y. (2015). Factors associated with treatment mode and termination among preschoolers with ADHD in Taiwan. *Psychiatric Services*, 66(2), 177-185.
- Lohse, K. R., Hilderman, C. G., Cheung, K. L., Tatla, S., & Van der Loos, H. M. (2014). Virtual reality therapy for adults post-stroke: a systematic review and meta-analysis exploring virtual environments and commercial games in therapy. *PloS one*, 9(3), e93318.
- Landreth, G. L., Ray, D. C., & Bratton, S. C. (2009). Play therapy in elementary schools. *Psychology in the Schools*, 46(3), 281-289.
- Lorenzo, G., Lledó, A., Pomares, J., & Roig, R. (2016). Design and application of an immersive virtual reality system to enhance emotional skills for children with autism spectrum disorders. *Computers & Education*, 98, 192-205.
- Makransky, G., Terkildsen, T. S., & Mayer, R. E. (2019). Adding immersive virtual reality to a science lab simulation causes more presence but less learning. *Learning and Instruction*, 60, 225-236.
- Miller, E. K., & Cohen, J. D. (2001). An integrative theory of prefrontal cortex function. *Annual review of neuroscience*, 24(1), 167-202.
- Milgram, P., & Kishino, F. (1994). A taxonomy of mixed reality visual displays. *IEICE TRANSACTIONS on Information and Systems*, 77(12), 1321-1329.

- Makransky, G., Lilleholt, L., & Aaby, A. (2017). Development and validation of the Multimodal Presence Scale for virtual reality environments: A confirmatory factor analysis and item response theory approach. *Computers in Human Behavior*, 72, 276-285.
- Miyashita, T., Meier, P., Tachikawa, T., Orlic, S., Eble, T., Scholz, V., ... & Lieberknecht, S. (2008, September). An augmented reality museum guide. In *2008 7th IEEE/ACM International Symposium on Mixed and Augmented Reality* (pp. 103-106). IEEE.
- Mitchell, P., Parsons, S., & Leonard, A. (2007). Using virtual environments for teaching social understanding to 6 adolescents with
- Maher, D. (2020). Altered Realities: How virtual and augmented realities are supporting learning. In *Handbook of Research*
- McMahon, D. D., Smith, C. C., Cihak, D. F., Wright, R., & Gibbons, M. M. (2015). Effects of digital navigation aids on adults with intellectual disabilities: Comparison of paper map, Google maps, and augmented reality. *Journal of Special Education Technology*, 30(3), 157-165.
- Maher, D. (2020). Altered Realities: How virtual and augmented realities are supporting learning. In *Handbook of Research on Innovative Pedagogies and Best Practices in Teacher Education* (pp. 34-51). IGI Global.
- Nah, F. F. H., Eschenbrenner, B., Zeng, Q., Telaprolu, V. R., & Sepehr, S. (2014). Flow in gaming: literature synthesis and framework development. *International Journal of Information Systems and Management*, 1(1-2), 83-124.
- O'Keefe, J. (1976). Place units in the hippocampus of the freely moving rat. *Experimental neurology*, 51(1), 78-109.
- O'Keefe, J., & Dostrovsky, J. (1971). The hippocampus as a spatial map: preliminary evidence from unit activity in the freely-moving rat. *Brain research*.
- Ou, Y. K., Wang, Y. L., Chang, H. C., Yen, S. Y., Zheng, Y. H., & Lee, B. O. (2020). Development of virtual reality rehabilitation games for children with attention-deficit hyperactivity disorder. *Journal of Ambient Intelligence and Humanized Computing*, 11(11), 5713-5720.

- Othmer, S., & Kaiser, D. (2000). Implementation of virtual reality in EEG biofeedback. *Cyberpsychology & Behavior*, 3(3), 415-420.
- Parsons, S., Mitchell, P., & Leonard, A. (2005). Do adolescents with autistic spectrum disorders adhere to social conventions in virtual environments?. *Autism*, 9(1), 95-117.
- Pontifex, M. B., Saliba, B. J., Raine, L. B., Picchietti, D. L., & Hillman, C. H. (2013). Exercise improves behavioral, neurocognitive, and scholastic performance in children with attention-deficit/hyperactivity disorder. *The Journal of pediatrics*, 162(3), 543-551.
- Radu, I. (2012, November). Why should my students use AR? A comparative review of the educational impacts of augmented-reality. In *2012 IEEE International Symposium on Mixed and Augmented Reality (ISMAR)* (pp. 313-314). IEEE.
- Resnick, R. J. (2005). Attention deficit hyperactivity disorder in teens and adults: They don't all outgrow it.
- Rohde, T. E., & Thompson, L. A. (2007). Predicting academic achievement with cognitive ability. *Intelligence*, 35(1), 83-92.
- Safaryan, K., & Mehta, M. R. (2021). Enhanced hippocampal theta rhythmicity and emergence of eta oscillation in virtual reality. *Nature Neuroscience*, 1-6.
- Safaryan, K., & Mehta, M. R. (2021). Enhanced hippocampal theta rhythmicity and emergence of eta oscillation in virtual reality. *Nature Neuroscience*, 24(8), 1065-1070.
- Shang, C. Y., & Gau, S. S. (2011). Visual memory as a potential cognitive endophenotype of attention deficit hyperactivity disorder. *Psychological Medicine*, 41(12), 2603-2614.
- Sparkes, A. C., & Smith, B. (2013). *Qualitative research methods in sport, exercise and health: From process to product*. Routledge.
- Spencer, T. J. (2006). ADHD and comorbidity in childhood. *Journal of Clinical Psychiatry*, 67, 27.
- Strickland, D. (1997). Virtual reality for the treatment of autism. *Virtual reality in neuro-psycho-physiology*, 81-86.
- Saltan, F., & Arslan, K. (2017). A comparison of in-service and pre-service teachers' technological pedagogical content knowledge self-confidence. *Cogent Education*, 4(1), 1311501.

- Smith, C. C., Cihak, D. F., Kim, B., McMahon, D. D., & Wright, R. (2017). Examining augmented reality to improve navigation skills in postsecondary students with intellectual disability. *Journal of Special Education Technology*, 32(1), 3-11.
- Strickland, D., Marcus, L. M., Mesibov, G. B., & Hogan, K. (1996). Brief report: Two case studies using virtual reality as a learning tool for autistic children. *Journal of autism and developmental disorders*, 26(6), 651-659.
- Schopler, E., & Mesibov, G. B. (Eds.). (1994). *Behavioral issues in autism*. Springer Science & Business Media.
- Tantillo, M., Kesick, C. M., Hynd, G. W., & Dishman, R. K. (2002). The effects of exercise on children with attention-deficit hyperactivity disorder. *Medicine & Science in Sports & Exercise*.
- Watson, P., Hasegawa, H., Roelands, B., Piacentini, M. F., Looverie, R., & Meeusen, R. (2005). Acute dopamine/noradrenaline reuptake inhibition enhances human exercise performance in warm, but not temperate conditions. *The Journal of physiology*, 565(3), 873-883.
- Woodcock, K., & Pole, J. D. (2007). Health profile of deaf Canadians: analysis of the Canada Community Health Survey. *Canadian Family Physician*, 53(12), 2140-2141.
- Vrij, A., Leal, S., Granhag, P. A., Mann, S., Fisher, R. P., Hillman, J., & Sperry, K. (2009). Outsmarting the liars: The benefit of asking unanticipated questions. *Law and human behavior*, 33(2), 159-166.
- Yang, L. K., Shang, C. Y., & Gau, S. S. F. (2011). Psychiatric comorbidities in adolescents with attention-deficit hyperactivity disorder and their siblings. *The Canadian Journal of Psychiatry*, 56(5), 281-292.
- Yan, N., Wang, J., Liu, M., Zong, L., Jiao, Y., Yue, J., ... & Liu, Z. (2008). Designing a brain-computer interface device for neurofeedback using virtual environments. *Journal of Medical and Biological Engineering*, 28(3), 167-172.

ΕΛΛΗΝΙΚΗ

- Drigas, A., Dede, D. E., & Dedes, S. (2020). Mobile and other applications for mental imagery to improve learning disabilities and mental health. *International Journal of Computer Science Issues (IJCSI)*, 17(4), 18-23.
- Drigas, A., & Mitsea, E. (2020). The 8 pillars of Metacognition. *International Journal of Emerging Technologies in Learning (iJET)*, 15(21).
- Drigas, A. S., & Pappas, M. A. (2017). The consciousness-intelligence-knowledge pyramid: an 8x8 layer model. *International Journal of Recent Contributions from Engineering, Science & IT (iJES)*, 5(3), 14-25.
- Drigas, A., & Mitsea, E. (2021). 8 Pillars X 8 Layers Model of Metacognition: Educational Strategies, Exercises &Trainings. *International Journal of Online & Biomedical Engineering*, 17(8).
- Drigas, A. S., & Papoutsi, C. (2018). A new layered model on emotional intelligence. *Behavioral Sciences*, 8(5), 45.
- Papanastasiou, G., Drigas, A., Skianis, C., Lytras, M., & Papanastasiou, E. (2019). Virtual and augmented reality effects on K-12, higher and tertiary education students' twenty-first century skills. *Virtual Reality*, 23(4), 425-436.
- Tzanetakos, N., Papastergiou, M., Vernadakis, N., & Antoniou, P. (2017). Utilizing physically interactive videogames for the balance training of adolescents with deafness within a physical education course. *Journal of Physical Education and Sport*, 17(2), 614.
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ΗΛΕΚΤΡΟΝΙΚΗ

YouTube-Video Links

https://www.youtube.com/watch?v=E3OyWSY1knY&ab_channel=CognitiveLeapSolutions%2CInc.

https://www.youtube.com/watch?v=nJ4gpRVmAVg&ab_channel=AssociatedPress

https://www.youtube.com/watch?v=o4Ey8JzTDBo&ab_channel=TEDxTalks

https://www.youtube.com/watch?v=R8MXJfvt7dQ&ab_channel=ABCNews%28Australia%29

<https://www.youtube.com/watch?v=HBNH8tzsfVM&t=1s>

https://www.youtube.com/watch?v=ouZrZa5pLXk&ab_channel=Understood

https://www.youtube.com/watch?v=t32CK5t8d2Q&ab_channel=CharlestonShoeProductions

<https://www.youtube.com/watch?v=1OWikmg2zko&t=9s>

<https://www.youtube.com/watch?v=-Kovxf6g0mo>

<https://www.youtube.com/watch?v=OtwOz1GVkDg>

https://www.youtube.com/watch?v=2hvuw3FmXyQ&ab_channel=Neuro_Physics

https://www.youtube.com/watch?v=5Zg-C8AAIGg&ab_channel=TED-Ed

https://www.youtube.com/watch?v=yrGAeHJ2Xg4&ab_channel=Microsoft

Εξωτερικοί σύνδεσμοι

<https://www.adhdhellas.org/>

<https://doi.org/10.1177%2F070674371105600507>

<https://www.dartmouthautismresearch.com/>

<https://www.psycom.net/autism-brain-differences>

<https://www.cognitiveleap.com/>

<https://edu.google.com/products/vr-ar/expeditions/>

<https://www.edutopia.org/blog/ar-apps-for-student-learning-monica-burns>

<https://depts.washington.edu/hplab/research/virtual-reality/>

<https://www.health.harvard.edu/mind-and-mood/non-drug-treatments-for-adult-adhd>

<http://bri.ucla.edu/people/mayank-r-mehta-phd>

<https://www.gamedesigning.org/gaming/virtual-reality-companies/>

<https://clinicaltrials.gov/ct2/show/NCT03221244>

<https://med.stanford.edu/news/all-news/2018/07/key-social-reward-circuit-in-the-brain-impaired-in-kids-with-autism.html>

<https://www.fi.edu/virtual-reality/history-of-virtual-reality#:~:text=The%20use%20of%20the%20term,technologists%20were%20developing%20simulated%20environments>

<https://www.gse.harvard.edu/news/21/05/learning-digital-worlds>

<https://edu.google.com/products/vr-ar/expeditions/>

<https://www.cognifit.com/el/brain-parts>

https://www.psychiatry.org/File%20Library/Psychiatrists/Practice/DSM/APA_DSM-5-ADHD.pdf

<https://www.edutopia.org/article/5-worthwhile-augmented-and-virtual-reality-tools> 5%20Worthwhile%20Augmented%20and%20Virtual%20Reality%20Tools%20Interesting%E2%80%94and%20free%E2%80%94ways%20to%20use%20AR%20and%20VR%20in%20the%20classroom%20to%20create%20engaging%20learning%20experiences.

<https://www.livescience.com/49021-virtual-reality-brain-maps.html>

https://www.nature.com/articles/s41593-021-00871-z?utm_medium=affiliate&utm_source=commission_junction&utm_campaign=3_nsn6445_deeplink_PID100041175&utm_content=deeplink

<https://thriveglobal.com/stories>this-is-your-brain-on-vr-the-neuroscientist-s-perspective/>

<https://www.news-medical.net/health/Brain-Difference-in-Patients-with-ADHD.aspx>

https://en.wikipedia.org/wiki/Jaron_Lanier

Courses

<http://stanford.edu/class/ee267/>