Impact of the preschool program on the socio-connective variables developed by the beneficiary children: the case of rural Morocco

Soumia Ettahri
PhD student
Faculty of Law, Economics and Social Sciences
Ibn Toufail University Kénitra, Morocco
Laboratory of Economics and Management of Organizations
soualae@gmail.com

Rachid Hasnaoui
Professor
Faculty of Law, Economics and Social Sciences
Ibn Toufail University, Kénitra
Laboratory of Economics and Management of Organizations
rachid3c@gmail.com

Abstract

Early childhood is a crucial phase in the construction of the individual. It is a period of rapid development that leads to the acquisition of a battery of skills on which future physical and psychological constructions will be based. Investments in early childhood are effective when they begin as early as possible. This means starting with the children at an early age to ensure that they benefit fully from educational opportunities and are well prepared for parenthood later in life. The purpose of this study is to assess the impact of early childhood education programs. The context chosen is public preschools, located in rural areas of Morocco. This work proposes a sequential methodology based on a conceptual analysis based on the SOR paradigm "Stimulus-Organism-Response", and an empirical methodology based on estimation by structural equations. Thus, the results of this work confirm the existence of a positive and significant relationship between the components environment of the preschool program and the skills acquired by the beneficiaries of its programs. Therefore, the results argue for the generalization of preschool education in rural areas with the support of public provision. Providing preschool education to those currently excluded is considered an efficient and equitable investment.

Keywords
Preschool structures, Preschoolers, Structural equation, S.O.R Paradigm and Acquired Skills.

1. Introduction
Currently, governments recognize the importance of investing in early childhood development programs. Positive development in early childhood will have an effect through the second most critical window of opportunity, adolescence. Not only do investments continue throughout the life cycle, building on the fundamentals established in the early years, but cross-cutting investments in health and nutrition and learning reinforce each other for greater impact.

Note that millions of children around the world are missing out on the opportunities that quality early childhood development can bring. In the Moroccan context, public policies have focused on education and health, prioritizing the generalization of policies to promote preschool and the development of access to prevention and health care programs for all children from conception.

In spite of these efforts, the rates of the indicators related to the two sectors of health and education are alarming[1]. This is related to the problem of supply, given the low density and dispersion of the population, which makes the provision of services very difficult both logistically and financially.

To remedy this situation, and to ensure the future success of today's children quality preschool education is one of the best public investments. Students who receive a quality preschool education are better prepared for the transition to elementary school. The present study is part of this perspective. In this regard, and in order to contribute to the implementation of an effective education program, we will attempt throughout this study to identify, through multidimensional statistical analyses, the factors in preschool programs that can either promote or penalize their effectiveness.

1.1 Objectives

The purpose of this study is to identify the characteristics of the preschool program environment that have an impact on its performance.

The performance of the program is defined as the interaction, observation, and evaluation of the skills acquired by preschool children (cognitive and socio-emotional skills), as a result of their passage through the preschool system.

Our main contribution is to assess the impact of class size reduction policies (defined by a high educator/child ratio, small groups) on children's academic performance as well as the evaluation of the impact of the sizing of surfaces within preschool structures (defined by the number of classes and rooms within each structure) on the quality of the program.

2. Literature Review

This paper proposes a research methodology based on a conceptual analysis using the Stimulus- Organism-Response paradigm. We have used this approach because we believe that it provides a holistic and comprehensive theoretical framework for examining the overall state of the program and the organizational environment in which it operates. Note that the SOR paradigm was first introduced into Management Science by (Donovan and Rossiter 1982) in an article entitled "Store Atmosphere: An Environment Psychology Approach".

The intrinsic relationships between the three variables of the SOR model conceive the stimulus and the organization as the independent and the mediator variable, and the response as the dependent variable (Tehand et al. 2014).

Conceptualization of the organism in the SOR paradigm

By definition, an organism's response in the SOR paradigm is any internal response at Stimulus (Mehrabian and Russell 1974). These internal responses are necessary to elicit a behavioral response and are intended to avoid maintaining the relationship between the organism and the stimulus object (Sweeney and Wyber 2002).

This approach, which seeks to explain the influence of the organization, places more emphasis on the organizational structure (Belsky 2006). It shifts the discussion of internal factors that promote program effectiveness to factors inherent in the organization. Indeed, some authors believe that preschoolers behaviors in organizations change according to the situations in which they find themselves (Parcel and Dufur 2001), and that the characteristics of organizations are more likely to shape preschoolers acquired skills than their own characteristics (Reynolds 1994).

In this sense, this approach provides an interesting explanation of some of the arguments generally put forward by authors who limit themselves only two approaches based on the individual characteristics of program beneficiaries and actors to explain the effectiveness of the preschool program. Indeed, this approach emphasizes that the external

---

[1]the mortality rate of children under 5 years of age is 26 per 1000 births and the school enrollment of these same children is only 61.8% in urban and rural areas

environment of the program directly influences the skills and abilities acquired by preschoolers, which pushes them to acquire the societal, language and connective skills necessary for their transition to primary school or not.

Conceptualization of the response in the SOR paradigm
Several studies have shown that an individual's internal affective, cognitive states when exposed to the stimulus and agency of their interaction environment influence their behavior (Kim and Lennon 2013).

According to (Lebrun 2007), who emphasize that learning can no longer be reduced to acquiring specific knowledge in fundamental areas, learning also requires the implementation of skills that are part of the "to know how to become", that is to say set of values, attitudes and behaviours that make it easier for individuals to be more autonomous, more confident in their learning possibilities and more able to develop projects.

Applying the lessons of the SOR model, influences of the program's external and internal environment on the skills acquired by preschool children are used to develop a model to study how the skills acquired by children following access to the preschool program will develop following changes in that environment.

Let's remember that this model explains how a perceived change, a stimulus (S), leads to a behavioral intention, a behavioral response (R). However, this response is also impacted by an organism variable (O) (Van Laere 2018). On the basis of this conceptual construction, a series of distinct dependency relations can be predicted. The proposed conceptual model, is as follows (Figure 1):
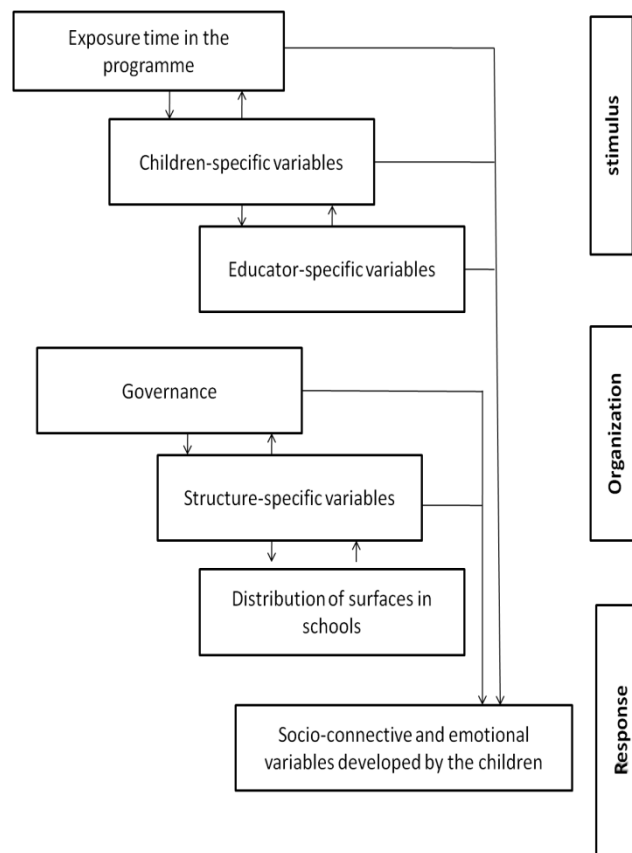

Figure 1 : Proposed theoretical model

The conceptual model, therefore, has three blocks. The first block refers to the Stimulus, which is a dimension that groups the different internal observable environmental aspects, the second block concerns an organization, which refers to the external environment of the program, and the last block involves a very important observable

dimension, the Response, which is defined by the number of skills acquired by the children benefiting from the program.

It should be noted that the Response dimension is measured by six learning areas: D1. Exploitation of self and environment, D2. Organization of thought, D3. Linguistic expression and communication, D4. Sensory-Motor Behavior, D5. Artistic and aesthetic aspects, and D6. Values and rules of living together.

3. Methods

The empirical methodology is based on a multivariate statistical analysis using the Principal Component Analysis technique for the exploratory analysis and an econometric analysis based on the PLS method for the confirmatory analysis to confirm or refute the research hypotheses.

The idea is to procced first by testing the data collected from the selected sample. The test consists of purifying and verifying the dimensionality of our measurement instruments using factorial analyses without and with orthogonal rotation of the VARIMAX type, eliminating the items that do not contribute significantly to the measurement of the indicators measuring the concepts. Then, it will be easy to test the research hypotheses by a confirmatory analysis of the measures based on new data, according to the approach of (Fornell and Larcker 1981) which is based on the criterion of discriminant validity of the constructs (AVE). We also mobilised a second approach, which is based on the calculation of the loadings Matrix.

The estimation and validation of the measurement model are carried out by the Partial Least Squares (PLS) analysis, which is well adapted to the theoretical model adopted for our research. This analysis concerns the estimation of composite variables known as formative variables. This approach has two major advantages in our opinion. The first one is related to its flexibility in terms of sample size and normality of the distribution, the second one is related to the capacity of this method to analyse very complex models, which corresponds perfectly to the nature of our model and our data.

The decision on which software to use was not a difficult one. We choose to "run" the model using Smart PLS software (Wong 2013), as this research tool offers a comprehensive set of tests, not least because of its user-friendly interface.

4. Data Collection

The source data for our study was collected from the Moroccan Foundation for the Promotion of Preschool (FMPS)[2].

The FMPS[3] was created in 2008, as a non-profit association, at the initiative of the Moroccan Higher Education Council.

The preschool structures, object of our parent population, concerns a total number of 3080 functional preschool structures under the 2020-2021 school year, and which covers twelve regions of Morocco, including 80 provinces and prefectures, 901 rural communities and 2960 villages.

The study population for the quantitative research was based on a non-probability and purposive sampling of 1180 preschools, 3271 preschoolers, 2539 educators, distributed across: 10 regions of the Kingdom, 43 provinces and prefectures, 424 rural communities and 1180 villages.
The methodology adopted to select the sample is as follows:
- Retain a confidence level of 95%.
- Retain a margin of error of 2%.

[2]The choice of the FMPS, is explained by the experience and know-how accumulated by the foundation in the development of preschool education in urban and rural areas throughout the Moroccan territory, and through the various partnerships made.
[3]The FMPS has developed and implemented a new preschool system that meets the standards of educational excellence, and accessible to all parents, regardless of income and offering a quality of reception, supervision and and offering a quality of reception, supervision, and teaching equally where verities located in the Morroco.

- Adopt a T-stat relative to the normal law which is 1.6448.

It should be noted that the FMPS carries out an evaluation of the skills acquired by the preschool children at the end of each semester for each school level, Middle and Great Section school.

5. Results and Discussion

Two complementary analyses were conducted during the empirical study. An exploratory analysis to explore the measurement instruments and a confirmatory analysis to affirm or refute the research hypotheses.

5.1 Numerical Results of the exploratory study

The calculations are performed using STATA version 14.2 software. This analysis is essential to be able to detect and verify anomalies concerning the uniformity of the data. For this purpose, a principal component analysis with rotation is used: VARIMAX with Kaiser normalization (orthogonal rotation). (This commonly used rotation method makes it simpler to remove items that affect the quality of the scale, it minimizes the number of variables with high correlations for a factor and thus improves the possibilities of interpreting the factors (Roussel 2005), (Table 1).

Table 1: Principal component analysis after rotation

Variable	Items	Definition	Abbreviation	Rotated components			Unexplained
				Component 1: External environment of structures			
External environment of the structures	Village with elementary school	Each village has only one structure, this item looks for structures housed in a primary school	EES1	0.6059			0.5688
	Village with Masjid[4]	Structures that are created in the form of the Masjid	EES2	0.5198			0.6827
	Village with koutab[5]	Structures that are created in the form of Koutab	EES3	0.6023			0.574
				Component 1: Typology of structures			
Typology of structures	Upgrading of the structures	Structures that have benefited from upgrading	TS3				0.9978
	Open of the structure	Open preschool structures	TS1	0.7069			0.3898
	Closed of the structure	Preschool structures that have been closed	TS2	-0.7061			0.3912
				Component 1: distribution of surfaces in schools	**Component 2: mode of distribution of the children in the structure**	**Component 3: Average number of children per educator**	**Unexplained**
M o d	Number of classrooms of	Average number of preschool	SA1		0.7012		0.04277

[4]Traditional preschool structure with a religious character

[5]Structure under the supervision of the Moroccan Ministry of Habous and Islamic Affairs for traditional preschool education

			Component 1: Societal skills acquired	Component 2: Language and Connective Skills acquired		Unexplained
the structures	children per classroom					
Number of classes of the structures	Average number of preschool children per class	SA2		0.6924		0.04143
Average number of children in class	Average number of preschool children per class	RE1	0.6579			0.07248
Average number of children in classroom	Average number of preschool children per classroom	RE2	0.6537			0.0742
Average number of children per educator	Average number of preschool children per educator	RE3	0.3396			0.1057
Average number of educators per structures	Number of educators per preschool structure	Nb éducateur par UP			0.8071	0.06464
			Component 1: Societal skills acquired	**Component 2: Language and Connective Skills acquired**		**Unexplained**
Competence assessment D1 : Exploitation of self and environment	Be willing to possess the tools of observation, self-discovery and environmental, and technological space	HLCA1		0.4461		0.7128
D2. Organization of thought	Be willing to possess the tools of thought organization, and construction of primary mental processes	HLCA2		0.6291		0.5027
D3. Linguistic expression	Be willing to acquire linguistic	HLCA3		0.6285		0.4956

and communication	and communication tools that can help your read and write					
D4. Sensory-Motor Behavior	To be willing to control one's movements (large and small gestures), to direct, organize, and execute them, from different body positions, and to achieve sensory-motor coherence	HSA1	0.5013			0.6616
D5. Artistic and aesthetic aspects	To be willing to receive and accept artistic, and aesthetic products and to acquire the basic tools of artistic expression	HSA2	0.5270			0.6259
D6. Values and rules of living together	To be willing to receive and accept religious, and national values and the rules of common life	HSA3	0.6666			0.4239

Seven constructs were selected, namely: External environment of structures, typology of structures, distribution of surfaces in schools, mode of distribution of the children in the structure, average number of children per educator, societal skills acquired and language and connective skills.

5.2 Numerical Results of the confirmatory study

The aim of this study is to estimate the quality of the research model and to evaluate the quality of the overall model.

We first proceeded to the convergent validity for the measurement of the existence of strong correlation intensity between the manifest variables of the same instrument (latent variable) measuring the same phenomenon (dimension), this result, allows admitting the convergent validity, (Table 2).

Table 2: AVE value of constructs

Factors	Average Variance Extracted (AVE)
Distribution of surfaces in schools	0.960
External environment of the structures	0.464
Average number of educators per structures	1.000
Mode of distribution of the children in the structure	0.790
Typology of structures	0.608
Variable Mode of operation of the structures	0.413
Language and Connective Skills acquises	0.433
Societal skills acquired	0.421

Then we proceeded to the validation of the structural model, this procedure retains a graphical scheme Path related to the structural equations (Path Weignting Scheme), this validation was carried out by using the Bootstrap method, (Figure 2).

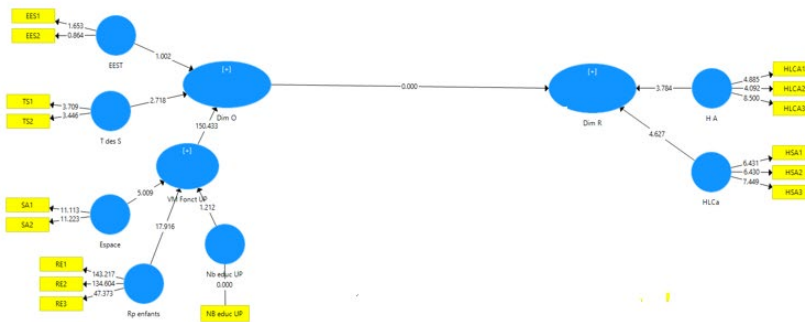## 5.3 Graphical Results of the confirmatory study

Figure 2 : The statistical significance of parameters the global model after Bootstrap

Following this step, the elimination of the Items whose Bootstrapping value is lower than 1.96 is mainly iterative. It is therefore necessary to first remove the Item(s) whose value is lower than this rate, and then proceed to the estimation of the Bootstrapping.

The final result obtained allows us to retain the following global model, (Figure 3):
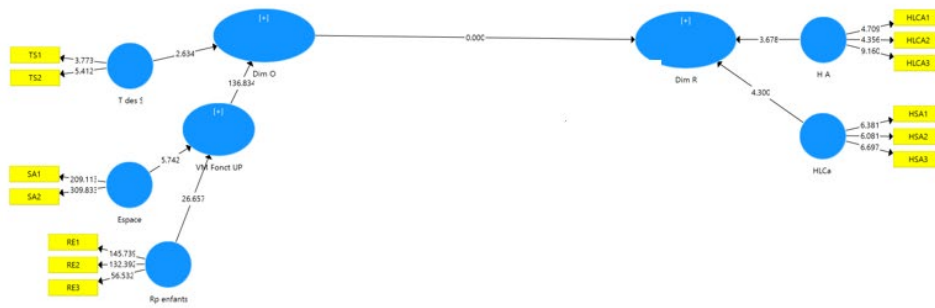
Figure 3 : Bootstrapping after spinning

It should be noted that after cleansing, the factor concerning the external environment of the structures was removed.

In a second step, the quality of the global model was evaluated through the indicator of the coefficient of determination R^2, then the hypotheses of the research specific to the global structural model were tested, (Table 3).

Table 3: Assessing the explanatory power of the structural model

Dimension / Variable	R²	R Adjusted square
Dimension Organism	0.999	0.999
Dimension Response	0.999	0.999
Variable mode of operation structure	0.999	0.999

The coefficient values of the construct determinations post value of 0.999. This suggests that these values are very acceptable and therefore reflect a good quality of the relationships between constructs.

5.3 Validation

For the testing of the research hypotheses of the overall structural model, only the two dimensions (Organism, Response) are concerned. It should be remembered that in this article the results of the tests of the Stimulus dimension will not be presented.

Its tests concern a single linear hypothesis relating to the relationship between the organization dimension and the response dimension (HypothesisH_1^0) and four sub-hypotheses concerning the impact of the concept (Organism) on the skills acquired (Response), namely:

- (HypothesisH_{11}^0): relationship between acquired skills and the dimensioning of surfaces of the preschool structure.
- (HypothesisH_{12}^o): the relationship between the typology of the structure and the skills acquired.
- (Hypothesis H_{13}^o): the relationship between the distribution of preschool children within the school structures and the skills acquired.
- (HypothesisH_{14}^O): the relationship between the mode of governance adopted and the social skills acquired by preschool children.

The Figure 4 gives us an overview of the linear relationships after rotation with the Bootstrapping software.
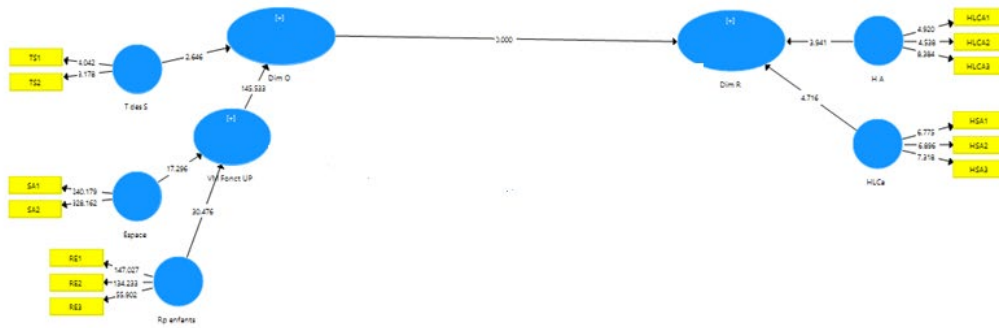
Figure 4: Bootstrapping with linear relationships

The validation of the research hypotheses, specific to the overall structural model is presented in the following Table 4.

Table 4 : The results of the tests of the hypotheses concerning the organism dimension and the response dimension

Hypothesis	Factors	Parameter	T-Stat	P value	Result	
Hypothesis H^O_1	Language and Connective Skills acquired	0.689	4.854	0.000	Accepted	Validated hypothesis
	Societal skills acquired	0.620	4.046	0.000	Accepted	
Hypothesis H^O_{11}	Distribution of surfaces in schools and mode of operation of structures	0.477	18.729	0.000	Accepted	Validated hypothesis
	Mode of operation of structures and the organizational dimension	0.989	144.635	0.000	Accepted	
Hypothesis H^O_{12}	Typology of structures and the organizational dimension	0.076	2.720	0.007	Accepted	Validated hypothesis
Hypothesis H^O_{13}	Distribution of preschool children and mode of operation of the structures	0.825	31.312	0.000	Accepted	Validated hypothesis
	Mode of operation of structures and the organizational dimension	0.989	144.635	0.000	Accepted	

The analysis of the results showed us that the model supports a number of hypotheses and that the remaining ones could not be tested, since the items concerning them were suppress during the exploratory analysis, such as the hypothesis H^O_{14} concerning the existence of a significant relationship between the type of governance established and the competences acquired by the preschool children. Nevertheless, it should be recalled that for a good part of our hypothesis, the results are in line with our expectations and consistent with the literature review and results previously obtained by other researchers. It would seem that the organization dimension has a positive and significant impact on the response dimension H^O_1. Therefore, the external and internal environment of these structures has a positive impact on program performance.

To this end, the validation of the hypothesis H^O_{11}, allowed us to admit that the distribution of surfaces has a positive and significant influence on the expected results of the preschool programme, which is why the decision makers in charge of the execution of this programme at the central level must establish directives and standard regulations concerning the dimensioning of surfaces to be applied for each new structure implanted and or fitted out, specifying the number of classrooms and rooms to be provided.

The second hypothesis H^O_{12} analysed was validated in the confirmatory analysis, and that concerning the relationship between the typology of the structures defined by the functional nature of their structures and the response dimension, the result obtained allows us to confirm the positive, but not very significant impact of the typology of the structures on the expected results of the preschool programme. It should be noted that the item "upgrading of the structures", one of the components of this factor, if maintained during the exploratory analysis, would increase the significance of the relationship between the two factors making up this hypothesis. In other words, as decision-makers, we will either direct our projects towards the construction of new preschool facilities or rather open up to projects for the development or upgrading of existing facilities.

The third and final test concerns the component of the distribution of preschool children in H^O_{13} preschool structures. The validation of this hypothesis allows us to admit the role that the mode of distribution of children within the preschool structures plays on the expected results of the preschool programme, which is consistent with the existing literature (Vandell and Wolfe 2000). Indeed, the adoption of small class sizes optimises the positive effects of the preschool programme, that is, opting for a high staff to child ratio, small groups of preschool children per facility, allow preschool children to demonstrate better the cognitive and language skills acquired. Policy makers need to engage in significant class size reduction policies in the least advantaged schools, and these results tell us that this policy, although costly, is likely to reduce the achievement gap when implemented in a targeted and intensive manner.

5.4 Proposed Improvements
The main orientations drawn from the results of the studies carried out are as follows

- Reduce class sizes and favour the lowest teacher-child ratio.
- Establish a standard reference for the size of the surface area within its structures.

6. Conclusion
As a conclusion, and through the research within the SOR paradigm, we have accepted that there is a positive and significant relationship between the internal and external environment of the programme and the skills acquired by the preschool children. This relationship is significant for each individual construct. That is, the variables measuring the internal and external environment are significant.

The results argue for the widespread provision of preschool education, particularly in rural areas, with support for public or community provision. Offering preschool education to those currently excluded is considered an efficient and equitable investment.

In this regard, it should be noted that policies to improve equitable access to quality preschool education in rural areas, particularly for girls aged 4-6 years, are very limited and, if they exist, are most often offered in traditional structures. To remedy these shortcomings, government policies must expand the provision of quality preschool education services that promote safety, inclusion and sustainable outcomes, either through the creation and/or equipping of preschool facilities in areas of need, and according to standards that guarantee the quality, accessibility and sustainability of its infrastructure and teaching materials, and also through actions to strengthen teachers qualifications and working conditions, or awareness raising and information sessions that promote playful learning for young children at home, which supports the stimulation of learning in the family environment and which, in the event of local school closures (such as in the case of natural disasters or pandemics), offers a means of mitigating learning losses.

Care should also be taken that tools are in placeto allows to maximise the impact of preschool reform on access to better quality education for all children, notably by (i) continuing the expansion of a network of high-quality pre-schools, (ii) improving the quality of educational processes and focusing on pedagogical practices in the classroom, and (iii) improving the measurement of children's cognitive and non-cognitive development.

The present status of preschool educators must be reviewed in order to enhance and perpetuate the profession of educator, especially in rural areas, by providing bonuses to staff working in these precarious environments.

References
Belsky, J. Early childcare and early child development: Major findings of the NICHD study of early childcare. *European journal of developmental psychology*, vol. 3, no 1, p. 95-110, 2006.
Donovan, R. J., Rossiter, J. R., Marcoolyn, G., and Nesdale, A. Store atmosphere and purchasing behavior. *Journal of retailing*, vol. 70, no 3, p. 283-294, 1994.
Fornell, C., and Larcker, D. F. Structural equation models with unobservable variables and measurement error: *Algebra and statistics*. 1981.
Kim, J., & Lennon, S. J. Effects of reputation and website quality on online consumers' emotion, perceived risk and purchase intention: Based on the stimulus-organism-response model. *Journal of Research in Interactive Marketing*, 2013.

Lebrun, M. Pedagogical theories and methods for teaching and learning: what place for ICT in education? *De Boeck Supérieur*, 2007.

Mehrabian, A., and Russell, J. A. The basic emotional impact of environments. Perceptual and motor skills, vol. 38, no 1, p. 283-301, 1974.

Parcel, T. L., & Dufur, M. J. Capital at home and at school: Effects on student achievement. *Social forces*, vol. 79, no 3, p. 881-911, 2001.

Reynolds, K. M. et Holsten, E. H. Relative importance of risk factors for spruce beetle outbreaks. *Canadian Journal of Forest Research*, vol. 24, no 10, p. 2089-2095, 1994.

Russell, J. A., and Mehrabian, A. Distinguishing anger and anxiety in terms of emotional response factors. *Journal of consulting and clinical psychology*, vol. 42, no 1, p. 79,1974.

Roussel, P. Methods for developing survey questionnaire scales, n° halshs-00008920, 2005.

Sweeney, J. C., and Wyber, F. The role of cognitions and emotions in the music-approach-avoidance behavior relationship. *Journal of services marketing*, 2002.

Tehand, G. M., Kalidas, V., and Zeeshan, M. Personality as a Moderator of SOR Model. *Review of Integrative Business and Economics Research*, vol. 3, no 2, p. 67, 2014.

Van Laere, P. Une approche psychosociale de la protection de l'environnement: perspective temporelle et distance psychologique. *Thèse de doctorat Sorbonne Paris* Cité. 2018.

Vandell, D., and Wolfe, B. Childcare quality: Does it matter, and does it need to be improved? University of Wisconsin-Madison, Institute *for Research on Poverty*, 2000.

Wong, K. K. K. Partial least squares structural equation modeling (PLS-SEM) techniques using SmartPLS. *Marketing Bulletin*, vol. 24, no 1, p. 1-32, 2013.

Biography

Vandell, D. is chancellor and Professor of Education and Psychology at the University of California Irvine, is a Developmental Psychologist, Expert in Early Childhood Development. She is the Founding Dean of the School of Education at UC Irvine.

Russell, A.R. is an American Psychologist Whose Work Focuses on Emotion. En 2009, he Created the of the Most Influential Models to Explain the Effect of Physical Environment on Human Behavior. The Model Posits that Emotional Response Acts as a Mediator in the Relationship Between Environmental Stimuli and Human Behavior.

Mehrabian, A. is a Professor of Psychology at the University of California at Los Angeles. He has Constructed a Number of Psychological Measures, Including the Arousal Seeking Tendency Scale. Findings on Inconsistent Messages of Feelings and Attitudes, Percentages Relating to the Relative Impact of Words, Tone of Voice and Body Language When Speaking.

Belsky, J. is an expert in the field of Child Development and Family Studies. His Areas of Expertise Include the Effects of Child Care, Parent-Child Relationships in Early Childhood, and the Etiology of Child Maltreatment. He is a Founding Researcher and Contributor to the NICHD Child Care and Youth Development Study (USA) and the Sure Start National Evaluation (UK).