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ETHNOBOTANICAL KNOWLEDGE OF CHILDREN IN SELECTED COMMUNITIES IN PLATEAU STATE, NIGERIA: DRIVERS OF CHILDREN'S PLANT KNOWLEDGE AND THE CONSERVATION IMPLICATIONS FOR THE FUTURE OF BIODIVERSITY

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ABSTRACT

The study was conducted to assess the ethnobotanical knowledge of primary school children in six selected communities of Plateau State, Nigeria and to determine the drivers of their knowledge including methods of knowledge acquisition and transmission. Six different rural communities from Plateau State Nigeria were selected for the study; two schools in each community (total, 156 respondents). Data was collected through a mixed methods approach, using focus group plant identification exercise, picture identification activity, and oral interviews. Data was analyzed using simple descriptive statistics and frequencies. Results revealed that children had a relatively low knowledge of plants (30.3%), although this was mostly indigenous plants. A greater proportion (40.6 %) of children held no ethnobotanical knowledge, 19.5 % could identify both exotic and indigenous plants, while a further 9.6% identified only exotic species. Furthermore, the results revealed that parents, mostly mothers were the major transmitters of plant knowledge. We conclude that children's ethnobotanical knowledge of plants was relatively low, and that there is a need to deliberately encourage local involvement of children in practical plant learning activities to help improve their plant knowledge if they are to become effective and knowledgeable custodians and stewards of our future biodiversity.

Keywords: Ethnobotanical Knowledge, Nigeria, Traditional Knowledge, Biodiversity, Conservation.

INTRODUCTION

Children's learning is mostly driven by the types of cultural communities they grow up in (Tuan (1978). It has been shown that knowledge of nature is learned by children in an environment of social, experiential, and observational learning; being actively involved in out-door nature activities along with family and friends (Wyndham 2010; Lancy 1996; Hewlett and Cavalli-Sforza 1986; Ohmagari and Berkes 1997; Chawla 1988; Rogoff *et al* 2007; Zent 2009; Zarger, 2010; Gaskins 2010; Gallios *et al.*, 2015). Hunn (2002) showed that learning natural history comes readily to children, particularly when there is reinforcement of what they are

learning from older members of their community. How children perceive the world around them is therefore crucial to the role they will play in the future when they are faced with the challenges and responsibilities for its management (Hunn, 2002).

Indigenous plant and animal resources provide rural communities with products that provide energy, food, shelter and medicine (Sejabaledi 2016). Rural communities rely on indigenous plants for their livelihoods. They use a great variety of indigenous plants for a diverse range of purposes such as food, shelter, recreation, medicine and cultural activities (Simelane 2009; Molewa 2013). Many studies have shown that children's environmental knowledge is declining as more children spend time away from nature (Singer *et al.,* 2009; Louv 2008; Charles and Louv 2009), resulting in several behavioural, emotional and psychological phenomena which Louv has collectively termed *nature deficit disorder* (Louv 2008). While one might expect this phenomenon to be more widespread in urban settings and less in rural areas, studies are revealing the same pattern of knowledge loss in children in both urban and rural situations (Reyes-Garcia, 2006; Clements 2004; Somnasang and Moreno-black 2000). As Turner *et al.* (2000) observed, young people in many cultures nowadays are far less knowledgeable about the Traditional Knowledge (TK) of their environment because modes of transmission of knowledge have been threatened by more modern lifestyles and choices. Patrick and Tunnicliffe (2011) observed that in countries where children and adults are not in touch with nature, there seem to be a general low awareness about environmental issues and a general lack of interest, care and even apathy for the environment, as also observed by Pam *et al,* (2018) in their work with Mushere children, in Nigeria.

In Africa, there is a decline of knowledge of plants as there seem to be a reduction in local knowledge transfer from parent to offspring, mostly as a result of globalization (Bruyere *et al.,* 2016). This is mostly attributed to the loss in modes of intergenerational knowledge transmission which included oral transmission such as story-telling, and practical methods of doing by observation (Sugiyama 2017; Tuwe, 2016; Maffi, 2014; Scroggie, 2009; Lekoko 2007; Mundy and Compton, 1991). Parents are spending less time with the younger generation (DeWalt, 1994; Godoy, 1994; Benz *et al.,* 2000).

There is good evidence that the close association with nature found in many cultures around the world often translates into children having considerable traditional knowledge (TK) of plants and animals early in their growth, as they actively engage with their socio-ecological and cultural environments, especially through familial relationships (Rogoff, 2016; Rogoff *et al.,* 2003). For example, the Tzeltal-Maya of Mexico are known to have great depth of knowledge of their plants, with their children knowing over 100 plant names as early as nine years old, because of their roles and contributions in daily subsistence activities (Hunn, 2002; Casangrade 2004).

Consequently, what ecological components and domains children will know, and the depth of their knowledge depends mostly on the cultural relevance of that domain to the culture (Daugherty, 1978), and the social interactions that exists between adults and children, and between children and their environment (Tian, 2017). For instance, Mathez-Stiefel *et al* (2012) studied the ethnobotanical medicinal plant knowledge of Children in the Andes and reported that both children and adults had good medicinal plant knowledge, although the proportions of plant medicinal uses varied with an individual's age. Quinlan *et al.* (2016), also reported on ethnobotanical knowledge of children in a Caribbean village. Their findings revealed that children gained ethnobotanical

knowledge mostly from familial associations, as children who lived in family compounds held more plant knowledge than their associates who lived separated from close kin. They also did not find that girls and women were more knowledgeable, contrary to many previous reports. Likewise, Constance and Tshisikawe (2018) also reported the importance of familial relationships in the acquisition of ethnobotanical knowledge of both adults and children.

For children to become effective and passionate caretakers of the plants in their environment, and as future custodians, having a close association and appreciation of the local flora and an appreciable understanding of their history and uses are major components needing attention. It is also important to understand the dynamics around how children learn and who they learn from. Ultimately, understanding the drivers that determine children's plant knowledge or the lack thereof are necessary in the race to save our plant diversity. To the best of our knowledge, there does not exist any study in Nigeria, and specifically in Jos-Plateau that has looked at children's ethnobotanical knowledge. This study therefore, was aimed at contributing empirical data to fill this knowledge gap and contribute to literature in this regard. It was also to identify and measure the level of plant knowledge among young children, with the intent of establishing the link between this knowledge, how it is acquired and transmitted, and the implications for the future of biodiversity and its conservation.

MATERIALS AND METHODS

Study Area

The study was conducted in six Local Government Areas (LGAs) of Plateau State, Nigeria. Plateau is located in Nigeria's Geo-political middle-belt with an area of 26,899 square kilometers. It is located between latitude 9^0 34'0.00" N and longitude 9^0 45'0.00" E. The State is named after the many Plateaus found there. Bare rocks are scattered across the grasslands, which cover the Plateau. The altitude ranges from around 800 m around the south-eastern borders; 1,200 m to a peak of 1,829 m above sea level in the Shere Hills range in Jos (Blench 2003; UNDP 2018). It has a population of over 3.5 million people across the 17 LGAs (National Population Commission office, Jos Census Data 2006).

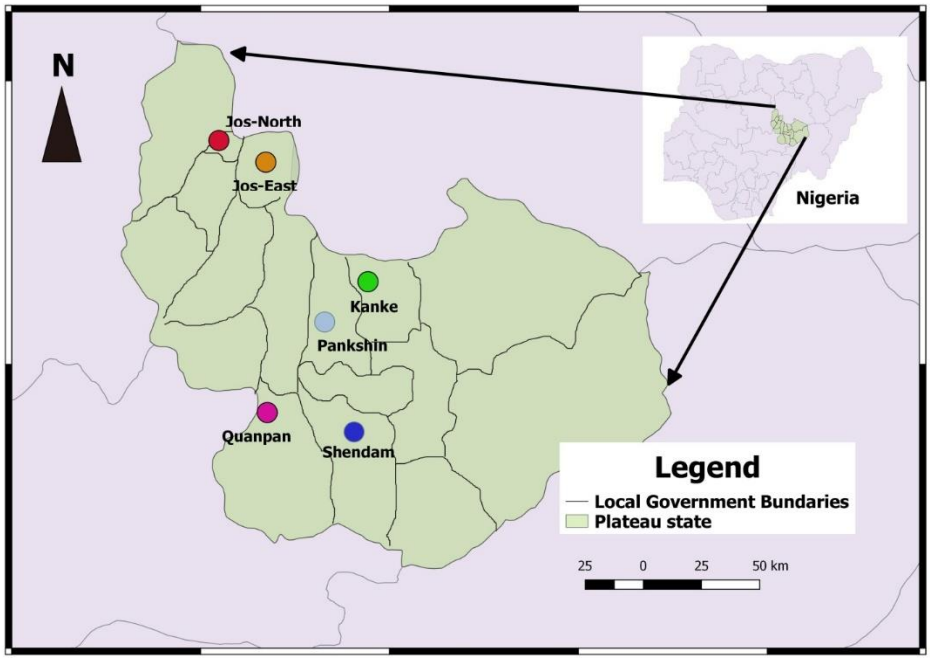

Figure 1: Map of Plateau State showing the Studied LGAs

Experimental Design

Respondents for this study were randomly selected from each school visited by the researchers, with the help of the school teachers. An average of 20 pupils per school were assessed, representing all ages between 6-12 years old

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Table 1: Local Government Areas and Primary Schools surveyed in Plateau State

S/No.	LGA	Primary School
1	Kanke	Ampang West Central Primary School
2	Jos-East	Laminga Primary School and Kwanga Primary School
3	Quan-pan	LGEA Primary School Pandam
4	Jos-North	Maza LEA Primary School
5	Pankshin	Berek Primary School, Perka Primary School
6	Shendam	LEA Primary School Lakushi

Data Collection

Photo elicitation exercises were carried out, with children being shown photographs of some common plants around their school environments. Prior assessment of the plant diversity was done to select at least 10 common indigenous and exotic species for inclusion in the exercise. Children identified and shared their knowledge about each plant; its name, (local language), plant uses if any, methods of knowledge acquisition and transfer. In addition, children were taken out to the field to identify actual plants within their environments. Two random line transects (100 m) were established cutting through vegetation around the premises of the school.

The sources of knowledge acquisition were vertical transmission (which includes any or both parents), oblique transmission (one or both grandparent and relatives such as Aunt, Uncle) and horizontal transmission (peer group including older siblings and younger siblings, friends). All interactions and discussions were recorded using a voice

recorder, in addition to taking written field notes. These were later transcribed.

Data Analyses

Voice recordings were transcribed, while written notes were entered into an excel spreadsheet and organized. Descriptive statistics using simple frequency distributions was used in data analysis.

The knowledge of pupils was assessed based on the names of plants an individual was able to identify by either its local name, or its common name, or both, and any known (uses) of the plant or whether an individual held no knowledge of its name, and/or uses. From Pam et al (2018), we considered any list length with greater than or equal to 5-above listings a good knowledge while a list of plant names 0-5 and under was considered low knowledge of plants.

Plant Identification

Plant identified in the field by pupils were further authenticated using plant field guides (Arbonnier 2004).

RESULTS

Twenty pupils each from Shendam and Pankshin LGAs participated in the survey, 29 pupils from Ampang West (Mangu LGA), 39 pupils from Pandam (Quanpan LGA) and 16 pupils from Laminga (Jos-East LGA), 22 from Kwanga (Jos-East LGA) and 10 from Maza (Jos-North LGA) (Total=156). Boys were 68 (43.6%.) while girls made up 88 (56.4%). Overall, 38 plant species belonging to 16 families were identified by the pupils in the eight primary schools visited (Table 2).

Table 2: List of Plants Identified by Pupils within their Environment in Plateau State

S/No.	Scientific name	Family	Local/Common name	Language	Uses
1	*Agave sisalina perrine*	Agavaceae	Sisal	English	Fibre used for making ropes and baskets
2	*Alchonea laxiflora* (Benth.) Pax & K. Hoffm	Euphorbiaceae	Mali	Tarok	Medicine and animal fodder
3	*Anacardium occidentale* L.	Anacardaceae	Kashiu	Hausa	Fruits edible; juice extracted for medicinal purposes
4	*Andasonia digitata* L.	Bombacaceae	Kuka	Hausa	Leaves use as food. Fruit edible
5	*Azadirachta indica* A. Juss.	Meliaceae	Deshe, Neem	Demak, English	Leaves serves as medicine
6	*Bidens pilosa* L.	Asteraceae			Leaves edible
7	*Borassus aethiopum* Mart	Arecaceae	Giginya	Hausa	Leaves use for craft and fruit edible
8	*Canarium schweinfurthii* Engl.	Burseraceae	Pet, Atili	Ngas, Hausa and Afizere	Fruits edible; oil extracted for various uses including for medicinal purposes
9	*Carica papaya* L.	Caricaceae	Gwanda	Hausa	Medicine and food
10	*Citrus sinensis* (Linn.) Osbeck	Rutaceae	Lemu, Alemu	Hausa, Afizere	Leaves use as medicine and fruit edible
11	*Cnidoscolous chamayansa* (Mill.) I.M. Johnst.	Euphorbiaceae	Gu	Mwaghavul	Leaves used as medicine and fruit edible
12	*Commiphora africana* (A. Rich.) Engl.	Burseraceae	Nil		Leaves burned as incense (medicine)
13	*Daniellia oliveri* (Rolfe) Hutch.	Caesalpinoideae	Maje	Hausa	Leaves used as medicine and fruit edible
14	*Elaeis guineensis* Jacq	Arecaceae	Kwara	Hausa	Fruit edible
15	*Erythrina senegalensis* DC.	Papilionoideae	Nil		Plant used as medicine and animal fodder
16	*Erythrophyleum africanum* (Welw.) Harms	Caesalpinoideae	Tinder	Demak	Leaves used as medicine. Wood use as timber
17	*Eucalyptus camaldulensis* Dehnh.	Myrtaceae	Rastata, Timber tree	Afizere, English	Leaves used as medicine. Wood use as timber
18	*Euphorbia Kamerunica* Pax.	Euphorbiaceae	Gu, Kirani	Ngas, Hausa	Sap use as medicine. Plant use for fencing
19	*Faidherbia albida* (Delile) A.Chev.	Mimosoideae (Fabaceae)	Gadina, Tinhir	Mwaghavul, Ngas	Plant used as medicine and animal fodder
20	*Ficus polita* Vahl	Moraceae	Ubengbe	Igbo	Plant used as medicine and animal fodder
21	*Ficus sur* Forssk	Moraceae	Tuwas	Demak	Plant used as medicine and animal fodder
22	*Ficus thonningii* Blume	Moraceae	Timpang Tingting	Ngas, Mwaghavul	Plant used as medicine and animal fodder
23	*Hibiscus sabdariffa* L.	Malvaceae	Zobo	Hausa	Leaves used as medicine and fruit edible
24	*Jacaranda mimosifolia* D. Don.	Bignoniaceae	Girpiya	Mwaghavul	Used for Timber
25	Jatropha curcas L.	Euphorbiaceae	Arugbam	Afizere	Leaves and sap used as medicine
26	Lantana camara L.	Verbanaceae	Kashin kuda	Hausa	Leaves used as medicine and fruit edible
27	*Mangifera indica* L.	Anacardaceae	Mango Mangoro	Hausa	Leaves used as medicine and fruit edible
28	*Moringa olifera* Lam.	Moringaceae	Zogale	Hausa	Leaves used as medicine and fruit edible
29	*Nicotiana tabacum* L.	Solanaceae	Tima	Mwaghavul	Leaves are smoked by Elderly people
30	*Parinary polyandra* Benth.	Chrysobalanaceae	Nil		

S/No.	Scientific name	Family	Local/Common name	Language	Uses
31	*Parkia biglobosa* (Jacq.) Benth.	Mimosoideae (Fabaceae)	Mes, Dorowa	Ngas, Hausa	Leaves used as medicine and fruit edible
32	*Piliostigma thonningii* (Schum.) Milne-Redh.	Caesalpinoideae	Nil		Leaves used as medicine and animal fodder
33	*Senna siamea* (Lam.) H.S. Irwin & Barneby)	Caesalpinoideae	Kaciya	Afizere	Leaves used as medicine
34	*Solanum dasyphyllum* Schum & Thonn.	Solanaceae	Gautan Kaji	Hausa	Leaves and fruit used as medicine.
35	*Tamarindus indica* L.	Caesalpinoideae (Fabaceae)	Tsaminya	Hausa	Leaves used as medicine. Fruit edible
36	*Vitellaria paradoxa* Gaertn.f.	Sapotaceae	Tin-in	Demak	Leave, bark and root used as medicine. fruit edible
37	*Ziziphiphus mucronata* Willd.	Rhamnaceae	Mukuchon	Tarok	Leaves serve as animal fodder. Fruit edible
38	Unidentified1		Igiyan jub	Afizere	Leaves used as medicine
39	Unidentified2	Papilioniodae	Alter	Afizere	Leaves use as medicine
40	*Cleome sp.*	Cleomaceae	No local name	Afizere	Leaves use as medicine and vegetable

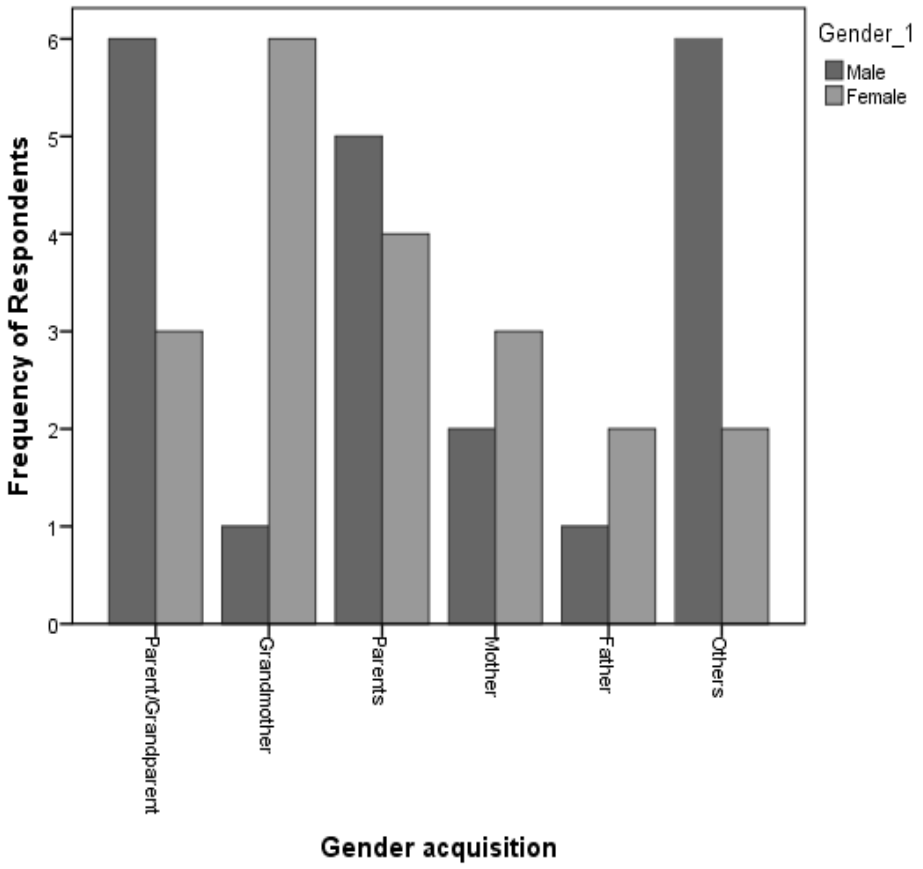

Figure 2: Gendered Responses on Sources of Knowledge Acquisition.

There was a significant effect of gender on children's plant knowledge (Pearson X^2= 29.56 df=14, $p<0.05$) with girls mentioning mothers and grandmothers as their predominant sources of knowledge than boys (Fig.2) whereas boys were not as specific, mentioning generically, grandparents and parents, and other sources such as electronic media and books. Also, children knew more local indigenous plant species 30 (25%), followed by a combination of native and exotic plant species 23 (19.2%), while 11 (0.92 %) of children named only exotic plant species but a greater percentage of children did not hold any plant knowledge 54 (45%).

DISCUSSION

Results from this study revealed an appreciable plant knowledge among respondents' (children sampled) even though the majority were less knowledgeable. Children could recall uses of plants, but could not specify what ailments the plants could treat or their medicinal purposes. This is similar to the reports by Setalaphruk and Price (2007) on children's wild plant knowledge in a village in Thailand, where children had knowledge of plants, but exhibited a low TK in the practical application of such knowledge. This suggests a transmission gap, although it could also be as a result of the age group sampled in this

work, perhaps they are considered too young for such details. Some researchers have reported that ethnobotanical knowledge improves with age of children (Schniter *et al.,* 2020; Wyndham, 2010; Piero *et al.,* 2019; Cruz-Garcia *et al.,* 2018; Eyssartier *et al.,* 2008). A further survey of an older group is suggested to gain deeper insights as Quinlan *et al.,* (2016), and Reyes-Garcia *et al.,* (2009) also observed that children's learning of local plants depends on their developmental stage, including their health and learning capacities, since each stage of development presents a new kind of opportunity for both exploring and observing the natural world.

Findings from this study also showed that learning and acquisition was mainly from close familial relations, particularly both parents, as also reported by Constance and Tshisikawe (2018) and Eyssartier *et al.,* (2008), and others. There however, does not seem to be a deliberateness on the side of the significant adults in the children's lives to ensure that whatever knowledge of the plants around them they hold is passed on to the younger generation, as observed that children struggled to explain exactly what activities they did with their parents or other significant adults in their lives in the process of gaining plant knowledge. The report of that they learnt from sources other than relations also suggests this. A similar report was made by Lancy (1996, 2010), who observed that children in small societies seem to learn on their own through indirect teaching such as shaming and story-telling or folklore. Although this some respondents observation might require further investigating into, this method of indirect teaching could prove less effective as it would mean that only children who are keen on observation and deliberate or self-motivated, or interested in the activities of adults would learn from their knowledge, leaving the much needed knowledge, in relation to sustainable utilization of plants and their conservation to chance

CONCLUSION

From this study, it can be concluded that there is a knowledge transfer gap between children and adults. Since children are the future care-takers and custodians of our biodiversity, it is of great importance that we become even more deliberate in our mentoring and knowledge transfer, especially local knowledge of plants. There is also a dare need for the documentation of local and indigenous knowledge of plants and their uses in local languages for the future generations, this will not only help in preserving the information on plants, it will also contribute to the preservation of the language in which knowledge was learnt.

RECOMMENDATION

Without proper knowledge of plants, conservation practices will become difficult in the future for the upcoming generation. New and innovative methods, such as the early participation of children in citizen Science, encouraging nature photography using their mobile devices, could be employed in gaining the undivided attention and interest of the younger generation in learning about nature, and the local flora. This will help create an awareness and a bond with these plants such that protecting and utilizing them in sustainable ways in the present and future might become easier and achievable when there is a connection and love for nature in the next generation of adults.

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Conflicts of Interest

We declare no conflicts of interest in this research.

REFERENCES

Arbonnier, M. (2004). Trees, shrubs, and lianas of West African dry zones *CIRAD MARGRAF publishers GMBH*. Pp-573

Benz, B. F., Cevallos, E. J., Santana, M. F., Rosales, A. J., Graf, M. S. (2000). Losing Knowledge about Plant Use in the Sierra De Manantlan Biosphere Reserve, Mexico. *Econ Bot.* Springer-Verlag; 54: 183–191. https://doi.org/10.1007/BF02907821

Bruyere, B.L., Trimarco, J. and Lemungesi, S. A. (2016): Comparison of Traditional Plant Knowledge between Students and Herders in Northern Kenya. *J Ethnobiology Ethnomedicine* **12,** 48 https://doi.org/10.1186/s13002-016-0121-z

Charles, C., and Louv, R. (2009). Children's Nature Deficit: What We Know and Don't Know. *Children and Nature Network,* Pp 1-32.

Casangrade, D. G. (2004). Ethnobiology Lives! Theory, Collaboration, and Possibilities for the Study of Folk Biologies. *Reviews in Anthropology*, *33*: *351-370*.

Chawla, L. (1988). Children's Concern for the Natural Environment. *Children's Environments Quarterly*, 5:*13-20*.

Cavalli-Sforza, L.L., Feldman, M.W., Chen, K.H and Dornbusch, S. M. (1982). Theory and Observation in Cultural Transmission. *Science*, 218: 19-27

Clements, R. (2004). An Investigation of the Status of Outdoor Play. *Contemporary Issues in Early Childhood, 5*: 68-80.

Constant, N.L., Tshisikawe, M.P. Hierarchies of Knowledge: Ethnobotanical Knowledge, Practices and Beliefs of the Vhavenda in South Africa For Biodiversity Conservation. *Journal of Ethnobiology Ethnomedicine* 14, 56 Https://Doi.Org/10.1186/S13002-018-0255-2

Daugherty, J. W. D. (1978). Salience And Relativity In Classification. *American Ethnologist, 5*: 66-80.

Gaskins, S., & Paradise, R. (2010). Learning Through Observation In Daily Life. InLancy, D. F., Bock, J. C., &Gaskins, S. (eds.), *The Anthropology Of Learning In Childhood*(Pp. 85-118), Plymouth, UK. Altamira Press.

Godoy, R. (1994). The Effects of Rural Education on the Use of the Tropical Rain Forest by the Sumu Indians of Nicaragua: Possible Pathways, Qualitative Findings, and Policy Options. *Hum Organ*.; 53:233 - 244. https://doi.org/10.17730/humo.5.3.e221170878h4701u

Hewlett, B. S., & Cavalli-Sforza. (1986). Cultural Transmission Among Aka Pygmies. *American Anthropologist, 88*:*922-934*

Hunn, E. S. (2002). Evidence For The Precocious Acquisition of Plant Knowledge By Zapotec Children. In Stepp, J. R., Wyndham, F. S., and Zarger, R. K (eds)*Ethnobiology and Biocultural Diversity*: Proceedings Of The Seventh International Congress of Ethnobiology (Pp 604-613), Athens, Ga. International Society Of Ethnobiology.

Lancy, D. F. (1996). Playing on The Mother-Ground: Cultural Routines for Children's Development. (Pp 11-120) New York: Guilford Press.

Lancy, D. F. (2010). 'Learning from Nobody': The Limited Role of Teaching in Folk Models of Children's Development. *Childhood in the Past*, 3: 79-106.

Lekoko, R. N. (2007). Storytelling as A Potent Research Paradigm for Indigenous Communities. *Alternative (Special Supplement)*, 2: 82-95.

Louv, R. (2008). Last Child in The Woods: Saving Our Children from Nature-Deficit Disorder: London: Atlantic Books. Pp 7-14.

Maffi, L. (2014). Biocultural Diversity Toolkit, 4. Documenting and Revitalizing Oral Tradition.

Mathez-Stiefel, SL, and Vandebroek, I. (2012). Distribution and Transmission of Medicinal Plant Knowledge in the Andean Highlands: A Case Study from Peru and Bolivia. *Evidence-Based Complementary and Alternative Medicine*, Article ID 959285, 18 pages,

Molewa, E. (2013). Minister of Water and Environmental Affairs. A Rich Harvest from Our Natural Resources. Speech Delivered on 13 April 2013. Online: http://www.iol.co.za/saturday-star/a-rich-harvest-from-our-resources-1499824 (accessed on 13 June 2015). National Human Development Report 2018. Pp 166

Mundy, P. and Compton, J. L. (1991). Indigenous Communication and Indigenous Knowledge Development Communication Report, Clearing House on Development Communication, Arlington, VA.

Ohmagari, K. and Berkes, F. (1997). Transmission of Indigenous Knowledge and Bush Skills among the Western James Bay Cree Women of Subarctic Canada. *Human Ecology*, 25: 197-222.

Pam, G., Zeitlyn, D. and Gosler, A. (2018): Ethno-Ornithology of the Mushere of Nigeria: Children's Knowledge and Perceptions of Birds. *Ethnobiology letters*, 9 (2):48-64.

Patrick, P. and Tunnicliffe, S. D. (2011). What Plants and Animals Do Early Childhood and Primary Students Name? Where Do They See Them? *Journal of Science Education and Technology, 20: 630-642.*

Quinlan, M. B., Quinlan, R. J., Council, S. K., and Roulette, J. W. (2016). Children's Acquisition of Ethnobotanical Knowledge in a Caribbean Horticultural Village. *Journal of Ethnobiology*, 36: 433-456.

Reyes-García, V., T. Huanca, V. Vadez, W. Leon-ard, and D. Wilkie. 2006. Cultural, Practical, and Economic Value of Wild Plants. *Economic Botany*, 60:62–74

Reyes-García, V., J. Broesch, L. Calvet-Mir, N.Fuentes-Peláez, T. W. McDade, S. Parsa, S.Tanner, T. Huanca, W. R. Leonard, and M.R. Martínez-Rodríguez. (2009). Cultural Trans-mission of Ethnobotanical Knowledge and Skills. Evolution and Human Behaviour, 30: 274–285.

Rogoff, B., Paradise, R., Arauz, R.M., Corerea-Chavez, M., and Angelillo, C. (2003). Children and Learning Through Intent Participation. *Annu. Rev. Psychol. 54: 175-203*

Rogoff, B., Moore, L., Najafi, B., Dexter, A., Correa-Chávez, M., and Solis, J. (2007). Children's Development of Cultural Repertoires through Participation in Everyday Routines and Practices. In Grusec, J.E &

Hastings, P.D. (eds), Handbook of Socialization: Theory and Research. (Pp 490-515) New York, NY, US: Guilford Press.

Rogoff, B. (2016). Learning by Observation and Pitching in To Family and Community Endeavors: An Orientation. *Human Development*, 56: 69-81.

Scroggie, A.M. (2009). Preserving Traditions and Enhancing Learning Through Youth Storytelling. *Journal of Bhutan Studies, 13: 76-92*

Sejabaledi, A. R. (2016). Sustainable Use and Management of Indigenous Plant Resources: A Case of Mantheding Community in Limpopo Province, South Africa. *Sustainability* 16(8) 221.

Singer, D. G., Singer, J. L., D'Agnostino, H., & DeLong, R. (2009).Children's Pastimes And Play In Sixteen Nations: Is Free-Play Declining? *American Journal of Play, 1:283-312*

Simelane, Z. P. (2006). Indigenous Knowledge on Tree Conservation in Swaziland. M.Sc Thesis University of the Witwatersrand, Johannesburg, South Africa.

Somnasang, P., and Moreno-Black, G. (2000). Knowing, Gathering and Eating: Knowledge and Attitudes About Wild Food in An Isan Village in Northeastern Thailand. *Journal of Ethnobiology, 20*:*197-216*.

Sugiyama, M.S. (2017). Oral Storytelling as Evidence of Pedagogy Forager Societies. Frontiers in Psychology, 8.

Tian, X. (2017). Space and Personal Contacts. Cross-Group Interactions Between Mainland and Local University Students in Hong Kong. *Journal of Social and Personal Relationships,* [Online], https:// doi.org.10.1177/0265407517718967.

Tuan, Y. (1978). Children and the Natural Environment. In Altman, I. and Wohlwill, J.F. (Eds.), *Children and the Environment. Human Behaviour And Environment. Advances in Theory and Research* (Pp*5-32*), New York. London: Plenum Press.

Tuwe, K. (2016). The African Oral Tradition Paradigm of Storytelling as A Methodological Framework: Employment Experiences for African Communities in New Zealand. In: African Studies Association of Australia and The Pacific AFSAAP) Proceedings of the 38th AFSAAP Conference, 21st Century Tensions and Transformations in Africa.

Wyndham, F. S. (2010). Environments of Learning: Rarámuri Children's Plant Knowledge and Experience of Schooling, Family, And Landscapes in The Sierra Tarahumara, Mexico. *Human Ecology, 38*: *87-99.*

Zarger, R. K. (2010). Learning The Environment. In D. F. Lancy, Bock, J. C., &Gaskins, S. (Ed.), *The Anthropology Of Learning In Childhood*(Pp. 341): AltaMira Press.

Zent, S. (2001). Acculturation and Ethnobiological Knowledge Loss among the Piaroa of Venezuela: A Demonstration of a Quantitative Method for The Empirical Study of Traditional Ecological Knowledge Change. In: Maffi, L (Ed), Biocultural Diversity: Linking Language, Knowledge and The Environment (Pp 190-211), Smithsonian Institute Press: Washington, DC.