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Original Article

Quality Improvement of Educational Systems: Using iPads and Smart Tablets for Autism Learners to Accomplish Class Activities

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Abstract

today inclusive education is a major positive trend in education. Developing learning opportunities for children with special needs allows to increase the efficiency of the system of education in general and corresponds with the idea of availability of education. This research utilized a survey using single subjects which was administered to find out the effects of new technologies, particularly, iPads and tablets in an autism class-wide intervention to raise the degree of class activity completion as well as elementary numeracy skills for seven learners with autism spectrum disorders (ASD). The study used the traditional classroom approaches for its baseline while elementary numeracy apps on smart tablets and iPads were used for intervention. After math prompts, the researcher recorded the results for four sessions. The study findings concluded that new technologies present an effective tool for instruction among ASD learners. The results obtained during the study demonstrate a promising trend in improving the learning skilss of the children with specila needs through technology-enhanced learning tools.

Key words: Autism, ASD, LAP, New Technologies, Assistive Technologies

INTRODUCTION

Jones in 2006 presented the literature related to good practices in educating autistic children in which he identified a dual emphasis[1]. Firstly, literature emphasized the need to help such children with the development of skills as well as strategies for understanding situations and communicating needs. Secondly, it focuses on environmental adaption skill that could allow children to effectively function and learn. Moreover, Guldberg added, it was critical to have a good understanding of autism prior to the implementation of evidence informed approaches to learning or managing behavior[2]. Similarly, Jordan has also supported the Guldberg and Jones's idea noting that when teachers understand autism, they are in a position to correctly identify the learning needs of an individual pupil and thus formulate strategies to help students to meet the learning outcomes for these strategies, which will lead to the developing personalized learning strategy for these learners[3]. In a related study, Norwich and Lewis point out that the practitioner's knowledge is valuable in its own right in the sense that it underpins the learner's development. Research has established that autism features a particular set of cognitive strengths as well as weaknesses whereby it is also characterized by related behaviors among other traits[4,5,6]. As the foregoing discussion illustrates, the most emphasized aspect in the education of autistic children is practitioner's understanding of the condition which is deemed as an ideal backdrop against which educators develop good practices. The research work has raised an interesting question of how modern technological innovations can also be incorporated as tools for enhancing autistic children's educational attainment and general development.

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TECHNOLOGY AND AUTISM

Cafiero writes that there is an emerging body of studies to support the idea of using technological tools in helping autistic children and individuals to meet the challenges associated with this condition, including; social,

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communication, and motivational challenges[7,8]. Moreover, some other research has also established that numerous challenges that autistic children face are also increasingly addressed using technology and smart devises[9,10,11,12]. Cafiero also notes that technology advancements improve the accessibility to various tools and techniques for supporting education strategies. These strategies are then used for training families and practitioners of individuals with autism spectrum disorders (ASD)[7].

LITERATURE REVIEW

According to Cafiero, autistic children and individuals with autism in general are usually strong when it comes to visual processing that supports technology incorporation. Other learning features as Cafiero continues to explain of children with autism/ASD including interest in inanimate objects and sameness are also inclined towards technological application. The author continues to observe that autistic children experience difficulties that can be addressed by technology. There are several features specific to autism that technology can be addressed. Al-Jumeily and his colleagues have developed an Open Learning system for special needs education. The experiment has shown that users of this system benefited from the novel presentation of keywords and associated context through the use of animations and adequate activities[60].

Communication Difficulties

McGee and Lord contend that communication is among the primary skills that define an individual's quality of life and is increasingly lacking among autistic children[13]. The authors contend that technology can go a long way towards resolving the problems that children with autism experience with tools for reading, speaking, writing, in addition to other derived augmented speech support systems[14,15,16,17].

Difficulty with Complex Cues

According to Cafiero, autistic children usually experience difficulties with global sensory processing. They also have difficulty with the translation into localized and fragmented stimuli processing within their context[18]. The processing challenges that children with autism usually experience have to do with understanding of complex multiple cues[19,20,21,22,23]. Significant to note is the fact that technology offers great opportunities and a range of applications for educators and practitioners of children with autism whereby it avails a range of symbols that signify various cues.

The Associated Difficulty of Social Learning

According to Sula and Spaho, learners have difficulties in the process of relating with others and the environment around them[24]. Technology avails a number of applications that can be used as a buffer or bridge between communication partners for individuals with ASD[25]. Although, in practice, these learning features are usually framed as distinct elements, they are constituent elements of one another. For instance, experiencing difficulties in processing multiple skills, particularly, spontaneous and functional conversation is a core element of learning for autistic children. Moreover, it remains critical that educators provide communication supports as soon as a child is diagnosed with ASD[26,27,28].

EXPERIMENT DESIGN

The research design opted in the current study was a field survey – cross sectional field survey. Generally, field surveys are non-experimental in nature whereby the researcher does not manipulate or control for independent variables[29]. On the contrary, this research measured variables and tested their effects with statistical methods. Because the design was a cross sectional field survey, the research measured dependent and independent variables with the use of a survey questionnaire. The research design was favored because of its external validity owing to the fact that the researcher collected data from field settings. Moreover, this research design is also known for its ability to capture as well as control of a large number of variables. This was significant where there are numerous technological applications that can be deployed in helping autistic children with the challenges that they continuously face. Lastly, this research design is ideal because of its ability to analyze a phenomenon from multiple points of view or using different theories[30]. However, the approach is deficient because of its non-temporal nature which means that it lacks internal validity, an aspect that draws from the fact that the researcher cannot easily make inferences. Additionally, surveys may also be subject to the bias of

Study Population

The research study included 7 children (5 male and 2 female) that had a primary ASD diagnosis and were aged between 10 and 13 years. All the students were diagnosed with the condition at an early age by an independent agency whereby they exhibited moderate to severe delays in development. The delays cut across social, communication, as well as behavioral developmental delays. The students were referred by their local school system to special education schools so that they could benefit from structured education programs. The classrooms in the study served students with a severe end of the autism spectrum whereby they increasingly struggled with behavioral challenges (Table 1).

The researcher derived the demographic questionnaire concerning the participant's age, gender as well as grade level and ethnicity from the school records.

Table 1: Children's demographic questionnaire

Student	Gender	Age	Nationality	The grade level
1	Male	13	UAE	7
2	Male	12	UAE	6
3	Female	11	UAE	4
4	Male	12	UAE	6
5	Male	11	Italian Asian	5
6	Female	11	Brazil Spain	5
7	Male	11	India	4

ACCESS TO TECHNOLOGY

This research came up with three surveys to ascertain the degree to which students accessed and used technology. The student's parents were requested to complete two surveys relating to their children's use of technology and accessibility, while at home. Teachers also completed 2 other questionnaires that measured the use of technology at school including a professional and personal degree of access to technology. The remaining surveys measured the degree of accessibility and usage of technology in the classroom while at school.

Arithmetic and Achievement of Numeracy

To measure the level of math skills among autistic children, the study identified a number of items from the Learning and Achievement Survey – Three (LAP-3)[31,32,33,34,35,36]. The LAP three test is sited by numerous studies as an ideal criterion referenced assessment tool with the ability to provide a systematic method for educators to observe and assess autistic children's skill development during 36-72 months.

Level of Teacher Prompts

The study employed a six-level hierarchy of teacher prompting in order to enable systematic student assistance during the learning process. Additionally, the derived hierarchy also enabled the researcher to measure the degree of teachers' prompts that they provided to learners in the course of a math class. The levels were ideally classified as follows:

5- Active non compliance
4 – Passive noncompliance
3 – Maximal Prompts
2 – Moderate prompts
1 – Minimal prompts
0 – independent

Non-Compliance Behaviors

The researcher derived a form in which they recorded data detailing whether incomplete student tasks were an attribute of their passive non-compliant behaviors for instance, looking away or resting their heads on desks and refusing to corporate, or alternatively, were as a result of active non-compliant such as aggression or throwing away learning material.

Fidelity Intervention

In relation to fidelity intervention, the study measured whether results using a 5-item checklist which was completed by special educators and teachers. The items were derived in relation to the efficacy of treatment. The process involved the following sequence of events:

1. Providing students with an iPad or a tablet
2. Launching the application of the tablet or iPad
3. Selecting the particular math skill to be taught
4. Keeping up or monitoring the learner's level of completion

To ascertain fidelity, the researcher divided the sum of steps checked by total registered steps and multiplying the result by a hundred.

Social Validity

For social validity, the researcher developed a seven item questionnaire that the special teachers completed at the end of the study. The survey was derived with the aim of assessing the degree of acceptability of the proposed intervention as well as its effectiveness. Six of the items in the checklist employed a Likert Scale, for instance, majority of teachers concluded the intervention approach to be appropriate among autistic students in relation to math computations. The teachers indicated the level of agreement with a derived statement on a scale of 1-5 with 5 indicating strongly agree while 1 denoted strongly disagree.

RESULTS OF THE EXPERIMENT

The researcher reported mixed findings whereby an analysis of the autistic learner's number of completed tasks on the presented assessment probes between intervention and baseline phases reported no increase. The percentage of students that completed math activities was reported at 11.1% at the base line and only rose to 14.1% in the course of the intervention. In relation to LAP 3 tests, there was no increase in learner performance for both LAP-3 pre and posttests. The mean was 8.71 while the computed standard deviation was estimated at 7.93 for the pre-test while the post-test reported a mean and standard deviation as 8.14 and 9.53 respectively. The Figure 1 below presents individual LAP-3 scores (Table 2).

The results from the visual analysis point to the fact that using the technology of the iPad intervention had positive effects among children with autism. Such was the case that the inter-scorer agreement was estimated at 98 percent with most teachers agreeing. Primarily,

the level of teacher prompts dropped in the course of the intervention reporting a mean drop of 0.75, and a standard deviation of 0.65 – they reverted to the baseline level when the researcher removed the intervention (iPad and smart tablets) with a reported mean rising to 1.97 while standard deviation was estimated at 0.58. At a class level the degree of teacher prompts were estimated at 88.9 percent at baseline, dropping to 85.9 percent in the course of the intervention. The rise in student performance difference score of 100 percent denotes that all scores at class-wide level dropped below baseline scores (Tables 3 and 4).

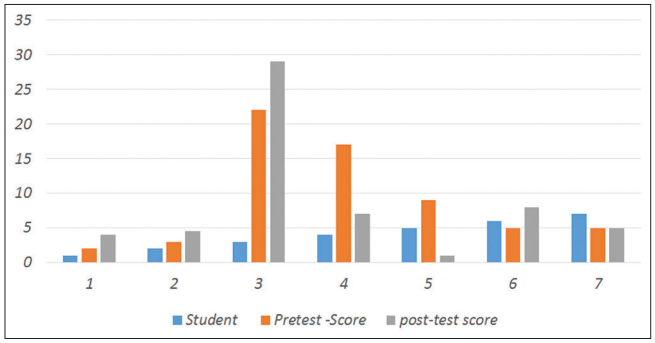

Figure 1: Individual LAP-3 Scores

Table 2: iPad intervention and independent completion of tasks among Autistic children

Student	Pre-test score	Post-test score
1	2	4
2	3	4.5
3	22	29
4	17	7
5	9	1
6	5	8
7	5	5

Table 3: Teacher prompt levels class wide within phase means and standard deviations

Baseline	Intervention	Withdrawal	Reinstatement
1.92 (0.52)	0.97(0.91)	2.08 (0.61)	0.46 (0.39)

Table 4: Baseline and intervention phases' mean teacher prompts

Respondent	Baseline	Intervention	Withdrawal	Reinstatement
1	1.49	1.38	2.95	0.25
2	1.52	1.40	1.43	1
3	1.19	0.38	1.25	0.49
4	1.49	1.79	1.46	1
5	1.68	0.60	1.73	0.19
6	2.29	0.20	2.52	1
7	1.59	1.38	2.19	0.16

DISCUSSION AND FINDINGS

The study primarily explores how new technologies such as smart tablets and iPad can be deployed as tools that enhance instruction delivery in autistic classes. Primarily, technologies go a long way towards supporting instruction that addresses the autistic student's engagement, motivation, as well as innovative practice[37,38,39,40,41, 42,43,44,45]. For learners with disabilities technology can go a long way towards maximizing independence, enhancing educational attainment, as well as increasing the students' degree of participation in classroom activities, not to mention preparing them for post-secondary learning and ultimate employment[46474849505152]. The findings in the current study add the existing knowledge that new technologies, for instance iPad enhance instructional based assignments among children with autism. Such is the case that the learners demonstrated a high degree of independent task completion when completing tasks using iPad and tablets compared to traditional or conventional instruction. Many students retained improved performance on the LAP-3 tool.

CONCLUSIONS AND FUTURE WORK

The study concludes that iPad, smart tablets and a range of other new technologies that are yet to be studied can be modified to adapt to the individual needs of learners. This can be done with variations in instructional and application formats. For instance, math instruction which can ultimately allow a learner to gain familiarity as well as independence with the named technological components[535455]. This independence is increasingly critical for autistic students, owing to the fact that it increases their willingness to engage with new technologies for continued practice with math skills[5657585960].As a future work, this research study can be further extended by incorporating a larger sample size of for the generalization of results.

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STATEMENTS ON OPEN DATA, ETHICS AND CONFLICT OF INTEREST

The studies participation was voluntary and harmless. All the participants including the parents of the autistic children were aware that their participation in the research was voluntary. Similarly, the study maintained anonymity as well as confidentiality as per ethics professional research.

REFERENCES

1. Jones G. (2006). Department of health good practice guidance on education of children with Autistic spectrum disorder. Child: Care, Health &Dev., 32, 543-552.
2. Guldberg K. (2010). Educating children on the autism spectrum. British Journal of Special Education, 37, 168-174.
3. Jordan R. (2006). Managing autism & Asperger's syndrome in current educational provision. Pediatric Rehabilitation, 8, 104-112.
4. Charman T. et al. (2011). Defining the cognitive phenotype of autism. Brain Research, 1380, 10-21.
5. Happé F, Ronald A. (2008). The 'fractionable autism triad': a review of evidence from behavioural, genetic, cognitive and neural research. Neuropsychology Review, 18, 287-304.
6. Pellicano E. (2010). Individual differences in executive function and central coherence predict developmental changes in theory of mind in autism. Developmental Psychology, 46, 530-544.
7. Cafiero, J.M. (2008). Technology supports for individuals with autism spectrum disorders, Technology in Action, 3(3)1-12
8. Libera, W.L, Bryant, I., &Gantwerk, B. (2004) Autism program quality indicators, New Jersey Department of Education Office of Special Education Programs.
9. Bellini, S., &Akullian, J. (2007). A meta-analysis of video modeling and video self- modeling interventions for children and adolescents with autism spectrum disorders. Exceptional Children, 73(3), 264-287.
10. Mirenda, P. (2001). Autism, augmentative communication and assistive technology: What do we really know? Focus on Autismand Other Developmental Disabilities, 16, 141-151.
11. Mirenda, P. (2003). Toward functional augmentative and alternative communication for students with autism: Manual signs, graphic symbols, and voice output communication aids. Language, Speech and Hearing in Schools, 34, 203-216.
12. Mirenda, P., Wilk, D., & Carson, P. (2000). A retrospective analysis of technology use patterns of students with autism over a five year period. Journal of Special EducationTechnology, 15, 5-16.
13. McGee, J., & Lord, K. (2001). Educating children with autism. Washington, DC: The National Academies Press.
14. Boser, K.I., Lathan, C.E., Safos, C., Shewbridge, R. Samango-sprouse, C. and Michalowski, M. (2014). Using therapeutic robots to teach students with autism in the classroom: Exploring research and innovation, in Boser, K.I. Goodwin, M.S. & Wayland, S.C. (Eds) Technology tools for students with Autism: Innovations that enhance independence and learning, Baltimore, MA: Paul H. Brooks Publishing
15. Beals, K.P. & Hurewitz, F. (2014). Language software for teaching semantics grammar, and pragmatics for students with autism, in Boser, K.I. Goodwin, M.S. & Wayland, S.C. (Eds) Technology tools for students with Autism: Innovations that enhance independence and learning, Baltimore, MA: Paul H. Brooks Publishing
16. Gersten, R., Chard, D., & Baker, S. (2000). Factors enhancing sustained use of research- based practices. Journal of Learning Disabilities, 33, 445-457.
17. Domings, Y, Crevecoeur, Y.C. & Ralabate, P.K. Universal design for learning: Meeting the needs of learners with autism spectrum disorders, in Boser, K.I. Goodwin, M.S. & Wayland, S.C. (Eds) Technology tools for students with Autism: Innovations that enhance independence and learning, Baltimore, MA: Paul H. Brooks Publishing.
18. Burke, J., & Cerniglia, L. (1990). Stimulus complexity and autistic children's responsivity: Assessing and training a pivotal behavior. Journal of Autism and Developmental Disorders, 20, 233-253.
19. Gray, T. & Brann, A. (2014) What is driving innovative and assistive technology solutions in autism services? in Boser, K.I. Goodwin, M.S. & Wayland, S.C. (Eds) Technology tools for students with Autism: Innovations that enhance independence and learning, Baltimore, MA: Paul H. Brooks Publishing
20. Kazdin A. E. (2003). Research design in clinical psychology (4th ed.). Boston: Allyn & Bacon,
21. Ertmer , P. (1999). Addressing first- and second-order barriers to change: Strategies for technology implementation. Educational Technology Research and Development, Vol. 47, No. 4, 47–61,
22. Middleton B., & Murray R. (2000). The impact of instructional technology on student academic achievement in reading and mathematics. International Journal of Instructional Media, Vol. 26, No. 1, 109-116, 2000.
23. Fuchs L. S. & Fuchs D. F. (2001). Principles for sustaining research-based practice in the schools: A case study. Focus on Exceptional Children, Vol. 33, No. 6, 1–14, 2001.
24. Sula, A. & Spaho, E. (2014). Using assistive technologies in autism care centers to support children develop communication and language skills. A case study: Albania, Academic Journal of Interdisciplinary Studies 3(1)203-212.
25. Malouf D. B., & Schiller, E. P. (1995). Practice & research in special education. Exceptional Children, Vol. 61, No. 5, 414–424, 1995.
26. Bugaj, C.R., Hartman, M.A. & Nichols, M.E. (2014). Classroom-based technology tools, in Boser, K.I. Goodwin, M.S. & Wayland, S.C. (Eds) Technology tools for students with Autism: Innovations that enhance independence and learning, Baltimore, MA: Paul H. Brooks Publishing
27. "Education programming for students with autism spectrum disorders: A review of the literature & a program development protocol", Retrieved from: http://www.springer.com
28. Wisconsin Assistive Technology Initiative, WATI (2009) Assistive technology supports for individuals with autism spectrum disorder, Retrieved from: http://www.wati.org
29. Bhattacherjee, A. (2012) "Social Science Research: Principles, Methods, and Practices" (2012). Textbooks Collection. Book 3.
30. Bhattacherjee, A. (2012) "Social Science Research: Principles, Methods, and Practices" (2012). Textbooks Collection. Book 3.
31. Sanford A.R., Zelman J.G., Hardin B.J., Peisner-Feinberg E. S. (2003). Learning Accomplishment Profile-Third Edition (LAP-3). Lewisville, NC: Kaplan Press.
32. Shah, N. (2011). iPads become learning tools for students with disabilities: Special education students become learning tools for students with disabilities. Education Week, Vol. 5, No. 1, 12, 2011.
33. National Research Council. (2001). Educating children with autism. Washington, DC: National Academy Press.
34. Kagohara D. M., van der Meer L., Ramdoss L., S. O'Reilly, M. F., Lancioni G. E., Davis T. N.,…&, Sigafoos J. (2013). Using iPods and iPads in teaching programs for individuals with developmental Disabilities: A systemic review. Research in Developmental Disabilities, Vol. 34, 147-156,
35. Horner, R.H., Carr, E. G., Strain, P. S., Todd, A.W., Reed, H. K.. Problem behavior interventions for young children. Journal of Autism and Developmental Disorders, Vol. 32, No. 5, 423-446, 2002.
36. Minshew, N. J., Goldstein G., H., Taylor D. & Siegel J. (1994). Academic achievement in high functioning autistic individuals, Journal of Clinical and Experimental Neuropsychology, Vol. 16, 261-70, 1994.
37. Patton, J. R., M. E. Cronin, D. S. Bassett, A. E. Koppel. A life skills approach to mathematics instruction: Preparing students with learning disabilities for the real-life math demands of adulthood. Journal of Learning Disabilities, Vol. 30, 178-187, 1997.
38. Fuchs, L. S., D. L. Compton and D. Fuchs, K. The prevention, identification, and cognitive determinants of math difficulty. Journal of EP, Vol. 97, No. 3, 493-513, 2005.
39. Calhoun M. B., R. W. Emerson, M. Flores, D. E. Houchins. (2007) Computational fluency performance profile of high school students with mathematics disabilities. Remedial and Special Education, Vol. 28, No. 5, 292-303
40. National Center for Educational Statistics. (2011)The nation's report card: Mathematics 2011. Washington DC: U.S. Department of Education.
41. Thompson S. J., A. B. Morse, M. Sharpe, S. Hall. (2005) How to select, administer, and evaluate use of accommodations for and assessment of

students with disabilities (2nd ed.). Washington, DC. Council of Chief State School Officers
42. Ganesh T. & Middleton J. (2006) Challenges in linguistically and culturally diverse elementary settings with math instruction using learning technologies. The Urban Review, Vol. 38, No. 2, 101-143.
43. Baki A., &Guveli, E. (2008). Evaluation of a Web based mathematics teaching material on the subject of functions. Computers & Education, Vol. 51, 854-863
44. Ramdoss S., W. Machalicek, M. Rispoli, A. Mulloy, R.B. Lang, & O'Reilly, M. F. (2012). Computer-based interventions to improve social and emotional skills in individuals with autism spectrum disorders. Developmental Neurorehabilitation, Vol. 15, 119-135
45. Anderson S.R. &Romanczyk, R. G. (1999). Early intervention for young children with autism: Continuum-based behavioral models. Journal of the Association for Persons with Severe Handicaps, Vol. 24, 162-173, 1999.
46. Katsiyannis A., &Yell , M. L.. Critical issues and trends in the education of students with emotional and behavioral disorders. Behavioral Disorders, Vol. 29, 209-211, 2004.
47. Davies, D. K., Stock, S., & S., Wehmeyer M. L. (2002). Enhancing independent task performance for individuals with mental retardation through use of a handheld self-directed visual and audio prompting system. Education and Training in Mental Retardation and Developmental Disabilities, Vol. 37, 209–218.
48. Mechling, L. C., Gast, D. L., Cronin, B. A. (2003). The effects of presenting high preference items, paired with choice, via computer-based video programming on task completion of students with a diagnosis of autism spectrum disorder. Focus on Autism and Other Developmental Disabilities, Vol. 21, 7-13, 2006.
49. D. F. Cihak, K. Kessler, K., P. A. Alberto (2007). Generalized use of handheld prompting systems. Research in Developmental Disabilities, 28, 397-408, 2007.
50. Alexander, K. L., Entwisle, D. R., & Dauber, S. L. (1993). First grade classroom behavior: Its short- and long-term consequences for school performance. Child Development, 64, 801-514.
51. Asaro-Saddler, K., & Saddler, B. (2010). Planning instruction and self-regulation training: Effects on writers with autism spectrum disorders. Exceptional Children, 77(1), 107-124.
52. Asaro-Saddler, K., & Saddler, B. (2010). Planning instruction and self-regulation training: Effects on writers with autism spectrum disorders. Exceptional Children, 77(1), 107-124.
53. Ganz, J. B. (2007). Classroom structuring methods and strategies for children and youth with autism spectrum disorders. Exceptionality, 15(4), 249-260
54. Gately, S. E. (2008). Facilitating reading comprehension for students on the autism spectrum. Teaching Exceptional Children, 40(3), 40-45.
55. Ganz, J. B. (2007). Classroom structuring methods and strategies for children and youth with autism spectrum disorders. Exceptionality, 15(4), 249-260.
56. Banda, D. R., Grimmett, E., & Hart, S. L. (2009). Activity schedules: Helping students with autism spectrum disorders in general education classrooms manage transition issues. Teaching Exceptional Children, 41(4), 16-21.
57. Center for Applied Special Technology (CAST). (April 17, 2013). The three principles of UDL. Retrieved from http://www.udlcenter.org
58. Cohen, M., & Sloan, D. (2007). The use of visual strategies for people with autism. Bethesda, MD: Woodbine House.
59. Edyburn, D. L. (2010). Would you recognize universal design for learning if you saw it? Ten propositions for new directions for the second decade of UDL. Learning Disability Quarterly, 33(1), 33-41.
60. Centers for Disease Control and Prevention (CDC). (2012). Prevalence of autism spectrum disorders: Autism and developmental disabilities monitoring network, 14 Sites, United States, 2008. MMWR Surveillance Summaries, 61(3).
61. Al-Jumeily, D., Hussain, A., Abuelmaatti, O., Fergus, P., and Lunn, J., "An open learning system for special needs education", The international Journal of Knowledge Management & E-Learning, Special Issue Entitled "Models, technologies and approaches toward widening the Open Access to learning and education", Vol.8, No.1, ISSN 2073-7904, IF: 1.052, 2016.

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