

IMPROVING GRADE THREE LEARNERS' ACHIEVEMENT IN BASIC SCIENCE: IMPACT OF ELECTRONIC LIBRARY RESOURCES

Christian Ugwuanyi¹, Chinedu Okeke²

¹Faculty of Education, University of the Free State, Bloemfontein (SOUTH AFRICA)

²School of Education Studies, University of the Free State, Bloemfontein (SOUTH AFRICA)

Abstract

The way children learn prior to the emergence of coronavirus 2019 (Covid-19) has been hugely affected due to the temporal suspension of the face-to-face mode of learning at the hit of the pandemic. When the pandemic was at its peak, most developed countries turned to online schooling, while most developing countries' schools were completely shut down. Part of the reason for this was a dearth of online resources in those underdeveloped countries. Literature has shown that the use of electronic library resources has potential for enhancing teaching and learning. However, no empirical study has been conducted in Nigeria to determine the potential impact of electronic library resources on grade three learners' achievement in Basic Science. Thus, the need for this research. This study was guided by a quantitative research approach using a simple repeated measures research design. A total of 45 primary three learners who were purposively sampled from primary schools in Nsukka Education zone participated in the study. A face and content validated as well as trial tested Basic Achievement Test (BAT) was used for data collection. The BAT items had internal consistency reliability of .76. Data gathered were analysed using mixed design repeated analysis of variance. It was revealed that the exposure of the learners to electronic library resources had significant impact ($p < .05$) on their achievement in Basic Science. It was thus, recommended that primary school learners and their counterparts in upper basic education should be adequately exposed to the use of electronic library resources.

Keywords: Achievement, Basic Science, Grade three learners, Electronic library resources.

1 INTRODUCTION

The temporary stoppage of face-to-face learning at the time of the pandemic had a significant impact on how children learned prior to the appearance of coronavirus 2019 (Covid-19). When the pandemic was at its worst, most developed countries switched to online education, while most developing countries' schools were shut down completely. A lack of web resources in those impoverished countries was one of the reasons for this. The utilization of electronic library resources has been shown in the literature to have the potential to improve teaching and learning [1]. In the twenty-first century, the rapid expansion of information communication and technology has altered and influenced human learning [2]. The learning management model needs to be updated to reflect today's society [2]. Libraries are not only obtaining reading materials such as printed books and periodicals, but also arranging for access to numerous learning resources in electronic form due to rapid development of electronic publication. The web's resources and use as a tool are transforming how people live and study. While the World Wide Web was first primarily utilized for push type applications to supply users with information and resources, the growth of Web 2.0, as well as the spread of open source and shared use concepts, has shifted the focus to user generated content and applications for sharing [3]. Electronic resources have exploded in popularity as a result of this. E-Resources account for a large share of the worldwide literature. E-books, E-journals, Databases, CDs/DVDs, E-conference proceedings, E-Reports, E-Maps, E-Pictures/ Photographs, E-Newspaper, Internet/Websites -Listservs, Newsgroups, Subject Gateways, USENET, and others are all examples of e-resources [3]. Due to digital technology, teaching and learning have become quicker, faster, and more enjoyable [3]. Libraries have been pushed to extend their collections as technology has advanced [3]. The digitization of print sources is becoming more common. Living in the interdisciplinary technology era has resulted in a plethora of e-books and other developments on the market [4]. E-resources are frequently used by academics as a source of information. Textbooks are being phased out of educational establishments all around the world [5]. Previous research on the impact of electronic resources on learning found that electronic resources had a bigger impact on children's learning than on adults' learning [5]. Electronic resources helped low and moderate achievers perform better [6]. Almost all students saw digital literacy as a requirement for both personal and academic communication and information collection [6]. Word meaning acquisition can be aided by e-

books at various levels [3]. The activity with the e-book had a strong long-term vocabulary effect [7]. After being exposed to technological materials, children in both learning groups improved their overall emerging literacy levels [8]. Many studies have revealed that utilizing e-books or other electronic versions of stories might cause children to become distracted from the plot, especially if they can interact with the screen and/or play games inside the text [6]. Children rapidly became familiar with e-books and liked the technology, according to a study [9]. The findings demonstrated a change in academic accomplishment for the experimental group between the pre- and post-test, indicating the practical effect of using digital storytelling in teaching scientific topics [10]. Children who learned statistics using interactive electronic resources scored higher on academic success than those who learned statistics through traditional mode, according to the results of the study [11]. Children's achievement in Basic Science was significantly influenced by electronic books [1].

Based on the foregoing, it can be observed that electronic library resources are veritable resources for improving the achievement of learners in both science and arts subjects. It is worthy to note that most done studies done on this subject matter were mainly on numeracy and literacy while minimal studies have done on basic science concepts. This has created gap in literature in which this study tried to fill. Hence, this study explored the impact of electronic library resources on pupils' achievement in basic science.

1.1 Purpose of the study

Specifically, this study determined what impact electronic library resources have on pupils' achievement in basic science.

1.2 Research Question

The following research question was posed for the study:

What impact has electronic library resources on pupils' achievement in basic science?

1.3 Hypothesis

A lone hypothesis tested at 5% probability level was formulated for the study.

Ho₁: There is no significant impact of electronic library resources on pupils' achievement in basic science.

2 METHODS

The postpositivist research paradigm was used to conduct this study. This is due to the fact that the research results were produced from the testing of the hypothesis. As a result, a quantitative research approach was used because the participants' characteristics were quantified and presented objectively. The investigation was led by a simple repeated measures research design based on this technique. This approach is based on numerous measurements of the dependent measure at various test times before and after treatment. This design has adopted by [11, 12, 13].

The study included 45 primary three children who were randomly selected from primary schools in the Nsukka Education Zone. This sample was taken from three primary schools in the Nsukka Education Zone on purpose. Because the study's treatment was exposure to the usage of library electronic books, purposive sampling was utilized to ensure that primary schools with computer and internet facilities were sampled.

Data were collected using a basic science achievement test (BSAT) created by the researchers. The test consisted of 30 multiple-choice questions with four options: A, B, C, and D, with only one answer being correct. Primary 3 basic science concepts were used to create these products. Each correct answer received two points, resulting in a maximum score of 60 points and a minimum score of 0.

Before trial testing, the BSAT was adequately content and face validated. The Table of Specification was used to guarantee that BSAT's content was valid. Following that, two physics education experts and one measurement and assessment expert performed face validation. These experts provided helpful feedback on the BSAT, including the language of the items, their appropriateness for the children's ability level, and their relevance to the research purpose, among other things. Following that, the validators' comments were used to make changes to the BSAT.

The modified BSAT was trial tested on 20 primary 3 children who were not part of the study after it was face validated. In order to establish the internal consistency dependability of the BSAT items, the data were subjected to Kuder-Richardson's formula 20 reliability estimate which yielded a reliability index of 0.76.

The University of Nigeria's committee on research ethics gave its permission for the study's conduct. In addition, informed permission forms were given to the participants as well as their teachers prior to the start of the research. The concerned parties filled out and signed these forms correctly.

Two rounds of pre-testing were performed one week apart before the start of the treatment. This allowed the researchers to collect the study's baseline data. Following then, the treatment sessions began. During the teaching of Basic Science concepts, the children were exposed to the use of electronic library resources. Sources of energy (light), physical movement, and measurements are among the topics taught using electronic library resources. The children were taught these topics by introducing them to various electronic library resources that contained similar principles. For a total of four weeks, this exposure was repeated. The students were encouraged to ask questions about the subjects they did not comprehend at each session. The individuals were given the reshuffled BSAT for the first posttest at the conclusion of the treatment. The second posttest was given at a one-week interval after the first posttest. Following that, the various measurement scores before and after therapy were organized and cleaned in preparation for data analysis.

Bar chart was used to illustrate the achievement scores of children before and after their exposure to the treatment condition. In order to answer the research question and test the accompanying hypothesis, the data were analyzed using a mixed design repeated measures analysis of variance. The mean was utilized to answer the study question, and the hypothesis was tested at 5% probability levels using simple repeated analysis of variance. The research strategy for the study was summarized in Figure 1.

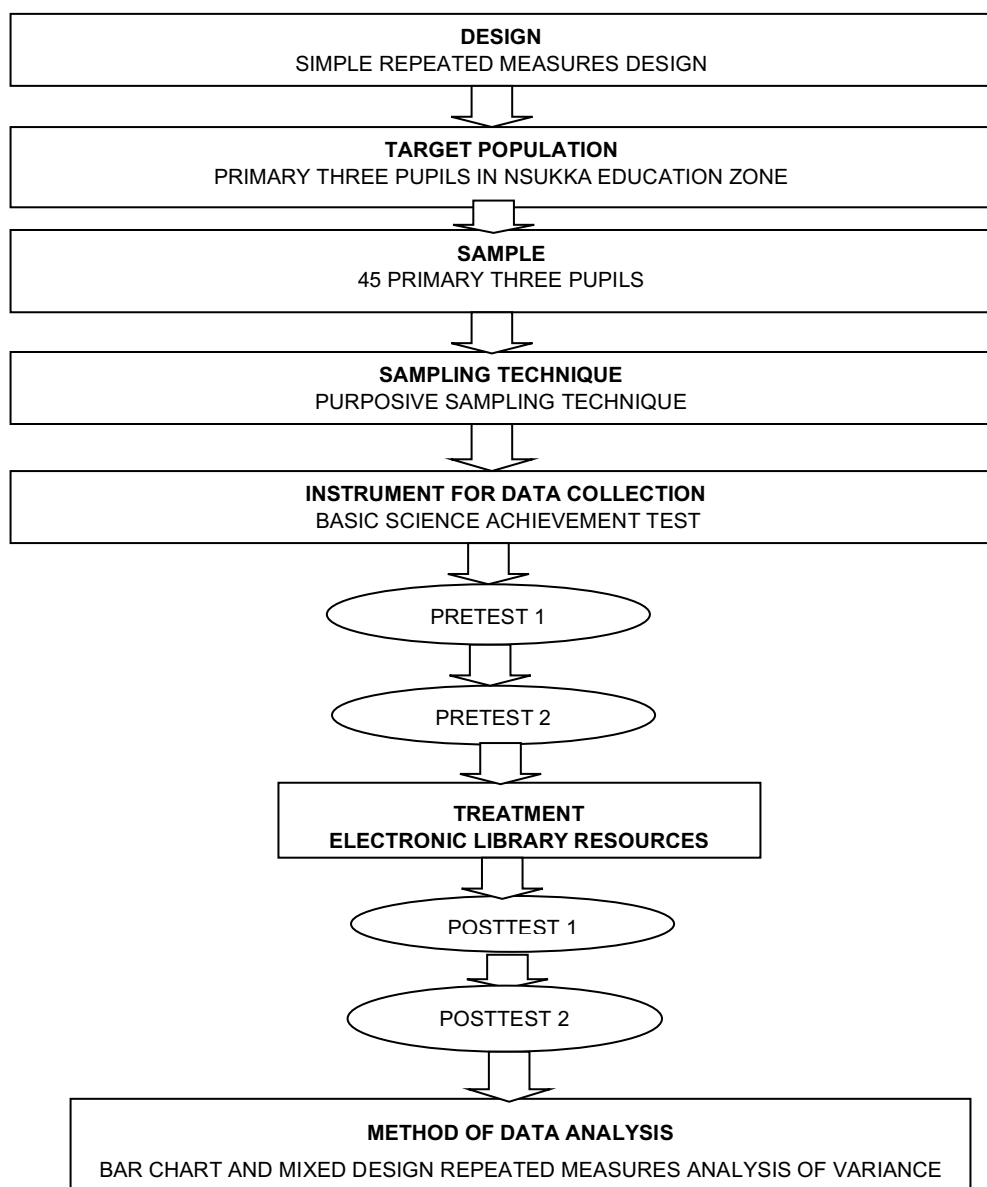


Figure 1: Schematic Representation of the Research Method

3 RESULTS

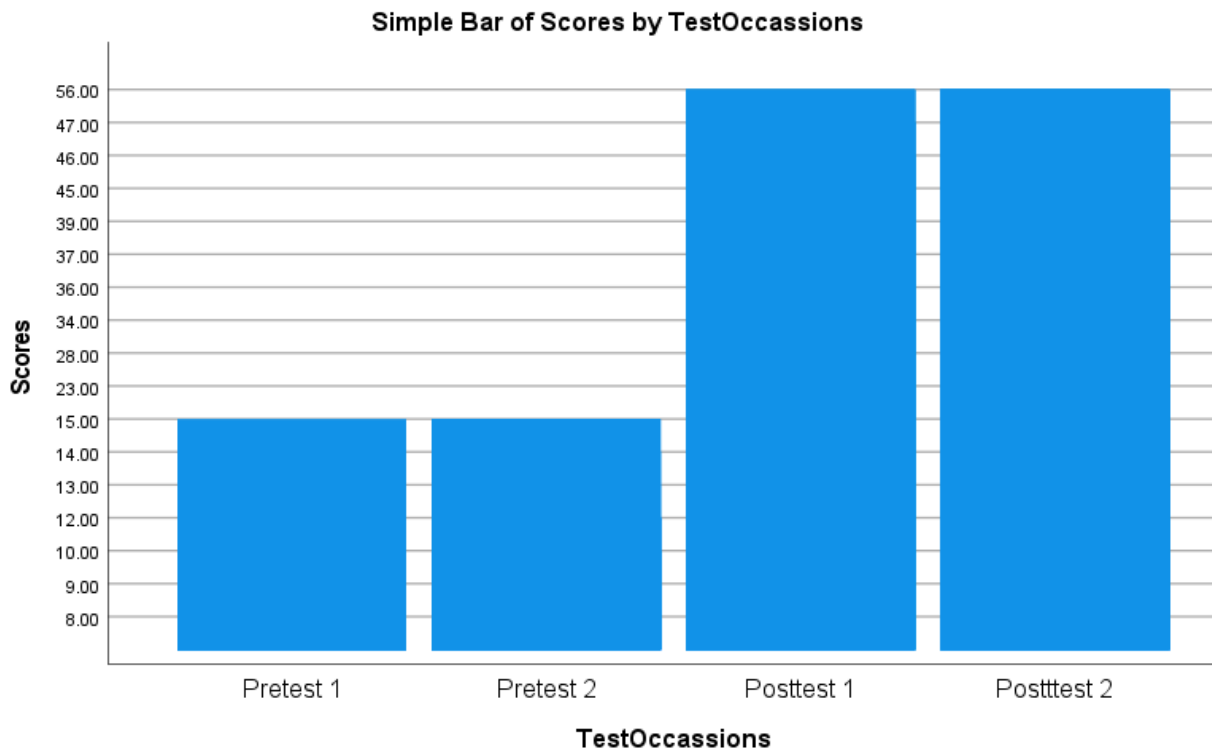


Figure 2: Bar chart representation of the scores of children before and after exposure to electronic library resources

Figure 2 showed that the highest score attained by the children at pretests 1 and 2 is 15.00 while after exposure to electronic library resources their score at posttests 1 and 2 stood at 56.00.

Table 1. Mean analysis of the scores of the children at pretests and posttests

<i>Time</i>	<i>N</i>	<i>Mean</i>	<i>Std. Deviation</i>
Pretest1	45	10.79	2.07
Pretest2	45	10.96	2.24
Posttest1	45	44.30	8.83
Posttest2	45	46.45	7.82

Table 1 showed that the mean achievement scores of the children at pretests 1 and 2 are ($M = 10.79$, $SD = 2.07$) and ($M = 10.96$, $SD = 2.24$) while at posttests 1 and 2, their mean achievements are ($M = 44.30$, $SD = 8.83$) and ($M = 46.45$, $SD = 7.82$).

Table 2. Repeated measures analysis of variance of the difference in the test occasions

<i>Source</i>	<i>Type III Sum of Squares</i>	<i>df</i>	<i>Mean Square</i>	<i>F</i>	<i>Sig.</i>	<i>Partial Eta Squared</i>
Time	Sphericity Assumed	55511.572	3	18503.857	912.686	.000
	Greenhouse-Geisser	55511.572	1.048	52944.432	912.686	.000
	Huynh-Feldt	55511.572	1.052	52771.223	912.686	.000
	Lower-bound	55511.572	1.000	55511.572	912.686	.000
Error (Time)	Sphericity Assumed	2676.178	132	20.274		
	Greenhouse-Geisser	2676.178	46.133	58.009		
	Huynh-Feldt	2676.178	46.285	57.820		
	Lower-bound	2676.178	44.000	60.822		

Table 2 revealed that electronic library resources had significant impact on the achievement of children in basic science, $F(3, 132) = 912.686$, $p < .05$, $\eta_p^2 = .954$. This implies that the null hypothesis was rejected ($p < .05$). Moreover, the effect size of .954 indicates that 95.4% improvement in the achievement of children in basic science can be attributed to their exposure to electronic library resources. The significant effect of time on the achievement of children in basic science is illustrated in Table 3.

Table 3. Post-Hoc pairwise comparison test for the significant difference in the test occasions

(I) Time	(J) Time	Mean Difference (I-J)	Std. Error	Sig. ^b	95% Confidence Interval for Difference ^b	
					Lower Bound	Upper Bound
1	2	-.200	.253	.967	-.898	.498
	3	-35.222*	1.163	.000	-38.426	-32.019
	4	-35.222*	1.163	.000	-38.426	-32.019
2	1	.200	.253	.967	-.498	.898
	3	-35.022*	1.148	.000	-38.185	-31.859
	4	-35.022*	1.148	.000	-38.185	-31.859
3	1	35.222*	1.163	.000	32.019	38.426
	2	35.022*	1.148	.000	31.859	38.185
	4	.000	.000	.	.000	.000
4	1	35.222*	1.163	.000	32.019	38.426
	2	35.022*	1.148	.000	31.859	38.185
	3	.000	.000	.	.000	.000

Based on estimated marginal means

*. The mean difference is significant at the .05 level.

b. Adjustment for multiple comparisons: Sidak.

4 DISCUSSION OF RESULTS

This research was designed to determine the potential impact of electronic library resources on pupils' achievement in basic science. Using a simple repeated measures design, it was found that electronic library resources had very high significant impact on pupils' achievement in basic science accounting for 95.4% improvement in their achievement in basic science. This finding is highly desirable as the researchers' experience during the intervention attest to the outcome of the research. The intervention in this case gave the children ample opportunity to explore basic science concepts using verities of electronic library resources under controlled condition. In this case, the children were closed monitored to ensure that they did not have access to materials other than the ones related to basic science. Electronic library resources support the effective provision of information to all types of users, promote collaborative research activities, encourage the development and distribution of knowledge through the use of communication network tools, and encourage the use of communication network tools [15].

Recent empirical studies have shown the significant impact of electronic library resources on children's achievement. Due to digital technology, teaching and learning have become quicker, faster, and more enjoyable [3]. Previous research on the impact of electronic resources on learning found that electronic resources had a bigger impact on children's learning than on adults' learning [5]. Electronic resources helped low and moderate achievers perform better [6]. Almost all students saw digital literacy as a requirement for both personal and academic communication and information collection [6]. Word meaning acquisition can be aided by e-books at various levels [3]. The activity with the e-book had a strong long-term vocabulary effect [7]. After being exposed to technological materials, children in both learning groups improved their overall emerging literacy levels [8]. Many studies have revealed that utilizing e-books or other electronic versions of stories might cause children to become distracted from the plot, especially if they can interact with the screen and/or play games inside the text [6]. Children rapidly became familiar with e-books and liked the technology, according to a study [9]. The findings of a study demonstrated a change in academic accomplishment for the experimental group between the pre- and post-test, indicating the practical effect of using digital storytelling in teaching scientific topics [10]. Children who learned statistics using interactive electronic resources scored higher on academic success than those who learned statistics through traditional mode, according to the results of the study [11]. Children's achievement in Basic Science was significantly influenced by electronic books [1].

5 CONCLUSION AND RECOMMENDATION

This research has revealed that electronic library resources had very high significant impact on pupils' achievement in basic science accounting for 95.4% improvement in their achievement in basic science. Based on that the researchers concluded that electronic library resources impact significantly on the achievement of children in basic science. It is therefore recommended that adequate access to electronic library resources should be provided for the primary school teachers by the Local Education Authority to facilitate the utilization of electronic library resources in the teaching of basic science and other related subjects.

ACKNOWLEDGEMENTS

The researchers appreciate all those who participated in the study as well as the Head teachers of the schools from where the children were sampled.

REFERENCES

- [1] C.S. Ugwuanyi. "Enhancing Children's Achievement in Basic Science using Library Electronic Books : A Case of Simple Repeated Evaluation," *Library Philosophy and Practice (e-journal)*. 6573, 2022.
- [2] P. Kwangmuang, S. Jarutkamolpong, W. Sangboonraung, and S. Daungtod, "The development of learning innovation to enhance higher order thinking skills for students in Thailand junior high schools," *Heliyon*, vol. 7, no. 6, p. e07309, 2021, doi: 10.1016/j.heliyon.2021.e07309.
- [3] Baskar A, "Resources and Its Uses In Library," *J. Crit. Rev.*, vol. 7, no. 8, pp. 3588–3592, 2017, [Online]. Available: <https://www.bibliomed.org/mnsfulltext/197/197-1616765362.pdf?1636642329>.
- [4] O. Korat, I. Levin, S. Atishkin, and M. Turgeman, "E-book as facilitator of vocabulary acquisition: Support of adults, dynamic dictionary and static dictionary," *Read. Writ.*, vol. 27, no. 4, pp. 613–629, 2014, doi: 10.1007/s11145-013-9474-z.
- [5] A. G. Almekhlafi, "The effect of E-books on Preservice student teachers' achievement and perceptions in the United Arab Emirates," *Educ. Inf. Technol.*, vol. 26, no. 1, pp. 1001–1021, 2021, doi: 10.1007/s10639-020-10298-x.
- [6] S. Chen, S. Jamiatul Husnaini, and J. J. Chen, "Effects of games on students' emotions of learning science and achievement in chemistry," *Int. J. Sci. Educ.*, vol. 42, no. 13, pp. 2224–2245, 2020, doi: 10.1080/09500693.2020.1817607.
- [7] A. Shamir, O. Segal-Drori, and I. Goren, "Educational electronic book activity supports language retention among children at risk for learning disabilities," *Educ. Inf. Technol.*, vol. 23, no. 3, pp. 1231–1252, 2018, doi: 10.1007/s10639-017-9653-7.
- [8] A. Shamir and O. Korat, "Computers in the Schools Developing an Educational E-Book for Fostering Kindergarten Children ' s Emergent Literacy Developing an Educational E-Book for Fostering Kindergarten Children ' s Emergent Literacy," *Comput. Sch.*, vol. 0569, no. November 2011, pp. 37–41, 2008, doi: 10.1300/J025v24n01.
- [9] T. Jones, A. Prof, C. Brown, and A. Prof, "Reading Engagement: a Comparison Between E-Books and Traditional Print Books in an Elementary Classroom," *Int. J. Instr.*, vol. 4, no. 2, pp. 5–22, 2011.
- [10] N. S. Shemy, "The Impact of Digital Storytelling on Motivation and Achievement in Teaching Scientific Concepts for Pre-School Students," *Eur. J. Educ. Stud.*, vol. 7, no. 12, pp. 801–820, 2020, doi: 10.46827/ejes.v7i12.3627.
- [11] B. C. Y. Lim, L. W. L. Liu, and C. H. Choo, "Investigating the Effects of Interactive E-Book towards Academic Achievement," *Asian J. Univ. Educ.*, vol. 16, no. 3, pp. 78–88, 2020, doi: 10.24191/ajue.v16i3.10272.
- [12] C. S. Ugwuanyi, C. I. O. Okeke, and M. U. Agboeze, "Management of Test Anxiety Among Pupils in Basic Science Using Music-Based Cognitive Behavior Therapy Intervention: Implication for Community Development," *J. Ration. - Emotive Cogn. - Behav. Ther.*, no. 0123456789, 2020, doi: 10.1007/s10942-020-00371-2.

- [13] C.S. Ugwuanyi, C.I.O. Okeke and C.C. Okeke. "Information and communication technology tool and children ' s achievement in Basic Science : Implication for Evaluation of Library and Information Resources," *Library Philosophy and Practice (e-journal)*. 6097, 2021. <https://digitalcommons.unl.edu/libphilprac/6097>
- [14] C. N. Onyishi, M. O. Ede, O. V. Ossai, and C. S. Ugwuanyi, "Rational Emotive Occupational Health Coaching in the Management of Police Subjective Well-Being and Work Ability: a Case of Repeated Measures," *J. Police Crim. Psychol.*, vol. 36, no. 1, pp. 96–111, 2021, doi: 10.1007/s11896-019-09357-y.
- [15] K. B. Dukper, B. Sakibu, and B. Arthur, "Awareness and utilization of electronic library resources by students of Tamale Technical University, Ghana," *Libr. Philos. Pract.*, vol. 2019, 2019.