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BETWEEN PUPILS AND THEIR LITERACY SKILLS: A ROUTE TO PERFORMANCE VIA PRINT IMMERSION STRATEGY IN LAGOS STATE

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Abstract

The effectiveness of a print immersion strategy in relation to students' literacy skills in four primary schools in Lagos State, Nigeria was investigated using a quasi-experimental design and three specific research questions. A total of 120 randomly selected participants comprised the sample from the population of students at the four sampled schools. An achievement test developed by the researcher that assessed students' literacy skills was used to collect the data for this study. A reliability coefficient of 0.78 was calculated for the achievement test based on results from the test-retest method. It was determined from the results that there was a positive correlation between the use of print immersion strategy and students' academic performance. Mean-different values were used to answer research questions one through three. It was recommended that teachers implement print immersion strategies to enhance student literacy; government and school proprietors should develop training and retraining workshops to provide teachers with resources to successfully implement print immersion strategies for enhanced educational outcomes.

Introduction

The academic performance of pupils will be largely determined by what the teachers or caregivers use to educate them at the preschool level and primary level up until they become independent academically; teachers/caregivers that do not provide pupils with access to visual aids during the instructional process like print immersion will also not be able to provide the pupils/children with the developing trends in academic achievement. Holistically, a pupil is defined as a total being who continues to grow from infancy to adulthood and subsequently language will grow and develop for the child, as language does not exist on its own but rather is entwined with the development of the entire child in physical, emotional-social and mental health (Mangal, 2009). When considering the holistic development of the child, language is an essential part of that development. The child develops through a combination of genetics and environmental factors over time; children have a gift from the moment they are born, to communicate through their exploration and interaction with the people and things in their worlds.

Machado et al. (2011) feel that the characteristics and abilities that children inherit from their parents and the interactions that they have with their environment will help define and shape the language development of the child; this is due to the fact that the social and educational status of the pupil's parent will define the language the pupil learns. Mafikuyomi & Odekunle (2024) agree that print immersion will provide the children with a useful way to develop their level of literacy when it is used as a teaching aid while transferring knowledge at any level of education. According to Obanya (2014), 'The process of learning begins when a child is born and continues for the rest of their lives; all

children will continue to develop their learning abilities for as long as they are alive; this will be evidenced during the preschool years and will vary in terms of the amount of development'.

Ibhaze (2016) believes that preschool education is a vital part of a child's initial education and development, whether the education is formal or informal, and occurs through attendance at an organized institution of learning from the ages of 1 to 5 (or 6) prior to entering into primary school; preschool education optimally serves the following: intellectual, emotional, physical, social-caphael, aesthetic, motor, health and nutritional development for all children. Significantly, the effect preschool education will have on pupils' performance in school will be present at all levels of schooling including primary, secondary and post-secondary (Nakpodia, 2003).

Children generally learn the language of their immediate environment unconsciously without any stress and formal teaching. They pick such language just by hearing it spoken by the users of that language and their attached meaning to symbols and features within their environment. presently, icons serve a more utilitarian purpose represented by print immersion. The concern of this paper is the conservatism often confronted by most teachers, especially in primary school education. Most caregivers are unwilling to embrace innovative and modern strategies in teaching at early childhood care education (ECCE) classrooms. In some cases, teachers still operate the conventional traditional classroom, while limiting themselves to the use of print immersion. The challenges to effective teaching and learning techniques and other factors serve as the pertinent problems that this paper attempts to solve.

Socio-economic Status or SES refers to the positioning of an individual or family in a hierarchy of social events depending on access to wealth, prestige and power (Willms & Tramonte, 2015 states Mueller & Parcel, 1981). SES is a measurement of access to resource from family, such as financial and human capital, but also social and cultural capital, as well. The SES status of a household or family impacts the functioning of the child and their physical and mental well-being over their lifetime (Morgan, Farkas, Hillemeier and Maczuga, 2009 children in families of lower SES develop their academic skills at a slower rate than those in families of higher SES).

Lower SES levels in children are associated with poorer mental development, poorer language skills, poorer memory, poorer socio-emotional processing, and ultimately, poorer income and health, as adults. In many cases, children from lower-income communities have little access to the materials and resources necessary to improve their academic achievement and ineffectually developing their social-emotional skills due to the lack of adequate schools to service children (e.g., drop-out rates, lack of funding) has resulted in children failing to meet the academic standards developed by their communities, prior to entering formal schooling, there are documented literacy deficiencies, which are related to families with lower socio-economic status children.

Further there are differences in acquisition of fundamental reading acquisition skills (phonological awareness, vocabulary, and oral language development) between children with lower and higher SES at the onset of formal schooling (Cowden, Wheldall, & Beaman-Wheldall, 2013), and home literacy environments affect the early reading ability of children as do the number of books and parental distress experienced (Aikens & Barbarin, 2008). There is broad consensus that children require family support to maximize their success in school. Family engagement in education is a goal that all levels of governance and families' organizations throughout the world are working towards (Scott, 2003). Families are not only expected to support their child do well in school but are also expected to contribute to school improvement and democratizing school governance.

Statement of the Problem

Research conducted by Wright (2016) and Oshinaike and Adekunmisi (2012) concludes that there is a dramatic decline in the levels of literacy of the students that they measured using a variety of standardized assessments and tests made by their teachers. The systemic decline in literacy is attributed to poor practices of instructional delivery used by parents which resulted in an inability to motivate children to learn on their own or to interact socially with other children or family members or to relate to the materials that children are presented with during instruction. Thus, the study will examine the impact of print immersion on the literacy level of primary school children in Lagos State.

Objective of the Study

This paper will explore how print immersion impacts the economic standing of students who read; therefore, the aim of this examination is twofold:

- 1) To explore how print immersion teaching affects students' reading levels when compared to conventional classrooms.
- 2) To explore whether a child's ability to read is determined by their socioeconomic background.
- 3) To determine whether both teaching methodologies used by the classroom teacher and the child's family background influence the development of a child's reading skills.

Research Questions

The following questions guided the research:

What is there a mean difference between pupils whom are exposed to print immersion strategies and those from conventional classrooms regarding their literacy skills performance?

What is their mean difference for pupils' socioeconomic status relative to their literacy skills performance? And

What is mean difference in the interaction between the teaching strategy employed and pupils' socioeconomic status based on the students' literacy skills performance?

Null Hypotheses

The study employed the following hypotheses for guidance:

H01: There is no difference between the treatment of pupil literacy skills when using print immersion strategies compared to traditional methods.

H02: Pupils' socioeconomic status does not influence their literacy skill performance.

H03: Teaching strategies and socioeconomic status do not interact to create a variation of pupil literacy performance among pupils.

Social Constructivism Theory

The study relies on Vygotsky's 1934 theory of social constructivism interaction (SCIT) to describe and better understand the topic. The proponent of this theory believes children make meaning and develop knowledge mentally through the interaction of all aspects of learning and the environment in which they learn. Children will learn through trying to make sense of something on their own, with their caregiver helping guide them in the process. Through activities and social interaction, the child's language develops based on the environment in which the child grows; thus, both play an important role in the learning process. Constructivist learning describes a person's learning as an activity where a learner can actively and independently apply their concepts, rules, and generalizations to a practical situation when it is acceptable to do so.

This means children produce meaning and knowledge through interactions by experiencing something and generating meaning based on their understanding of that experience. Therefore, coursework for pupils will have the potential to enhance learning and develop independently with the assistance of their teacher as an aide toward meeting their educational goals; however, the teacher will not pass on knowledge or experience based only on theory; this is what learners benefit from, and the teacher must provide ways for them to learn through experiences. The kindergarten environment consists of multiple entities, including children, teachers, principals, support staff, parents, resources, curriculum, facilities, funding, rules and regulations, and educational policy. Each of these entities influences other entities, thereby creating a continually evolving kindergarten environment.

In addition to the kindergarten environment, there are numerous exogenous factors that influence the kindergarten learning environment: surrounding community, surrounding kindergarten, local educational authority, and community socioeconomic status and beliefs. The development of kindergarten curriculum and classroom-based activities using ICT may be one of the most important factors for the evolution and change of teaching and learning. Vygotsky (1978) defined the zone of proximal development (ZPD) as the distance between the child's existing level of development as defined by the ability to independently solve a problem and the level of potential development as defined by the ability to solve a problem when assisted by an adult or more knowledgeable peer. The ZPD describes the acquisition of new knowledge and information via assistance from another person, such as a teacher, peer, or any adult who serves as a mediator between a learner and the new knowledge; thereby, this person tries to support the learner in achieving a goal beyond what could be achieved independently. The learning process, therefore, is a social or cooperative process resulting from interacting with multiple individuals (Rogoff, 2003).

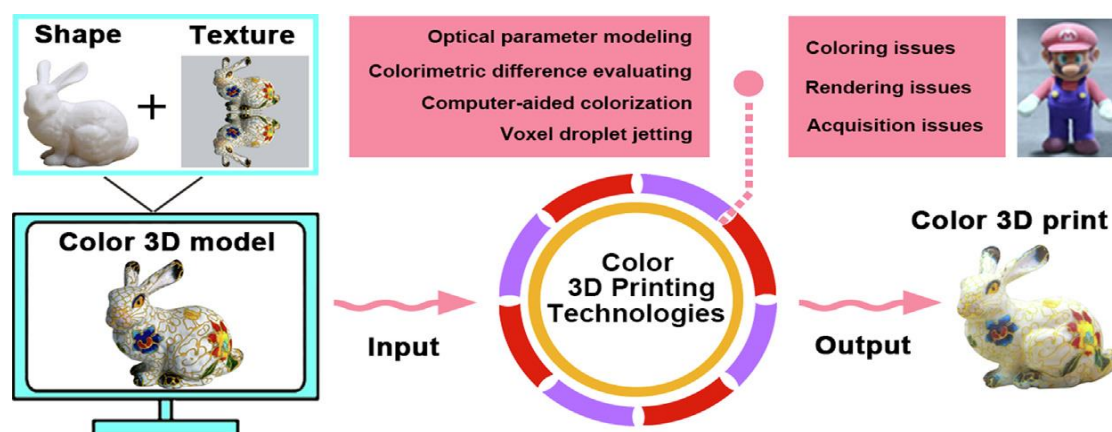
As described above, SCT outlines the support provided by teachers, adults, and peers as mediating support required to develop the learner's ZPD (Williams & Burden, 1997). The ZPD depends on how much support, intervention, and assistance is available from an adult or peer, including teachers, in helping to develop the learner through collaborative or cooperative activities. The concept of ZPD emphasises the interdependence of learners and indicates that social processes are critical to the creation of all forms of knowledge (Xu et al., 2005). The methods used by teachers to develop a learner's capability to use knowledge based on experience are considered "scaffolds" (Vygotsky, 1978). The scaffold concept illustrates a teacher's or expert's responsibilities to assist novice learners and build a novice's ability to construct his or her concept of learning. This describes an effective instructional method (Fleer et al., 2009).

Concepts of Print Immersion

Hydrographic printing is a widely-used method in many industries for putting coloured prints on a thin film, then applying them to a 3D manufactured object, which allows for a high rate of surface colour quality on a wide variety of materials, but one disadvantage of hydrographic printing is that it does not register the colour and texture to the complex geometry of the surface accurately. Hydrographic printing (also called hydro printing or water transfer printing) is a well-known process of transferring images of colours from some sort of artwork source to the 3D surface of an object. According to Yuan, Chen, Li, Prautzsch, and Xiao (2021), 3D printing is a new way of creating customised products and objects. Print immersion or 3D printing techniques have been used in various places around the globe, such as: Aerospace engineering, automotive electronics, biomedical engineering, cultural creativity, and geographic information to produce highly sophisticated and special purpose parts and components with a high level of performance (Fullerton

& Frodsham, 2014; Wohlers Report, 2017; Amit & Kellen, 2018; Safai et al., 2019; Elkhuizen et al., 2019; and Mafikuyomi, 2023). For a number of years, the automotive industry has relied on hydrographic printing technology for a variety of products, which may include the interior of airplanes; the exterior of automotive accessories such as wheels and helmets; and the exterior of mobile phones; and may be found on plastic, wood, steel, and ceramic parts.

Today, you can see this process used to print carbon fibre, wood grain, and geometric designs on some vehicle interiors all produced using hydrographic printing process using production lines.



Source: Yuan, et al. (2021)

Figure 2.15 Colour 3D printing technologies

The types of hydro-graphic printing or print immersion include

Manual hydrographic printing.

In Manual Hydrographic Printing, all steps occur manually by a skilled operator. It is suitable for stochastic colour design, inaccurate and Job type of production.

Examples are as follows:



Automatic print immersions

Automatic Hydrographic Printing is similar to manual hydrographic printing, but some steps occur automatically except placing the coloured film in a water tank, spraying reagents and immersing. It is also applicable for stochastic colour patterns and mass production. Examples of Automated Print Immersions are as follows:



Computational print immersions

Computational Hydrographic Printing predicates how the coloured films will expand when the three-dimensional object is immersed. In this technique, the three-dimensional surfaces to be printed are first simulated on a computer (Mehra, 2017).

Examples of computational print immersions are as follows:



Applying intricate patterns to objects through an aqueous medium, which has been pre-printed with the visual design, is called immersion printing. Immersion printing works on the principle that the substrate or object can be coated with the floating film of ink that is on the surface of the water by dipping the object into the water. The technique may be referred to by several other names; for example, it is often called water transfer printing, hydrographic printing and/or water marbling (Evangelou & Sylva, 2007). There has been much discussion between researchers regarding the significance of teaching children about print; however, there has been little research completed regarding how young readers understand print during the initial stages of reading development.

Methodology

The investigation utilized a quasi-experimental research design. The research involved both collecting and analyzing quantitative data in one study. There were two intact groups of students in Lagos State: an Experimental or print immersion strategy group, and a Control or Conventional group. The design of the research used a Two-Groups Design which utilised two different methods of instruction a Print Immersion Strategy and a Conventional Method of Instruction, as well as Three different Levels of Socioeconomic Status (High, Medium and Low) to assess Literacy Skills of both groups. The Target Population for the research was all Primary School Students in Lagos State. However, the specific sample of participants was Basic 2 Students, who are more likely to have developed Reading Skills, than Basic 1 and Basic 3 Students. For this research, Simple Random Sampling was used to select a total of 30 of the 120 students who participated from a sample of four schools that were included in this study. The research for this study was conducted using the Achievement Test for Literacy Skills (ATLS). Prior to starting the research, the ATLS was validated through the use of expert judgment through the field of Education in order to establish the face validity of the test. The test reliability was established using the Test-Retest Method and found to have a Reliability Coefficient of .78. The participant data for the analysis was analysed based on the specific Research Questions developed for the study and subjected to analysis using ANCOVA.

Research Question 1: What is the Mean Difference of Literacy Skills performance of Students exposed to Print Immersion Strategies vs. Those Students taught using Conventional Classrooms?

Table 1: Comparison of Descriptive Statistics of Control Group Classrooms vs Print Immersion Strategy Classrooms for Literacy Skills Performance.

Treatments	N	Posttest Mean	Pretest Mean	Mean Difference
Experimental group	60	15.65	11.60	4.05
Control group	60	14.96	12.65	2.31
Total	120	14.58	12.26	2.32

Table 1 indicates that participants in the experimental group (printed immersion) outperformed participants in the control group (average difference = 4.05). The average difference was lower for the control group (2.31).

Second Research Question: What is the mean difference with regard to students' socioeconomic status and their literacy skills?

Table 2 shows the descriptive statistics for students' socioeconomic status and their literacy skills.

Socioeconomic Status	N	Posttest Mean	Pretest Mean	Mean Difference
Low	51	14.96	12.65	2.31
Middle	41	14.32	11.85	2.47
High	28	14.25	12.14	2.11
Total	120	14.58	12.26	2.32

Table 2 also displays the performance of the mid SES group was higher than low SES and high SES groups; where average scores differed by 2.47, 2.31, and 2.11 respectively. 3rd research question discusses the interaction effects of SES on literacy performance based on teaching strategies used with pupils.

Table 3 contains summary statistics for each SES group and teaching strategy grouping; showing that these groups did not perform equally

Treatment	Socioeconomic status	N	Posttest Mean	Pretest Mean	Mean Difference
Experimental	Low	19	15.42	15.26	0.16
	Middle	27	15.96	14.19	1.77
	High	14	15.57	14.29	1.28
Control	Low	32	14.78	11.00	3.78
	Middle	14	11.14	7.36	3.78
	High	14	12.93	10.00	2.93
Total	Low	51	14.96	12.65	2.31
	Middle	41	14.31	11.85	2.46
	High	28	14.25	12.14	2.11

Based on Table 3, the participants within the control group with low and moderate socio-economic status scored the highest, both at a score average of 3.78. Next were the participants at high socio-economic status from the control group with an average score of 2.93 and then the participants from the experimental group with moderate socio-economic status having an average score of 1.77. The participants from the experimental group who were in the low socio-economic status group had the lowest performance, with an average score of 1.28. This shows that the participants within the moderate socio-economic status group from all participants achieved the highest average score of 2.46 whereas the participants in the high socio-economic status group from all three groups received the lowest average score of 2.11.

Hypothesis One: There will be no statistically significant difference between the scores of primary students receiving print immersion strategies for improving their literacy skills and their counterparts who received conventional instruction for improving their literacy skills.

Table 4: ANCOVA of pupils' literacy skills performance in experimental and control groups

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	714.64 ^a	6	119.11	7.54	0.00	0.29
Intercept	344.89	1	344.89	21.84	0.00	0.16
Pretest	435.50	1	435.50	27.57	0.00	0.20
Socioeconomic Status	0.37	2	0.19	0.01	0.99	0.00
Group	4.91	1	4.91	0.31	0.58	0.00
Socioeconomic Status * Group	46.86	2	23.43	1.48	0.23	0.03
Error	1784.69	113	15.79			
Total	27991.00	120				
Corrected Total	2499.33	119				

a. R Squared = .286 (Adjusted R Squared = .248)

The treatment given to pupils in both groups regarding their literacy (the print immersion strategy versus the control) was significant based on results that showed a large F-value of 21.84 ($p < 0.05$). In addition, the results showed that almost 16% of the difference in pupils' literacy skills (reflecting moderate effect size) can be attributed to the treatment given in the print immersion strategy classrooms as compared to those in the control group. Therefore, Hypothesis One, which suggested that there would be no significant differences in the area of treatment for literacy skills, was rejected.

As it relates to Hypothesis Two (socioeconomic status will not significantly impact pupils'), the research findings indicated that there was not a significant effect of socioeconomic status on literacy skills; the large F-value (0.12) indicated that the 0.00 eta² value regarding the effect of socioeconomic status on literacy skills. Therefore, Hypothesis Two was accepted.

Hypothesis Three (there is no interaction effect between teaching strategy and socioeconomic status on pupil literacy skills) was also rejected as the F-value of 1.48 indicates no significant interaction between teaching strategy and socioeconomic status on pupils. The eta² value (0.03) indicates that the 3% difference in the literacy performance of pupils was attributed to the lack of difference in the interaction effects between teaching strategy and socioeconomic status. As a result, Hypothesis Three must be accepted.

Discussion of findings

Using print immersion strategy for the intervention with Year 5 pupils, the research found that the pupils' literacy skills, as measured by a test, improved when utilizing the print immersion strategy compared to using traditional classroom methods. The socioeconomic status of the pupils significantly affected their literacy skills, whether they were in a print immersion or traditional classroom. The results of this research study align with previous research on the use of print immersion to enhance the literacy skills of pupils (Bickel et al., 2010; Stava et al., 2012; Skouras et al., 2013).

Furthermore, during the intervention, pupils in the print immersion classroom (experimental group) were more familiar with the use of images than pupils in the traditional classroom (control group), no matter what their socio-economic status was. Furthermore, when comparing the two groups, pupils from the experimental group exhibited relatively equal averages to those of the control group according to their socio-economic status. Therefore, there was no statistical significance in the effects of the pupils' socio-economic status between the experimental and control groups on the pupils' literacy skills. This was contrary to the findings of other researchers (Berkowitz et al., 2017; Lawson & Farah, 2017), who suggest that family socio-economic status is responsible for most variations in pupil performance, and that the family is more important than the school in determining a pupil's academic achievement.

Also of importance is the finding that there was no interaction effect between the socio-economic status of the pupils and their teaching methods as a family. The lack of a significant interaction effect between socio-economic status and the pupils' teaching strategy was due to the fact that the gifted pupils in the sample; regardless of their socio-economic status; generally exhibited better academic performance than non-gifted pupils, thus influencing the overall results. This conclusion challenges the findings of Ren and Xin (2013), who state that there is a significant positive relationship between socio-economic status and academic success from ages 0 to 17, and also that the relationship still holds true for all races.

Conclusion

The research investigates how print immersion methods impact the success of primary school students in reading and writing. Results indicate that students' reading and writing skills show improvement by using print immersion methods compared to traditional classroom approaches; however, students' income level or socioeconomic status does not impact their performance in both types of classrooms. It can be concluded from the findings that print immersion methods promote the development of literacy skills in students as well as improving their overall flat academic performance.

Recommendations

The following recommendations are based upon the findings of this study:

- 1) Teachers at the primary school level should incorporate the use of print immersion methods with their student population to enhance and improve literacy skills.
- 2) Regularly hold professional development activities (e.g., conferences, workshops, training) for teachers; based upon the results of this study, those professional development activities should focus on current trends and strategies related to literacy education, including print immersion methods.
- 3) Professional organizations (e.g., ANPEIN and ECAN) should promote the use of print immersion methods at all levels (zonal, state and national) of their respective organizations' conferences.
- 4) Publishers of books for the nursery and primary levels should develop products that promote the use of print immersion methods.
- 5) The plans developed for the (Nursery and Primary) level student curriculums should include print immersion methods.

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