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Influence of Availability of Instructional Resources on learning Mathematics in North-western Nigeria

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ABSTRACT

This study used a comprehensive literature review to investigate the influence of the availability of instructional resources on learning mathematics in north-western Nigeria. It was performed by reviewing relevant books, articles, and journals. The study results show that a student's capacity to learn mathematics depends on the availability and utilization of instructional resources. Students' senses are stimulated, and the availability and use of instructional resources arouse their interest in the subject. When the applications of instructional resources are emphasized in schools, students perform better in mathematics. Instructional resources constitute a potent factor influencing the teaching and learning of mathematics in schools. The study recommends, among other things, that teachers should always use instructional materials during instruction in the classroom to enhance the student's achievement in the subject.

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1. INTRODUCTION

Mathematics is a discipline that studies numbers and how they are used. The learning of Mathematics is a significant subject in the school syllabus throughout the world and is a subject that is directly associated with many subjects, specifically the Sciences [1]. Mathematics is also a subject that is studied both in primary and high school as a compulsory subject. Learning mathematics is imperative for attaining educational qualification at academic institutions, but unfortunately, at primary, secondary, and tertiary levels of education, learners' performance in this essential subject for many years has not been promising [2]. Among other degree programs, the most prestigious courses like medicine, engineering, and architecture include mathematics as a fundamental entry requirement [3]. He further argues that there have been undesirable grades in mathematics in the National Examination regardless of the vital role that the subject plays in society. Every learner studying primary and secondary education takes mathematics as a

compulsory subject. Despite being the mandatory unit, performance in the subject has been dismal for a long time in the Certificate of Secondary Education Examination (CSEE) [4].

Studies like Badru and Saka [5], Mutange [6], and the reports of the West African Senior Secondary Certificate Examinations (WASSCE) Chief Examiners (May/June 2019 and 2020) indicated that candidates' performance had been on a steady decline as a result of fear and dislike in learning and solving problems in Mathematics by many students. Learning Mathematics is a fundamental part of human thought that effectively builds mental discipline and encourages logical reasoning [7]. The world is working hard to progress technologically and scientifically, especially in developing nations like Nigeria, as science is becoming increasingly important in everyday life, and the world is turning scientific. The dynamic human endeavor of science seeks to comprehend how the world functions. Man can understand the universe better thanks to this comprehension. Without scientific applications, it would have been challenging for a man to explore the other planets in the world. Science comprises the basic disciplines such as Mathematics, Physics, Chemistry, and Biology. Besides, Mathematics remains one subject that students perceive as problematic in the school curriculum [8]. The teacher's method was considered one of several contributing factors to students' poor academic performance in mathematics[6]. He added that this implies that the learning of Mathematics might not be fully achieved without using instructional materials. Teaching mathematics without instructional materials may result in poor academic achievement [6].

The poor types of textbooks, lack of appropriate instructional resources, unsuitable methods of teaching, as well as negative attitudes concerning mathematics have been perceived as possible causes for poor results [9]. Researchers have proved that learners who obtain good grades in their examinations contribute to their success by obtaining quality instructional resources like textbooks, equipped libraries, newspaper cuttings, use of teaching aids such as lesson handouts, and teacher experience and qualification [3]. Mbugua et al. [10] found that a few staff, inadequate instructional resources, lack of motivation, negative attitudes of both instructors and students and retrogressive practices contributed to poor performance. Seeing, touching, and listening, which are instructional materials' characteristics, are the gateway to human learning in this 21st century.

Again, Aramide and Bolarinwe [11] opine that these instructional resources can potentially enhance student learning. Its role in teaching and learning is one of current education policy's most essential and widely discussed issues. With the development of education in this era, a pedagogy that relies solely on oral instruction is no longer viable. Using a multiple baseline design, these researchers, in their study of three Secondary Schools with learning disabilities in mathematics, found that utilizing physical manipulatives to teach perimeter and area concepts helped children learn and retain problem-solving skills. Despite the importance of learning mathematics, the subject's performance has not been encouraging and, as a result, cannot produce competitive students who can match the global market demand [12]–[16]. There is a need to improve mathematics learning to produce high performance in mathematics. One of the intervention measures to help improve learning and performance in mathematics is the availability and usage of instructional resources during teaching and learning mathematics. This study,

therefore, sought to review empirical work on the influence of the availability of instructional resources on learning Mathematics in North-western Nigeria. The main objective of this study is to review empirical work on the influence of the availability of instructional resources on learning Mathematics in North-western Nigeria

Significance of the Study

The benefits of this review are valuable tools in determining the influence of the availability of instructional resources on mathematics learning among Nigerian pupils. Another benefit of this review work is providing evidence for teachers to incorporate instructional materials in teaching and learning to improve the standard of Mathematics in the schools. The general public is not left behind among the beneficiaries of the findings of this review, as they will become conscious of the influence of the availability of instructional resources on learning Mathematics. This study also provides instructors and students with the knowledge to create their local educational materials rather than relying on the government to provide them. It enhanced the sustainable upkeep of the current materials and their attentive use. This review again provides empirical evidence on using available instructional resources to teach mathematics. The results of this review will add to the existing body of knowledge and literature in academic and professional mathematics fields.

Scope of the Study

The geographical scope of this study is the North-western part of Nigeria. The conceptual scope of this study covers instructional resources and learning Mathematics. Therefore, the researcher tries to limit the study to investigate the influence of the availability of instructional resources on learning Mathematics in North-western Nigeria.

2. REVIEW OF LITERATURE

Instructional Resources

Instructional materials are materials or tools, either locally made or imported, that can significantly improve the impact of a lesson if used wisely. Instructional materials refer to objects or devices that help the teacher make learning meaningful [17]. Isola [18] defined instructional materials as things or tools that help teachers convey their teachings to students logically and sequentially. Abdu-Raheem and Oluwagbohunmi [17] acknowledged that teachers use instructional materials to aid explanations and make the learning of subject matter understandable to students during the teaching-learning process. Instructional resources have also been described as resources or teaching materials that a teacher utilizes when presenting a lesson to make the lesson's content understandable to the learner [19]. These researchers explained instructional resources as concrete or physical objects which provide sound, visual, or both to the sense organs during teaching. They added that instructional resources facilitate learning abstract concepts by helping concretize ideas and stimulate learners' imagination. Also, their utilizations help to

increase active participation in the learning process while saving teacher energy and reducing verbal instructions.

Again, Agbulu and Wever [20] argued that instructional materials are essential in education because they are used to transfer knowledge from one person to another, aid teachers in broadening their students' horizons of experience, pique students' interests, and assist both teachers and students in getting past physical barriers to learning when presenting the material. According to Agwu [21], teaching resources such as textbooks, workbooks, charts, audio-visual aids, chemicals, specimens, and other pertinent tools that would grab students' attention should only be introduced by the teacher at the appropriate moment. Teaching at any level requires students to be exposed to some form of simulation [22]. "instructional materials" refers to things or tools teachers use to help students understand what they are learning. Education inputs, or instructional resources, are crucial to teaching every subject in the school curriculum. The usage of educational materials would assist pupils in remembering recently learned information. A teacher who uses suitable instructional materials to support his teachings will enhance students' imaginative and creative thinking and enthusiasm.

There are visual materials comprising reading and non-reading materials, and audio-visual materials comprising electrically operated and none electrically operated materials. These materials and resources, according to Vincent et al. [23], include audio tape recorders, video tape recorders, slide projectors, still pictures, pre-programmed instructional film strips, maps, charts, and graphs; they provide a variety of learning experiences either separately or in combination to meet various teaching and learning experiences. These scholars define teaching and learning resources as accessible, gathered, and brought into the educational setting. They can be three-dimensional, natural two-dimensional objects, or electronic. A "mathematical instructional resource" is any form of specific mathematical apparatus (structured or unstructured), image, ICT game, tool, paper, or everyday material that can be used to teach or study mathematics. It is possible to improvise teaching aids [23].

According to Onasanya and Omosewo [24], improvisation requires adventurous, creative, curious, and persistent teachers. Only a carefully thought-out improvisation training program can produce such skills. Improvised educational resources can be used as practice aids to increase students' accuracy, comprehension, and production. Onasanya and Omosewo [24] define improvised instructional materials as creating and utilizing substitute resources to aid instruction. In order to effectively realize specific educational goals and objectives, improvised materials involve selecting and deploying relevant instructional components of teaching and learning processes when there is a lack of or an insufficient supply of traditional teaching and learning materials. Researchers had previously observed that using improvised materials in math classes helped introduce new abilities, develop understanding, and demonstrate the proper way to do things. Instructional strategies must be identified where manipulation is often suggested as a practical approach to improve student mathematics achievement [24].

Using manipulative-based educational strategies, students can physically interact with the objects to learn the intended information [25]. For instance, primary school

teachers utilize play money to teach kids the fundamentals of mathematics. It has been suggested that one method for encouraging pupils to draw on their real-world experience is to employ manipulatives in math lessons. Students should be helped to link abstract mathematical concepts and the actual world via tangible things resembling everyday objects [25]. In a separate study, Oriji [26] concurred that if the students are brilliant and the teacher is knowledgeable about the subject, teaching materials may not even be necessary. According to Egbu [27], engaging students in classroom activities counts most since it makes instruction learner-centered.

Learning of Mathematics

Mathematics is one of the academic subjects that assists man in building a solid foundation for long-term survival. Mathematics is a necessary component of scientific and technological advancement. According to Ginsburg [28], mathematics is a fundamental human activity and a means of understanding the world. Teaching mathematics is a task that needs to be accomplished no matter what, for its applications in other fields of study are numerous [8]. Nigeria has made mathematics a requirement for both primary and secondary school pupils to provide a solid foundation for critical and scientific thinking and prepare students for higher education.

Nevertheless, some pupils lack appropriate mathematical knowledge, abilities, and concepts. Among other degree programs, any main course, such as medicine, architecture, and engineering, uses mathematics as a fundamental entry prerequisite. Despite the significance of mathematics in society, students have performed poorly on national exams in this subject [29].

Several factors have been attributed to poor performance in mathematics, including poor teaching methods, poor interest in mathematics, and the absence of appropriate teaching resources across all educational levels [30]. Comparing public and private schools, public schools outperformed their private counterparts regarding equipment. The 2011 TIMSS report on mathematics result analysis revealed that mathematics achievement has increased in some member countries. Several nations are debating how to give their citizens the finest possible mathematics education. According to the report, students' ability in mathematics is deteriorating over their school years. As a student grows older, mathematics competencies decrease.

3. METHOD

This study empirically reviews the influence of the availability of instructional resources on learning Mathematics among pupils in North-western Nigeria by using a systematic literature review. This was done by identifying relevant articles and journals. The research employed Pautasso's five steps as a guide [31]. These five steps are: conducting preliminary searches and creating search strings; searching electronically for relevant articles and journals; screening and then adding and removing items; reading all relevant articles and journals thoroughly; and identifying relevant articles and journals for the teaching and learning experiences of international students.

4. RESULTS AND DISCUSSION

Sa'ad et al. [32] found that fear of Mathematics, learners' poor attitude towards Mathematics, scarce teaching resources, and insufficient competent teachers were a few reasons for meager Mathematics performance. Children taught Mathematics using intangible Mathematics symbols perform less than those taught Mathematics using instructional resources [3]. Mutai [33] further argued that in case of scarcity, an adequately established program needs to be made to enable all learners to use the library, practical rooms for Mathematics, and any other skill intended to encourage learning of Mathematics. Mutai [33] findings from different high schools show that various adequately furnished schools, satisfactorily ordered classes, and good textbooks improve performance. Aramide and Bolarinwe [11] opined that those instructional resources could improve students learning. The preferred method of instruction in contemporary society is using instructional materials, particularly when combined with creative abilities appropriate to modern information technology [3].

He added that technological developments conveyed teaching resources – mainly the predictable and electronic resources- to the lead as the essential tools of social development and globalization, positively affecting the classroom teaching/learning state. Using instructional resources in teaching and learning assists the students in intensively exploring, experimenting, generating, and relating with the environment [3]. Abundant usage of teaching resources helps to offer students a facilitating setting to learn Mathematics. However, in such institutions, there are instances of scholars that achieve poorly. Lack of teaching/instructional resources affects learners' performance [34]. They further argue that inadequate visual aids play materials, and textbooks lower learners' self-esteem. Physical facilities and the state of the classroom are significant aspects that affect students' results. Small, dark, poorly ventilated classrooms are uncomfortable and minor, and closed courses restrict students' freedom of movement. They further claim that improperly maintained flooring risks pupils' health because of jiggers. The type of furniture students use impacts their performance, and students do not benefit from chairs and tables that are too short or tall. Unrepaired fixtures, such as damaged chairs, could harm students [34].

Otieno [35] said that despite several limitations, such as insufficient instructional resources in high schools because of poor planning and corrupt deals, the education system is changing steadily. The financial support given by the government to the schools will assist in providing many of the learning /teaching resources required for excellent performance in Mathematics. Otieno's research observed the consequence of learning /teaching materials on high school Mathematics performance. According to Abdu-Raheem [22], inadequate and unavailability of teaching resources significantly contribute to the educational system's inefficiency and pupils' subpar academic achievement. It was established that most secondary schools in Nigeria lack access to necessary materials, creating an extremely unfavorable atmosphere for teaching and learning. Later, it was suggested that using instructional aids for instruction delivery is crucial for raising academic standards and helping students learn more.

Ogbondah [36] raised awareness of the alarming underutilization and gross insufficiency of instructional resources required to make up for the deficiencies of sense organs and strengthen the capacity of dominating organs. It was noticed that many schools lack basic supplies like textbooks, chalkboards, and necessary technology like computers, projectors, televisions, and movies. According to Olumorin et al. [37], instructional materials make it easier for teachers and students to learn without any difficulties. They argued that all sense organs are in direct interaction with educational materials. Kochhar [38] endorsed those teaching aids as valuable teaching and learning resources. The study recommended that to widen concepts and pique students' interests in the subject, teachers discover other instructional tools to augment what is offered in textbooks.

According to Abolade [39], the benefits of instructional materials are that they are less expensive to develop, effective for teaching many students at once, encourage pupils to pay attention and increase their interest. To make learning more vivid, rational, realistic, and pragmatic, Akinleye [40] attested that effective teaching and learning need the teacher's instructional materials and practical activities. Insufficient learning resources, their lack of availability, and teachers' lack of knowledge were identified by Afolabi and Adeleke [41] as contributing factors to the usage of the lecture technique. They suggested that improvising instructional resources for teaching and learning in schools entail participation from all parties, including students, instructors, parents, the Parents/Teacher Association, the government, and charitable organizations. Ogbondah [36] promoted teachers' resourcefulness as a result, and he also urged them to look locally for the educational materials they need to complement or replace the traditional ones. Oso [42] concurred that the ideal method for teachers to use their manipulative skills is to improvise to at least partially accomplish their educational objectives.

Moreover, Jekayinfa [43] noted the value of improvising educational materials to make learning concrete and tangible, replacing one item for another, including students in creating materials, being cost-effective, and emphasizing teacher-student collaboration. According to Abdu-Raheem [22], improvised teaching materials developed locally could help raise educational standards overall and the caliber of graduates coming out of schools. In order to raise academic standards in Nigerian schools, Abdu-Raheem and Oluwagbohunmi [17] also supported the idea that creative and talented teachers should improvise the required teaching materials.

5. CONCLUSION

This review of empirical work has revealed additional research on the influence of the availability of instructional resources on learning mathematics among pupils in north-western Nigeria. The study's findings indicate that the availability and use of instructional resources are critical to students' learning of Mathematics. The availability and use of instructional resources stimulate students' senses and arouse their interest in the subject. When the applications of instructional resources are emphasized in schools, students will perform better in mathematics. Instructional resources constitute a potent factor influencing the teaching and learning of mathematics in schools. The current situation in mathematics teaching and learning is low availability and use of instructional resources.

6. RECOMMENDATION

Going by the literature review and the findings of this study, the following recommendations were made:

a. That mathematics teachers should try their best to provide locally made materials in substitution for the unavailability of standard ones to promote their lessons on mathematics.
b. Teachers should always use instructional materials during classroom instruction to enhance student achievement in school subjects.
c. The teacher should involve the students in providing local instructional materials that could be used as substitutes for the unavailability of standard ones.
d. The school authority should provide instructional materials recommended by the NERDC in teaching and learning mathematics.
e. The school administrators, teachers, parents, and officials of the Ministry of Education should maintain regular supervision to encourage the effective use of instructional materials and resources in teaching and learning mathematics in schools and homes.

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