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Learning through interaction: impact of interactive radio instructions in improving literacy skills of out-of-school children in IDP camps in Nigeria

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ABSTRACT

The goal of this study was to examine the effect of interactive radio instruction (IRI) in improving the literacy skills of out-of-school children in IDP camps in Nigeria. The study was a quasi-experiment involving 470 children who were out of school at the time of the study. The indices for measuring literacy skills included phonological skills, letter knowledge, oral comprehension and vocabulary skills. The result of the intervention showed that although all the children scored low regarding their literacy skills at pre-intervention, participants in the IRI group reported a significant improvement in their literacy skills after the intervention. A follow-up assessment was carried out after twelve months and the result showed stability in the literacy skills of participants in the IRI group while those in the control group did not improve in their literacy skills over time. Comparatively, IRI was found to be more efficient in improving literacy skills than a face-to-face learning environment. The implications of these results on learning have been highlighted.

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Introduction

Literacy skills are those intellectual capabilities that enable people to read and write. Usually, people are not born with such skills, hence literacy skills are learnt. If people do not learn literacy skills, they may never have such skills. Researchers (Bowers et al., 2010; Perin, 2013) agree that learning is the surest way people can acquire literacy skills. Literacy skills are better learnt at a younger age than at adulthood. This assumption has been confirmed by arguments in literature (Fracasso et al., 2014; Lonigan & Shanahan, 2010). Overall, literacy skills can be broadly divided into reading and writing skills; both of which usually go hand-in-hand.

Typically, reading is the ability to decode written words and make meaning from them. In other words, reading is mediated communication between a writer and a reader. Perin (2013) says that reading entails an accurate understanding of the text on the page, or the ability to comprehend written language. From this perspective, reading entails accurate encoding and linguistic

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comprehension. Lesgold and Welch-Ross (2011) say that students face challenges attaining proficiency at both levels of readings, hence need to be taught. The implication is that the situation with out-of-school children could even be worse because they are not in school and may not have the opportunity to learn and improve their reading skills.

Another important aspect of literacy skills is writing. This entails communicating through written words. Perin (2013) says that writing skill is a result of an effective combination of skills such as proper planning, efficient composition and revising text in a process that is simultaneous and recursive, in manners that the three processes combine to produce a good write-up. According to MacArthur and Philippakos (2012), writing skills are as essential to academic success as reading. MacArthur and Philippakos note further that writing poses a serious problem to children and needs to be taught. Researchers (Graham & Hebert, 2010; Graham & Perin, 2006) are of the view that writing and reading are inseparable and complement each other. For example, Graham and Hebert (2010) posit that writing plays a significant role in enhancing reading compression while Graham and Perin (2006) note that reading facilitates writing skills, especially reading well-written materials. Researchers (Edgecombe, 2011; Jackson, 2009) are of the view that considering the complementary role that reading and writing play, they are better taught single courses as literacy skills.

Out-of-school children in IDP camps require learning literacy skills so that they will be able to effectively function in contemporary society. This is because, without literacy skills, out-of-school children in IDP camps will grow up to become literate without the minimum knowledge and skills to function as useful members of society. Gever et al. (2021) note that if society ignores vulnerable children to their fate, they will grow up and become a problem to the same society that did not bother about their welfare. Talabi et al. (2021) say that there is the need to consider creative approaches for imparting knowledge to out-of-school children so that they will not completely lose out on the opportunity of acquiring acknowledge that will brighten their chances of becoming better citizens in the future. The objective of this study was to test the effectiveness of interactive radio instructions in improving the literacy skills of out-of-school children in IDP camps in Nigeria.

Interactive radio instruction as a learning tool

The interactive instructional package has the potential to assist out-of-school children in IDP camps to acquire literacy skills. One of such interactive instructional packages is interactive radio. By definition, interactive radio instruction (IRI) can be defined as an instructional channel that is put together to transfer a set of effective learning kits with the utilization of radio broadcast. IRI as a learning approach allows for the development of learning packages in audio formats to serve as a guide for teachers, facilitators and students concerning exercises, games, activities as well as exercises. IRI packages allow learners to interact freely with radio facilitators that serve as a guide for them (the students) to provide oral and physical responses as well as exercises that are raised by radio characters (Ho & Thukral, 2009). The World Bank (2005) notes that the format of IRI differs depending on the subject being taught but the content is normally organized based on the approved curriculum. The World Bank further adds that IRI allows learners to equally get involved in group work, experiments and other activities as may be recommended in the learning package.

IRI typically assumes a dual-audience technique. The audiences are the students and the teacher. This is because when IRI packages are delivered, the contents of what to learn are meant for the students while the modelling teaching strategies and behaviours are meant for teachers. That is to say that IRI is designed for dual-audience to educate learners of new ideas as well as teachers on new teaching methods. According to Thukral (2006), during learning through IRI, teachers have both primary and secondary expectations. The primary expectations include organizing the IRI classroom, adhering to instructions from the radio and making sure that students effectively participate. On the other hand, secondary expectations are emulating pedagogies and facilitating learning above the instructions. Researchers (Naidoo & Potter, 2007; Potter & Naidoo, 2006; Potter & Naidoo, 2009) argue that interactive radio instrument allows for both the development of students and teachers.

Within this context, it can be said that interactive radio instruction could prove beneficial to both students and teachers.

Historically, Stanford University in Nicaragua (a country in North America) first developed IRI in the 1970s. The United States Agency for International Development (USAID) sponsored the project to serve as a learning tool to effectively transfer knowledge and improve learning experiences. Data gathered from 1975 and 2000 revealed that IRI positively impacted learning outcomes in comparison with controlled classrooms that did not make use of IRI (Bosch, 1997; Leigh, 1995; Tilson et al., 1991). Evidence equally points to the fact that IRI was successful in closing the gap in academic achievement between learners from rural and urban areas as well as boys and girls (Bosch, 1997; Tilson et al., 1991).

IRI can promote learning, especially in challenging times or to disadvantaged groups. McBurnie (2020) argues that during COVID-19, interactive radio instruction served as a useful platform for promoting learning among children. Komodromos (2021) in a study reported that interactive radio instruction was an effective tool for teaching farmers new farming techniques. Elliot and Lashley (2017) test the impact of IRI on learning with the descriptive survey as the design of the study. The researchers utilized a structured questionnaire to collect data for the study with descriptive and inferential statistics as methods of data analysis. The researchers reported that although the respondents acknowledged the potential of IRI as a learning platform, teachers were not ready to deploy it because of the lack of appropriate arrangements needed for its use. The additional result showed that students were positively disposed towards IRI because it aids learning and enhances listening skills. Ayalew (2016) conducted a study to ascertain the impact of interactive radio instruction for teaching the English Language. The researchers utilized a quasi-experimental design for the study with a test questionnaire as the instrument for data collection. The researchers found that IRI was an effective tool for improving the English Language skills of the participants.

Instructional approaches to teaching and learning

The teaching and learning of literacy skills can assume instructional approaches which Perin and Charron (2006) note are different in design and implementation. Gagné et al. (2005) define instructional design as the systematic process of packaging and implementing events to enhance learning. Dubovi (2018) says that a carefully designed instructional strategy makes sure that it can activate the internal cognitive structures of the learners as well as boost their possibility of successful learning. Dubovi adds that there are two instructional strategies namely simple-to-complex strategy and productive failure strategy.

According to Van Merriënboer et al. (2003), the simple-to-complex (S2C) strategy assumes that learners who are novices benefit more from an instructional package that is simple, fully guided which gradually builds up to a more complex whole-task arrangement. Making use of the S2C approach requires that the sequence begins in simple manners that slowly guides the learners to the complex tasks. According to Van Merriënboer and Sweller (2005), S2C instructional package has the capacity to built the intellectual abilities of the learners thereby gradually guiding them in the learning process, hence it positively impacts learning outcome and motivation.

On the other hand, the productive failure (PF) learning strategy begins the learning process with complex tasks that are usually above the current abilities and skills of the learners (Kapur, 2008; Kapur & Bielaczyc, 2012; Schwartz et al., 2011). Typically, PF explores the challenges, struggles, and in some instances, failures of the learners before offering guidance at the knowledge transfer stage. The overall aim of the PF strategy is to identify the areas of limitations of the learners before assisting them. The choice of which instructional approach to use depends on the teacher and the channel of learning. The classification of instructional approaches above is general and not limited to literacy skills alone. However, this classification has offered insights into the possible instructional approaches available.

Another classification of instructional approaches is provided by Grubb (1999) who listed skills-based and constructivist as the two instructional approaches. Beder et al. (2007) used the terms *discrete skills* and *meaning*-making to describe these two strategies. Discrete skills instruction explains the explicit teaching of skills to assist learners to locate central ideas, make inferences, understand vocabulary and write sentences as well as paragraphs. On the other hand, meaning-making brings reading and writing elements together through focusing on critical thinking and problem-solving through the application of appropriate materials. It is important to add here that whenever an approach is taken, the platform of instruction could play an essential role in determining the success or failure of instructions. In this study, the focus was on interactive radio instruction with particular attention to out-of-school children in IDP camps in Nigeria.

Study context

Nigeria has a serious problem controlling the growing number of out-of-school children. The United Nations International Children Emergency Fund (UNICEF) (2021) corroborates that Nigeria has a serious problem with a large number of out-of-school children. UNICEF notes further that the picture is worrying such that one out of every five out-of-children globally is from Nigeria and that as high as 10.5 children of school age have not attended. Talabi et al. (2021) and Gever et al. (2021) note that Nigeria is struggling to address the lingering problem of out-of-school children in the country.

Added to this already precarious situation is the issue of internal displacements. Many people have been displaced in Nigeria as a result of conflict such as that between farmers and herders, ethnoreligious conflict, Boko Haram insurgency as well as natural disasters like floods. Most of the displaced persons are living in IDP camps in areas like Borno State, Federal Capital Territory, Abuja, Makurdi, among others. The Federal Government of Nigeria also acknowledges that children in IDP camps are largely out-of-school and has planned to get them back to school by 2023 (Olugbode, 2021). What this means is that the government of Nigeria has equally taken note of the danger inherent in ignoring children in IDP camps.

Children from IDP camps need to possess literacy skills so that they will be able to function effectively as useful members of society. The world is gradually becoming dependent on information utilization. Such information comes in different ways and the inability to read and understand them may limit the potential of children to function maximally. It is with this in mind that the current study tested the usefulness of interactive radio instruction as a cost-effective way of promoting the acquisition of literacy skills among out-of-school children in IDP camps in Nigeria.

Theoretical framework and hypotheses

The researchers applied Cognitive Load Theory (CLT) to examine the impact of interactive radio interaction on the literacy skills of out-of-school children in IDP camps in Nigeria. The theory was suggested by Sweller, van Merrienboer and Paas in 1998 to highlight the need for instructional methods to decrease extraneous cognitive load so that available cognitive resources can be fully devoted to learning (Van Merriënboer & Sweller, 2005). According to CLT, people have both working memory and long-term memory. The former is used to process new information while the latter is for storing process information that is used to construct schema. How easy or difficult it is for people to process information in the working memory is the central concern of CLT. The theory outlines two basic loads that are combined to determine the success of an instructional intervention. These are intrinsic cognitive load and extraneous cognitive load. Intrinsic cognitive load defines the interaction between the task to be learnt and the intellectual capacity of the learner. For this reason, instructional interventions manipulate intrinsic load. The extraneous load is the load that is not required for learning, instructional interventions can alter extraneous load (Van Merriënboer & Sweller, 2005). Therefore, for instructional interventions to be effective, they must be able

to enhance intrinsic load and decrease extraneous load as much as possible. In this study, the IRI intervention must take the attention of children in IDP camps away from the suffering they may be going through as a result of their displacement and make them understand that learning literacy skills hold the key to a better future for them. Based on the above, the researchers hypothesized:

H1: At baseline out-of-school children in the treatment and control group will score lower regarding their literacy skills.

H2: IRI will be effective in promoting the acquisition of literacy skills among out-of-school children in IDP camps in Nigeria.

Methodology

The researchers utilized a quasi-experimental design to assess the impact of IRI on literacy skills among out-of-school children in IDP camps in Nigeria. This type of design is needed to test the impact of an intervention in a non-laboratory situation. The target population of this study was all the out-of-school children in Nigeria who are currently in IDP camps. There is no list regarding the number of out-of-school children in Nigeria. Therefore, the researchers decided to develop a population for the study by first, recruiting five research assistants who compiled the list of out-of-school children in IDP camps. The compiled lists were verified with the various IDP camps in Nigeria and this showed that there is a total of 2, 341,213 children in IDP camps who are not in school.

Sample size

The sample size of this study was made up of 470 out-of-school children in IDP camps in Nigeria. To determine the sample size for the study, the researchers conducted a priori power analysis with the use of the G*power programme. The parameters were set as $(1 - \beta)$ at 0.90, 0.30 effect size f, and $\alpha = .05$. The outcome of the priori power analysis showed that a sample size of 470 was needed to test the relationship between interactive radio instruction and literacy skills of out-of-school children at a .05 level of significance.

Sampling technique

Multistage sampling was used in this study. The stages are as shown below:

Stage 1: The first stage of the sampling process involved the use of a purposive sampling technique to select IDP camps in Benue State as the location of the study. Benue State has witnessed increasing instances of conflict between farmers and herders, thus leading to the displacements of villages and communities. The United Nations Office for the Coordination of Humanitarian Affairs (2020) says that there are seven IDP camps in Benue State.

Stage 2: During this stage of the sampling, the researchers applied a simple random sampling technique to sample two IDP camps in Benue State. Camp 1 was used as the control group while Camp 2 served as the treatment camp.

Stage 3: The researchers applied the purposive sampling technique to sample out-of-school children in IDP camps within the ages of 6–11 which UNICEF (2021) considers as school age.

The instrument for data collection

The instrument of data collection in this study was a self-developed test that was aimed at measuring the reading and writing skills of the respondents. The researchers adopted measures of literacy skills from the study of Ecalle et al. (2015) who reported that measures like phonological skills, (PS) letter knowledge (LK), oral comprehension (OC) and vocabulary skills (VS) are important measures of

literacy skills. Ecalle et al. regard the first two as code-focused while the latter two were regarded as meaning-focused. From these four indicators, a total of 20 test items were developed. Three experts validated the test that was used for the study. Also, the pilot study was conducted involving 40 samples and a correlation coefficient of .88 was obtained for PS, .78 for LK and .77 for OC and .76 for VS, an indication that that instrument was reliable based on evidence in the literature (Ale, 2020; Kari, 2021; Ogbonne, 2019) to the effect that a reliable score of .75 and above is excellent.

Measures

The following were measured in the study:

Phonological skills: The goal here was to test the ability of the participant to recognize words based on their ability to understand syllabi and phonemes in words.

Letter knowledge: The goal here was to assess knowledge of English language letters from A to Z and how to differentiate between lower and upper cases. Children were trained on the English language letters and given a task to identify these letters as well as write such letters themselves.

Oral comprehension: The goal here was to assess the listening comprehension of the children. This was measured using five short narrative sentences that had 10 words each.

Vocabulary skills: The goal here was to understand the receptive vocabulary of the children. This was measured by asking them to provide synonyms and antonyms of some words.

Data collection

The participants were randomly classified into treatment and non-treatment groups with each group comprised of 235 members. The researchers collected data for the study three times, the first time was before the intervention to establish baseline knowledge on literacy skills. The second stage of data collection was after the intervention while the last stage was a follow-up intervention which took place twelve months after the intervention.

The intervention

The intervention in this study was interactive radio instruction (IRI). The instructional package was designed by experts from early childhood education and mass communication. The package was designed based on the approved curriculum for promoting literacy skills among children. The designed contents were validated by three experts who assessed their contents based on usefulness, appropriateness and clarity. The experts were from early childhood education. The intervention was developed primarily to assist out-of-school children in IDP camps to improve their literacy skills. It was a pre-recorded programme that was divided into four modules namely phonological skills, letter knowledge, oral comprehension and vocabulary skills. Each of the modules had five episodes leading to 20 episodes. Each of the episodes was taught and repeated twice. The duration of each episode was 30 min. The package was taught for a time frame of six months.

The participants were categorized into groups made up of 11 groups that had 20 children while 1 group had 15 children. Each group had a facilitator who delivered the intervention. The facilitators received training for two weeks from the research team to enable them to deliver according to plan. The minimum requirements to be included as a facilitator were National Certificate in Education and five years minimum teaching experience. The facilitators assisted in the data collection.

There was another group that received face-to-face teaching on literacy skills. The content was the same, the only difference was the mode of delivery. To ensure that the participants did not mix up, they were from two different camps were used located at least 20 km apart.

Method of data analysis

The researchers made use of descriptive statistics to describe the data while inferential statistics such as multiple analysis of variance (MANOVA) was used to test the hypotheses. The hypotheses for the study were tested at a .05 level of significance. Tables were used to present the results of the study.

Results

A total of 470 out-of-school children responded to the instrument. This represents a 100% return rate. The participants were 52% male and 48% female for the treatment group and 51% male and 49% female for the control group. The mean age of the sample was seven years for the control group and eight years for the treatment group. All the participants were not in school at the time of the study and were in the IDP camps at the time of the study. The result of the hypotheses testing is presented below:

Table 1 revealed the baseline literacy skills of out-of-school children in IDP camps in Nigeria. The result of the study showed that participants in the interactive radio instruction and those in the non-instruction group scored low regarding their literacy skills. None of the groups had a mean score of close to 50% from the maximum mean score. The first hypothesis was, thus accepted and it is concluded that the participant had a low mean score regarding literacy skills before the intervention.

The result of the study as presented in Table 2 revealed the post-intervention scores of the participants regarding their literacy skills. The result of the study showed at after the intervention, participants in the IRI and face-to-face teaching groups improved but their counterparts in the control group did not significantly improve. Therefore, the second hypothesis was accepted and it is concluded that IRI was effective in improving the literacy skills of out-of-school children in IDP camps in Nigeria. The result of the effect sizes showed that the magnitude of the impact was large (Cohen, 1988).

Table 3 shows the results of a follow-up assessment to determine the impact of time on the outcome of the study. The result of the study showed that participants did not differ at Time 1 ($p < .05$), but significantly differed at Time 2 ($p < .05$) and at Time 3 ($p < .05$), respectively. This

Table 1. MANOVA analysis on the baseline literacy skills among the sample (Max mean = 12).

		IRI		Control Group		
S/N	Items	Mean	*SD*	Mean	*SD*	Sig
1	Phonological skills	3.0	.12	3.0	0.33	.66
2	Letter knowledge	4.0	.43	3.4	0.42	.74
3	Oral comprehension	3.0	.14	3.1	0.56	.76
4	Vocabulary skills	3.0	.76	4.0	0.12	.82

Table 2. MANOVA analysis on the post-intervention on literacy skills (Max mean = 12).

		Control Group		IRI		Face-to-face			
S/N	Items	Mean	*SD*	Mean	*SD*	Mean	*SD*	Sig	f^2
1	Phonological skills	3.2	0.21	8.0	0.54	7.1	0.56	.010	0.40
2	Letter knowledge	3.1	0.34	9.2	0.43	8.0	0.32	.031	0.35
3	Oral comprehension	3.3	0.41	8.2	0.65	8.3	0.43	.021	0.36
4	Vocabulary skills	3.0	0.23	8.3	0.67	7.8	0.23	.011	0.44

Table 3. Follow-up result after twelve months of the intervention (Max. mean = 12).

Time	Exp. Group	Control group	*Df*	*F*	Sig.	95% CI	f^2
Time 2	8.0	3.0	1.12	42.181	<001	10.3212	.37
Time 3	9.3	3.2	1.03	71.223	<001	11.1340	.39

means that even after twelve months, respondents who did not receive the intervention did not significantly improve in their literacy skills.

Discussion of findings

The goal of this study was to test the usefulness of interactive radio instruction in improving the literacy skills of out-of-school children in IDP camps in Nigeria. The indices that were used to measure literacy skills include phonological skills, letter knowledge, oral comprehension and vocabulary skills, respectively. The study was a quasi-experimental design in which case data were collected at three stages namely before the intervention, after and the follow-up assessment. There were two interventions, namely interactive radio intervention and face-to-face learning.

The result of the study showed that at baseline, participants in both groups scored below 50% regarding the test conducted on their literacy skills. What this means is that out-of-school children in IDP camps who are not taught literacy skills may grow up lacking basic literacy skills in the areas of phonology, letter knowledge, oral comprehension as well as vocabulary. When children lack literacy skills, they may not be able to function effectively. This assumption is supported by evidence in the literature (Bowers et al., 2010; Fracasso et al., 2014; Lonigan & Shanahan, 2010; Perin, 2013) as researchers argue that literacy skills are important mental capabilities that will assist children to brighten their future.

The result of the study further showed that after the intervention, participants in the IRI group reported an important increase in their mean scores on literacy skills whereas their counterparts in the treatment group did not report a substantial improvement. The result also showed that although both participants in the IRI and face-to-face learning group reported an improvement in their mean scores on literacy skills, those in the IRI group scored higher regarding their literacy skills. This result has extended previous studies (Ho & Thukral, 2009; Naidoo & Potter, 2007) related to the impact of interactive radio by focusing on the literacy skills of out-of-school children in IDP camps. This extension will enrich literature regarding the centrality of interactivity in learning, especially in the twenty-first-century society that is witnessing increasing advancements in technologies.

Conclusion/recommendations

Based on the result of this study, it is concluded that an interactive radio instructional package is a useful avenue for assisting out-of-school children in IDP camps to improve their literacy skills. The result of this study has implications on theory, practice and scholarship. Regarding theory, the result of this study has contributed to our understanding of cognitive load theory by showing how interactivity through radio instructions can enhance learning among vulnerable children. This information could serve as a guide to other researchers who may wish to apply this theory in their studies related to ways of improving learning among vulnerable children. This result has also contributed to the practice of teaching and learning by highlighting how to promote literacy skills among out-of-school children in IDP camps. Finally, this study has enriched literature regarding the effectiveness of interactive radio instruction as well as how to improve the intellectual capabilities of vulnerable children. Based on the results of this study, it is recommended that IRI packages should be developed and utilized to improve the literacy skills of out-of-school children in IDP camps in Nigeria.

Disclosure statement

No potential conflict of interest was reported by the author(s).

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