

INNOVATIVE PEDAGOGY FOR SUSTAINABLE DEVELOPMENT IN THE EARLY CHILDHOOD EDUCATION

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Abstract

This study sought to explore the effects of innovative pedagogy on learning about the sustainable development in developing the sustainability skills and creative thinking skills in the early childhood education.

Crossover research design was employed to investigate the ECD Learners' response to the innovative pedagogy for sustainable development in promoting sustainability skills and creative thinking skills. The findings revealed an increase of the mean scores in the three dimensions after they were treated of the innovative pedagogy with sustainable development program, the creative thinking skills as well increased after being exposed to the treatment.

This study, after the findings recommends future crossover research study to a larger scale of Child Development Centers and be done in a longer time frame. Based on the curriculum of the early childhood education, the integration of sustainability skills be applied in the city and region depending on its needs. There's also a need to increase information dissemination for knowledge awareness and collaborations of Sustainable Development integration and implementation to schools and government agencies.

Keyword: Sustainable Development, Early Childhood Education, Innovative Pedagogy

1. INTRODUCTION

The most important part in the early years of education is the integration of sustainable development which aims to develop environmental and ethical consciousness, values and competent attitudes. The UNESCO, generally believed that young children are more capable of acting, thinking, reasoning and understanding issues concerning sustainable development (UG, 2011). Thus, to transform individuals and societies, the new Sustainable Development Goals recognize that children are agents of change when their boundless potential that education needs to invest in intensive teacher education and training to achieve higher quality outcomes as the practitioner must have specific knowledge, skills and competencies.

Children as agents of change and our hope for the future world are the most delicate being who are affected from the destructive consequences of humanitarian and ecological crisis. In pursuit of transformation through Education for Sustainable Development towards sustainable society, a transformative pedagogical approach that suites for the ECD-Learners was developed. Innovative Pedagogy which focuses on the Education for Sustainable Development envisions to integrate environment, economy and society in the ECCD program.

To the resolve the crisis, a transformative pedagogical parlance that suites for the ECDlearners could be articulated through an innovative pedagogy that is developmentally appropriate for young children. An innovative curriculum from the perspective of education for sustainable development defines the need to address the relevance of curricula and pedagogy in the 21st century. The clamor for the sustainability of ESD has resolved the participation of the ECD-Learners ages 3-5 years old. A vital shift in lifestyle and transformation of ways people think could address the urgent global challenges. Sustainable development in education is an essential tool for achieving sustainability; a paradigm shift such as innovative pedagogy could support in the well-being of the three overlapping and inseparable sustainable development components: environment, economy and socio-cultural phenomena to seek balance for development and improved the quality of life.

1.1 Framework of the Study

The framework in Fig. 1 below illustrates the theory and concept of an Innovative Play-Based Pedagogy for Education of Sustainable Development at Early Childhood Development (ECD) years with the underlying goal of examining the effects of innovative play-based pedagogy in developing ECCD-learner's sustainability skills and creative thinking. According to Dannel and Pyle (2018) play-based learning as the innovative pedagogy is essential, to learning during play. Play is good precursor for

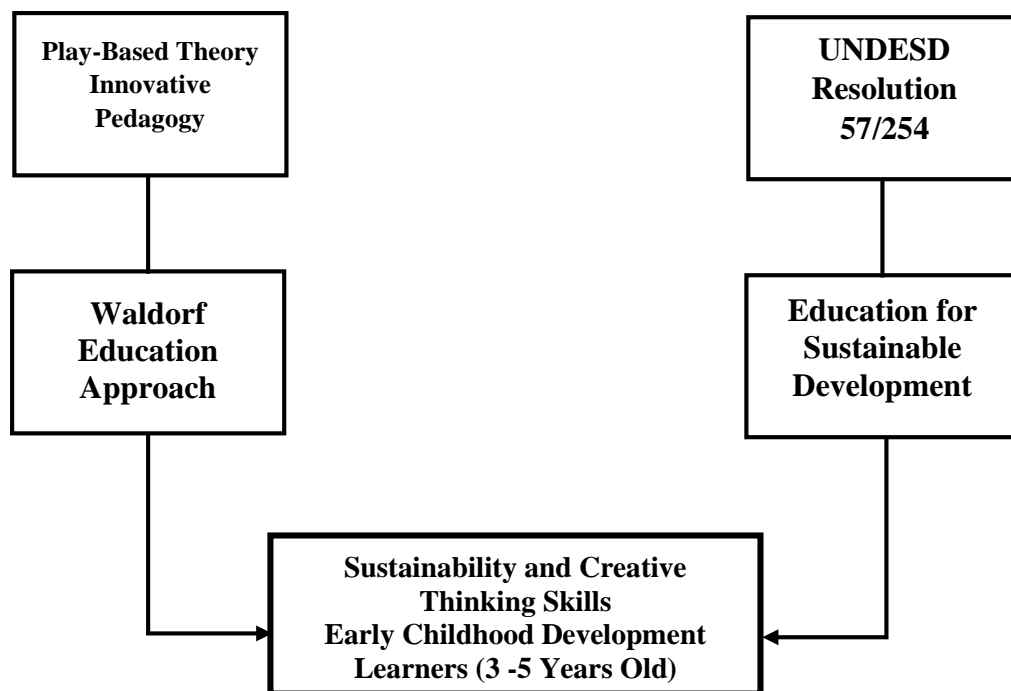


child’s brain development. Play as an innovative approach is effective in increasing child’s flexibility learning potential later in life, enabling children to explore, identify, negotiate, take risks and make sense. In this study, two different types of play-based learning that will be used: free play led by children, and guided play which has a certain level of teacher participation in guidance. According to Coates and Wilson (2019) for children to learn, they need to go through something meaningful and relevant.

Young children are the most important assets in reaching the goal of Sustainable Development goals and transforming future world into sustainable (UNESCO, 2017). Thus, the study utilizes the ECD-learners as the target respondents with age ranges from 3-5 years old and who are enrolled in Upper Pasonanca Early Childhood Education Development Center in Zamboanga City. The researcher designed the Learning Resource Package (LPR) containing three (3) pillars of sustainable development such as the environment, economy and socio-cultural phenomenon using the play-based pedagogy developed by the researcher as a tool for instruction. The effects of this ESD play-based learning activities are to develop creative thinking and increased of sustainability skills which includes 7R domains such as *Reduce, Reuse, Respect, Reflect, Rethink, Recycle and Redistribute*. The variables will be measured through pre and post-test assessment.

The final output of these queries is to develop and propose an innovative play-based pedagogy under the lenses of ESD. An Innovative Play–Based Pedagogy for Education of Sustainable Development is a new way approach of managing children’s learning environments which is an evidence-based method that may require continuous improvement in order to achieve holistic development of the child and fostering sustainability skills and creative thinking. Moreover, the Innovative Play-Based applies the Instructional Model of quality teaching practice such as engage, explore, explain, elaborate, evaluate to promote innovative teaching practices designed to meet the needs of a changing learning environment.

Figure 1. Theoretical and Conceptual of Innovative Pedagogy for Sustainable Development for Early Childhood Development (ECD) Learners



1.2. Objective Of The Study

This study aimed to find out the effects of innovative pedagogy in promoting the sustainability and creative thinking skills of Early Child Development- Learners.

2. METHODOLOGY

2.1 Research Design

This study utilized the crossover research design, also called as a changeover trial design. It is an experimental design in which each participant receive a consequence of two or more treatments over



the course of two or more treatment periods. This research design was used to investigate the participants’ response in terms of their creative thinking and sustainability skills to the innovative pedagogy in promoting the Education for Sustainable Development approach.

Table 1. A 2 × 2 Cross-Over Research Design Study

Designs 4	Period 1 (Weeks 4)	Period 2(Weeks 4)
Sequence AB	A ESD Play-based Pedagogy	B Learning Resource Package No. 5
Sequence BA	B Learning Resource Package No. 5	A ESD Play-based Pedagogy

This is a 2-sequence, 2-period, and 2-treatment crossover design

Table 1 shows the layout of 2x2 crossover design based on the illustration of Lodwick (2016). The ECE classes served as the sequence group [Sequence AB (Morning Class) and Sequence BA (Afternoon Class)] were assigned as the main plot; and the two (2) treatment were composed of the Innovative Pedagogical and Learning Resource Package No 5 were assigned as the sub-plot, the two (2) Periods as Period 1 and Period 2.

The experimental units were assigned to Sequence AB, the morning class received the Innovative Pedagogical learning activities in the first Period and treatment B received Learning Resource Package No 5 in the second period, whereas experimental unit assigned in Sequence BA, the afternoon class received treatment B with LRP No 5 learning activities in the first period and treatment A in the second period received the Innovative Pedagogical learning activities.

2.2 Respondents

The population consisted all Early Childhood Development - learners Upper Pasonanca Early Childhood Development Center in Zamboanga City. The eligibility criteria involved the crossover design; respondents were 3 to 5 years old, girl or boy, who were enrolled in ECD Center in Upper Pasonanca who were consented with and approval from parents or caretakers who were willing to participate in the study.

2.3 Instrument

In order to gather the sustainability skills and creative thinking of the ECD-Learners the researcher used the Intelligence Quotient Test and well-structured questionnaire for ECE-learners, in the form of a checklist that was designed to measure the child’s sustainability skills.

2.4 Gathering Data Procedures

The researcher secured approval from the school and DSWD for the conduct of the study, and lastly an approval for a general meeting with parents or child caretakers was given permission to allow their children to participate in the study.

3. RESULT AND DISCUSSION

3.1 Effects of Innovative Pedagogy with Sustainable Development on Sustainability Skills

It was investigated that there was a significant effect of Innovative Pedagogy with Sustainable Development between the experimental and control group of ECD Learners on sustainability skills, an Independent-Samples t-test was conducted to compare sustainability skills in IPBPSD and LRP 5 Pedagogical Approaches in ECD-Learners’ Sustainability Skills. In this study, the data from the treatment and baseline groups were analyzed through two separate Independent-Samples t tests, due to the unequal group sizes of the samples (n = 11 and n = 15, respectively). Since only two months period were given for the implementation of the intervention to take place. Based from the results, group 1 after the period 2 treatment experienced the carry over effect which was indicated to be the effective in the treatment. For environmental skills, the results showed that there was a significant difference in the scores for Innovative Pedagogy intervention and LRP 5 intervention. These results suggested that the Innovative Pedagogy intervention were effective in developing environment sustainability skills of ECD learners. Specifically, our results suggested that when ECD



learners explored and manipulated environment through guided and child-initiative play, their environmental skills increased.

For social-cultural skills, the results indicated that there was a significant difference in the scores for Innovative Pedagogy intervention and LRP 5 intervention. These findings implied that Innovative Pedagogy intervention certainly ensured positive effects on the social-cultural sustainability skills of ECD learners. In particular, results indicated that when ECD learners explore sustainability social events through guided and child-initiative play, their social-cultural skill were enhanced.

For economic skills, the results revealed that there was a significant difference in the scores for Innovative Pedagogy intervention and LRP 5 intervention. These findings suggest that IPBPSD intervention as compared to LRP 5 treatment positively influence the effects on economic sustainability skills of ECD learners. Specifically, findings suggested that when ECD learners explored and manipulated diffuse crafts through guided and child-initiative play, their economic skills were honed.

The findings reported here shed new light on how innovative pedagogy for learning sustainable development effectively developed ECD- Learners sustainability skills. The results concurred on the study of Pujiati et al (2019) in which direct integration of the economy of the environment through pedagogy can influence the behavior of the learner with regard to the economy of the environment. It demonstrated that it does not reduce the student’s ability to master key skills in the environment and economy. Although not all pedagogical practices were equal therefore it was important to identify the most effective pedagogy practices that can promote skills of pre-kindergarten learners and achieve the desired learning outcomes effectively as possible (Feyfant, 2011 cited Gauthier et al. (2004). Innovative pedagogy meets the developmental needs of children’s cognitive development. According to SIS (2018) play is extremely important on child brain development as it shapes the neural structural design of the brain. Children are naturally interested to play, they enjoy to explore, experiment, discover and solve problems in resourceful and playful ways (Kimberton School, 2019), in which children exploration, discovery and learning during play helps in building and strengthening the neural pathways of brain that creates the foundation of a lifetime learning (Robertson, Morrissey, & Rouse, 2018).

The results of this current study had many implications for understanding the effects of sustainability skills for pre-kindergarten programs. The 11 ECD -learners had exhibited satisfactory performance after being exposed to the Innovative Pedagogy across all domains of sustainability skills (environmental, economic and social-cultural). The sustainability skills have seven 7 Rs which are the *reduce and reuse, respect, rethink and reflect, recycle and redistribute* and these 7Rs emerged from the three pillars of Sustainable Development - the environmental, social-cultural and economics that were developed by the Brundtland Commission for ease of practices of sustainable development in the education system (Ozturk et al. 2012). Each of these components required balance and should be analyzed inseparably to ensure synergies to promote quality of life and sustainable society (Munasinghe, 2012; Mckee, 2002). Every component has a distinct driving force and objectives: *environmental dimension* seeks to maintain the earth’s capacity to upkeep life in all its diversity, respect the restrictions of the planet’s natural resources and guarantee a great level of protection and development of the quality of the environment. Prevent and diminish environmental pollution and encourage sustainable consumption. *Social-cultural dimension* aims to stimulate a democratic, socially wide-ranging, cohesive, healthy, safe and just society with respect for major rights and cultural diversity that creates equal opportunities and fights discrimination in all its forms. Lastly, the *economic dimension* emboldens an innovative, well-knowledge, competitive and eco-efficient economy that produces practical forms of living and highquality employment (Kolukisa & Ugurlu, 2016).

Table 2
Mean Gain of the two groups in three areas on Sustainability Skills

Areas/Group	Inter vention	Mean Gain		Statistics		Findings
		Mean	SD	t-value	p-value	Decision
A. Environmental Skills						
with/out I Group 1 (n=15)	15.60	3.52	17.16	0.000**	Reject Ho	
with I	19.13	2.89	25.55	0.000**	Reject Ho	



Group 2 (n=11) with/out I 0.08 0.029 -1.00 0.341* Accept Ho with I 18.45 3.11 19.68 0.000** Reject Ho

B. Social-Cultural Skills

with/out I	7.80	2.54	11.89	0.000**	Reject Ho	
Group (n=15)						1
with/out I	0.01	0.30	-1.00	0.341*	Accept Ho	with I
with I	7.73	1.74	14.75	0.000**	Reject Ho	
	with/out					
I	17.00	2.75	23.93	0.000**	Reject Ho	
with I	20.02	1.97	39.69	0.000**	Reject Ho	
with/out I	-0.09	0.30	-1.00	0.341*	Accept Ho	
with I	16.91	1.38	40.79	0.000**	Reject Ho	
	10.73	2.31	17.89	0.000**	Reject Ho	

Group 2 (n=11)

C. Economic Skills

Group 1 (n=15)

Group 2 (n=11)

Legend: **-Significant, *- Not Significant

3.2 Significant Effects of Play-Based Pedagogy between the Control and Experimental Group of ECD Learners on Creative Thinking

It was investigated that there was a significant effect of Innovative Pedagogy with Sustainable Development between the experimental and control group of ECD Learners on Creative Thinking, an independent-samples t-test was conducted to compare critical thinking in PreEvaluation Performance, Post Evaluation Performance (After Period 1) and Post Evaluation Performance (After Period 2).

For Pre Evaluation Performance, the results showed that there was no significant difference in the scores for experimental group and control group evaluation performance. These results suggested that the ECD-learners did not have treatments that have an effect on critical thinking. Specifically, our results suggested that when ECD learners were exposed to pedagogical treatment, their critical thinking increases.

For Post Evaluation Performance (After Period 1), the results indicated there was a significant difference in the scores for experimental group and control group evaluation performance. This result revealed that the Innovative Pedagogy with Sustainable Development really does have an effect on critical thinking compared to the Learning Resource Package 5. In particular, results suggest that when ECD -learners explore and manipulate craft from the nature environment, their critical boosts. For Post Evaluation Performance (After Period 2), results revealed that there was no significant difference in the scores for experimental group and control group evaluation performance. The findings suggest that the two groups of ECD-learners who have received the same Innovative Pedagogy treatment can be seen that the effect on critical thinking have reached the same high average level. Specifically, this finding implied that when the control group was exposed to Innovative Pedagogy treatment, their critical thinking increased to same level of the experimental group.

Changes were manifested when parents gave evident responses on their child’s changed behavior. One parent said:

Parent A: “*Miyo anak ya pipina el botelya kaya se daw ele hurgesa liga na eskwela.*” (On our way to school, my son saw an empty bottle on the street, he picked it up and said “I can make a toy out of this bottle” he gave the bottle to you, teacher.)

Another parent said,

Parent E: *Miyo anak ya buta el laman del alcohol kay liba daw le na eskwela para ase jeep-jeep kunel botelya.*” (My daughter poured out all the alcohol because she wanted to bring the bottle to the teacher to make her a car.)

These were mentioned as few of the evidences on how IPBSD pedagogical treatment affects children’s creativity and developing sustainability skills.



With reference to the results obtained from the study, Innovative Play-based Pedagogy produced better effects in developing ECD Learners’ creative thinking for these dimensions of vocabulary, general information, similarities and difference, comprehension, quantitative and auditory memory. Many scholars held the view that Play-Based Pedagogy and Sustainable Development can influence the development of creative thinking among ECD learners like Feyfant, (2011) stated that while the child plays, it motivated them to experience inquiry processes of problem solving, analyzing, evaluating, applying knowledge and creativity.

Also, Wall, Litjens and Taguma (2015) highlighted play mostly contributed to a child’s development when it is considered to be meaningful and effective in stimulating early learning such as puzzle or constructional materials with a guided free play. That is to say, playbased learning is very effective method in improving children’s socio-emotional and building academic attitude towards learning which the substance of creative thinking is. This concept agreed to what Russ (1996) stated that creativity requires a combination of ingredients of personality traits, capacities and skills. Russ underscores the theoretical model of the need for creativity development by providing a creative environment to build up children skills through play, behaving creatively themselves and praising children’s creative efforts.

Moreover, the findings of researchers like Ali and Mahamod (2015) have demonstrated that the Play-Based Instruction Module for teaching pre-schoolers’ language skills has found to be useful by allowing children to engage in play and learn the language better and more easily. The most obvious finding to emerge from the analysis is the consistent increase of ECD learners in creative thinking dimension in vocabulary, general information, similarities and difference, comprehension, quantitative and auditory memory which is also consistent to the findings of Robertson, Morrissey & Rouse (2018) that play-based classroom can increase children’s vocabulary and ability to tell a story than a traditional classroom. Likewise, Kimberton (2019) emphasizes that play can build and improve abilities of compound problem solving, critical thinking, creativity and collaboration across the lifespan and these skills are essential for 21st century learning.

Research that can demonstrate a substantial link between creative thinking and sustainable development can provide strong point to a growing body of evidence representing important sustainability skills and creative thinking that are crucial to the survival of children needs in the progressive global effects of climate change, poverty and social conflict. In addition, research like this can provide early childhood educators with a profound reason to step back from the fast-tracked curriculum with a motivated instruction and more time for learning through play opportunities.

Table 11
Independent t - test Results between the Control and Experimental Group in the Pre and Post Evaluation Performance (N=26)

	Group	Mean	SD c	Mean Difference	t - value (df =24)	p value
						.218 ^{ns}
	Group 1 (n = 15)	105.1	10.46	4.7	1.26	
	Group 2 (n = 11)	100.4	7.58			
<i>Pre-Evaluation Performance (After Period 1)</i>	Group 1 (n = 15)					
	<i>a</i>	122.6	13.87	17.2	3.08	.005 ^s
	Group 2 (n = 11)	105.4	14.37			
<i>Post Evaluation Performance (After Period 2)</i>	<i>b</i>					
	Group 1 (n = 15) <i>b</i>					
	Group 2 (n = 11)	133.0	18.62	16.6	2.22	.036 ^s
	<i>a</i>	116.4	19.17			

Legend: ^a Assigned in the Experimental Group. ^b Assigned in the Control Group.

^c Equal variances are assumed. ^{ns} H₀ is not rejected. Mean Difference is not significant at alpha = .05. ^s H₀ is rejected. Mean Difference is significant at alpha = .05.

Levene's Test for Equality of Variances between the Control and Experimental Group in the Pre and Post Evaluation Performance (N=26)

	Group	F value	p value
<i>Pre Evaluation Performance</i>	Group 1 (n = 15)	.113	.740 ^{ns}
	Group 2 (n = 11)		
<i>Post Evaluation Performance (After Period 1)</i>	Group 1 (n = 15)	.171	.683 ^{ns}
	<i>a</i>		
	Group 2 (n = 11)		
	<i>b</i>		
<i>Post Evaluation Performance (After Period 2)</i>	Group 1 (n = 15)	.034	.854 ^{ns}
	Group 2 (n = 11) ^a		

Legend: ^a Assigned in the Experimental Group. ^b Assigned in the Control Group.


^{ns} H₀ is not rejected at alpha = .05. Equal variances are assumed.

4. CONCLUSION

In general, the statistical results revealed that the ECD participants who were crossover to Innovative Play-Based Pedagogy with Sustainable Development made much improvement in sustainability skills and creative thinking, the application of Play-Based Pedagogy and Sustainable Development Educational strategies, and the counterpart of widely used Learning Resource Package 5.

REFERENCES

- [1] Alliance for Childhood (AC) and US Play Coalition (USPC) (2018). Improving Children's Health through Play: Exploring Issues and Recommendations.
- [2] Almon, J. and Miller, E. (2011). *The Crisis in Early Education: A Research-Based Case for More Play and Less Pressure*. Alliance for Childhood
- [3] Annual Poverty Indicators Survey (APIS) (2016). Philippine Statistic Authority, Manila Philippines.
- [4] Aslanabadi, H. R. (2013, October 14). The Effect of Games on Improvement of Iranian EFL Vocabulary Knowledge in Kindergartens.
- [5] Britto, P., (2015, October 22). Why early childhood development is the foundation for sustainable development. *UNICEF*.
- [6] Cengizoglu, S. (2013, September). Investigating Potential of Education for Sustainable Development Program on Preschool Children's Perceptions about HumanEnvironment Interrelationship.
- [7] Chan, M. (2013). Linking child survival and child development for health, equity and sustainable development. *The Lancet*. 381, 1514-1515.
- [8] Child Rights International Network (CRIN). (2013, Oct 29). *reliefweb*. Retrieved April 8, 2019.
- [9] Csikszentmihalyi, M., & Wolfe, R. (2014). New Conceptions and Research Approaches to Creativity: Implications of a Systems Perspective for Creativity in Education. In M. Csikszentmihalyi, *The Systems Model of Creativity* (pp. 161-184). Dordrecht: Springer Netherlands.
- [10] Effective and Appropriate Pedagogy. (2018, March 29). THE IMPORTANCE OF SUSTAINABLE DEVELOPMENT IN THE FIELD OF EDUCATION Introduction. ResearchGate P 49 - 58.
- [11] Eriksen, K. G., (2013). Why Education for Sustainable Development Needs Early
- [12] Childhood Education: The Case of Norway. *Journal of Teacher Education for Sustainability*, vol. 15,
- [13] Green, S. (2013, August 1). Preschool Teachers' Early Perceptions Of Education For Sustainable Development In Early Childhood Education.
- [14] Häggglund, S. and Samuelsson, I. P (2009). Early childhood education and learning for sustainable development and citizenship. *International Journal of Early Childhood* 41(2):49-63 DOI: 10.1007/BF03168878
- [15] Karoly, L.A. and Bigelow, J.H. (2005) "The economics of investing in universal preschool education in California" (Santa Monica, CA: Rand Corporation).

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- [16]Kates, R. W. Parris, T. M. and Leiserowitz, A. A. (2005). What is Sustainable Development? Goals, Indicators, Values, and Practice. *Environment Science and Policy for Sustainable Development*, 47(3), pages 8-21.
- [17]Logue, M. (2007, January). Early Childhood Learning Standards: Tools for Promoting Social and Academic Success in Kindergarten.
- [18]Lonka, S. (2016, August). Pedagogical Small Group Approach in a Day Care Center.
- [19]O’Flaherty, J. & Liddy, M. (2018) The impact of development education and education for sustainable development interventions: a synthesis of the research, *Environmental Education Research*, 24:7.
- [20]Öztürk, D. K. (2016, August 17). Analysis of Pre-School Teachers’ Views on the Importance of Education for Sustainable Development by Means of Location and Household Type in Childhood. *Philippine Standard Classification of Education (PSCED)*. (2017).
- [21]Play-based learning can set your child up for success at school and beyond. (2018, February 22).
- [22]Platz, D., & Arellano, J. (2011). Time tested early childhood theories and practices. *Education*, 132(1), 54-63.
- [23]Sachs, J. D. (2014, Sept 24). *World Economic Forum*.
- [24]Sheridan, S. (2001). Pedagogical Quality in Preschool - An issue of perspectives.
- [25]Siraj-Blatchford, J. Smith, K.C and Samuelsson, I. P. (n.d). *Education for Sustainable Development in the Early Years*.
- [26]Susa, M. (2018, January 6). Work Values and Teaching Performance of Early Childhood Educators in Tuguegarao City, Philippines.
- [27]UNESCO (2017 May 09). *Education for Sustainable Development and Global Citizenship in Education 2030 / SDG 4*.
- [28]UNESCO. (2014). What is Education for Sustainable Development.
- [29]UNESCO (2010). Report on Global Consultation: Closing The Knowledge Gap On Early Childhood In Developing Countries. New York UNICEF. (2018, June 27).
- [30]UNICEF (2017). Closing the Knowledge Gap on Early Childhood In Developing Countries
- [31]UNITED NATION SUSTAINABLE DEVELOPMENT GOALS (UNSDG). (2018). Progress of Goal 4 in 2018. UNITED NATIONS New York.
- [32]The Absorbent Mind. Clio Montessori Series. England: ABC-Clio Limited, (first published in 1949).
- [33]University of Gothenburg (UG) (2010, September 13). Early childhood education important for sustainable development.
- [34]U.S. Department of Health and Human Services, Office of Child Care, “Child Development and School Readiness,”
- [35]Verma, G., (2017, October 27). Role of Early Childhood Education in Achieving Sustainable Development in India.
- [36]Walsh, G., Sproule, L., McGuinness, C., Trew, K. and Ingram, G (2010). Developmentally Appropriate Practice and Play-Based Pedagogy in Early Years Education: A literature review of research and practice. *Rewarding Learning*, UK
- [37]Wojciehowski, M & Ernst, J (2018). Creative by Nature: Investigating the Impact of
- [38]Nature Preschools on Young Children’s Creative Thinking. *The International*
- [39]Journal of Early Childhood Environmental Education, 6(1), p. 3