

CURRICULUM ADAPTATION AS CORRELATES OF GIFTED LEARNERS' ACADEMIC ACHIEVEMENT IN MATHEMATICS IN INCLUSIVE SCHOOLS IN CALABAR METROPOLIS, CROSS RIVER STATE, NIGERIA

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Abstract

This study examined curriculum adaptation strategies as correlates of gifted learners' academic achievement in Mathematics in inclusive schools in Calabar. Specifically, the study investigated the relationship between content differentiation and enrichment strategies on gifted learners' academic achievement in Mathematics. A correlational research design was adopted. The population comprised all the 104 gifted learners in inclusive secondary schools in Calabar. Data were collected using structured questionnaires and Mathematics achievement scores from a sample of 40 respondents. Pearson Product Moment Correlation was used to test the hypotheses at 0.05 level of significance. Findings revealed that both content differentiation and enrichment strategies significantly relate to gifted learners' academic achievement in Mathematics. The study concluded that effective curriculum adaptation enhances academic performance of gifted learners in inclusive settings. It was recommended that teachers should intensify the use of differentiated instruction and enrichment-based learning strategies in Mathematics classrooms.

Keywords: Curriculum Adaptation Strategies, Gifted learners, Academic achievement in Mathematics, Inclusive Schools

Introduction

Inclusive education has become a central emphasis of global educational reform, driven by the need to ensure that all learners, irrespective of their ability level, have equitable access to quality education (UNESCO, 2017; Florian, 2014). Within inclusive classrooms, learners present diverse academic, cognitive, and socio-emotional characteristics. Among these groups, gifted learners represent a unique category who demonstrate high intellectual potential, advanced reasoning skills, rapid learning ability, and exceptional performance in specific academic domains such as Mathematics (Subotnik et al., 2011). Nevertheless, despite their abilities, gifted learners are often underserved in inclusive school settings where instructional practices are typically designed to meet the needs of average or struggling learners (Tomlinson, 2014).

Mathematics, as a core subject in secondary education, requires abstract reasoning, logical thinking, problem-solving, and conceptual understanding. These demands make Mathematics particularly suitable for gifted learners; however, when classroom instruction fails to provide sufficient challenge or opportunities for advanced learning, gifted learners may become disengaged, lose interest in learning, and fail to achieve their full academic potential (Subotnik et al., 2023; Peters, 2022). In many inclusive classrooms, teachers tend to adopt a “one-size-fits-all” approach, which limits opportunities for advanced learners to fully develop their potential (Tomlinson, 2017). This situation creates a gap between learners' abilities and classroom instruction, thereby affecting academic outcomes.

Curriculum adaptation is therefore a critical instructional approach in addressing learner diversity. It refers to the modification of curriculum content, instructional processes, learning materials, and assessment strategies to meet the varying needs of learners within the same classroom (Tomlinson, 2014). In the context of gifted education, curriculum adaptation ensures that instruction is sufficiently challenging, engaging, and intellectually stimulating. Key forms of curriculum adaptation include content differentiation, enrichment activities, acceleration, flexible grouping, and performance-based assessment strategies (Tomlinson, 2017). Content differentiation involves adjusting the depth, complexity, and pace of instruction to match learners' readiness levels. For gifted learners, differentiation may involve the provision of advanced problem-solving tasks, higher-order thinking activities, and exposure to complex and abstract mathematical concepts beyond the standard curriculum (Peters, 2022; Renzulli & Reis, 2021).

Enrichment activities, on the other hand, extend learning opportunities by engaging learners in authentic problem-solving, mathematical investigations, modelling activities, and project-based learning experiences that connect Mathematics to real-world contexts (Subotnik et al., 2023). These instructional strategies are designed to deepen conceptual understanding, foster creativity, and enhance critical thinking skills, thereby supporting the intellectual development and academic achievement of gifted learners in Mathematics (Sternberg, 2021; Peters, 2022).

Despite the recognised importance of curriculum adaptation, evidence suggests that its implementation in many inclusive schools, particularly in developing countries such as Nigeria, remains limited due to inadequate teacher preparation, limited instructional resources, and large class sizes (Adebayo & Akinyemi, 2018). Teachers often lack adequate training and support to effectively differentiate instruction for gifted learners, resulting in under-stimulation and reduced academic engagement.

In Calabar, inclusive education practices have expanded in recent years; however, there is still concern regarding how well the needs of gifted learners are being addressed within Mathematics classrooms. While attention is often directed toward learners with learning difficulties, less emphasis is placed on those at the higher end of the ability spectrum, creating an imbalance in instructional support (Ema & Ekpe, 2020). This raises questions about whether curriculum adaptation strategies are effectively implemented and how they relate to the academic achievement of gifted learners in Mathematics.

Furthermore, research evidence indicates that appropriate curriculum adaptation is strongly associated with improved academic outcomes. Studies have shown that differentiated instruction and enrichment-based learning significantly enhance learners' conceptual understanding, problem-solving ability, and overall achievement in Mathematics (Bal, 2016; Smale-Jacobse et al., 2019). However, the extent to which these strategies are applied consistently in inclusive schools in Calabar Metropolis remains underexplored.

It is against this background that this study seeks to examine curriculum adaptation strategies as correlates of gifted learners' academic achievement in Mathematics in inclusive schools in Calabar Metropolis. The study focuses specifically on content differentiation and enrichment activities as key dimensions of curriculum adaptation, and their relationship with learners' achievement in Mathematics. The findings of this study are expected to provide empirical evidence that will guide teachers, curriculum planners, and education stakeholders in improving instructional practices for gifted learners within inclusive education settings.

Statement of the problem

Despite the rising acceptance of inclusive education in secondary schools, there remains a persistent problem in effectively meeting the learning needs of gifted students in Mathematics. Inclusive classrooms are always characterised by differences in learners' abilities, up till now instructional practices in many schools continue to follow a uniform teaching approach that is primarily designed for average-ability learners. As a result, gifted learners are frequently exposed to content that does not sufficiently challenge their cognitive abilities, leading to boredom, reduced engagement, and in some cases, underachievement in Mathematics (Tomlinson, 2014).

In many inclusive schools, particularly in developing educational contexts such as Nigeria, curriculum adaptation practices such as content differentiation and enrichment activities are either poorly implemented or completely absent. Teachers often lack adequate training, instructional materials, and institutional support required to modify curriculum effectively for high-ability learners (Adebayo & Akinyemi, 2018). Consequently, gifted learners may not experience the depth, complexity, or acceleration required to fully develop their mathematical reasoning and problem-solving skills.

In Calabar Metropolis, unreliable evidence suggests that while inclusive education policies are being implemented, attention is largely focused on learners with learning difficulties, with limited consideration for gifted learners who also require specialised instructional attention. This imbalance raises concerns about whether curriculum adaptation strategies are sufficiently applied in Mathematics classrooms and how such practices relate to the academic achievement of gifted learners. The lack of empirical evidence specific to Calabar further limits the ability of educators and policymakers to design targeted interventions that support gifted learners effectively.

Moreso, even though existing literature indicates that curriculum adaptation strategies particularly differentiated instruction and enrichment are associated with improved academic outcomes, there is a dearth of localised studies examining these relationships among gifted learners in inclusive schools in Calabar Metropolis. This gap in knowledge creates doubt regarding the extent to which curriculum adaptation practices influence Mathematics achievement in this context.

It is on the basis of the foregoing therefore, that this study investigates curriculum adaptation strategies as correlates of gifted learners' academic achievement in Mathematics in inclusive schools in Calabar Metropolis. The study specifically focuses on content differentiation and enrichment activities, seeking to determine their relationship with gifted learners' academic performance in Mathematics.

Research objectives

The study was guided by the following specific objectives:

1. To determine the relationship between content differentiation strategies and gifted learners' academic achievement in Mathematics in inclusive schools in Calabar.
2. To examine the relationship between enrichment activities and gifted learners' academic achievement in Mathematics in inclusive schools in Calabar.

Research questions

1. What is the relationship between content differentiation strategies and gifted learners' academic achievement in Mathematics?
2. What is the relationship between enrichment activities and gifted learners' academic achievement in Mathematics?

Research hypotheses

1. There is no significant relationship between content differentiation strategies and gifted learners' academic achievement in Mathematics.
2. There is no significant relationship between enrichment activities and gifted learners' academic achievement in Mathematics.

Method

The study adopted a correlational research design. According to Afolabi, and Adeyemi, (2022), correlational research design is a type of non-experimental research method used to investigate the relationship between two or more variables. It is a systematic investigation that seeks to determine the extent to which two or more variables are related. It involves collecting data to assess the strength and direction of the relationship between variables, typically using statistical methods such as correlation coefficients which is considered suitable for this study.

The population consisted of all the 104 gifted learners in 16 inclusive secondary schools in Calabar Metropolis. A sample of 40 senior secondary two (SS2) gifted learners were drawn using a simple random sampling technique. Data were collected using a validated questionnaire on curriculum adaptation strategies and students' Mathematics achievement scores. The instrument was validated by experts in gifted education, and two experts in educational measurement and evaluation, while reliability was established using Cronbach's alpha which yielded a reliability coefficient of .82 and .87. Data analysis was conducted using Pearson Product Moment Correlation Coefficient to determine the relationship between variables at .05 level of significance.

Results

Hypothesis 1: There is no significant relationship between content differentiation and gifted learners' academic achievement in Mathematics. To test this hypothesis, Pearson Product Moment Correlation was applied to analyse the information collected on content differentiation as the independent variable and gifted learners' academic achievement in Mathematics as the dependent variable. The results of this analysis is presented in Table 1.

Table 1: Pearson Product Moment Correlation for the relationship between the Content differentiation and gifted learners' academic achievement in Mathematics in inclusive schools (N=40)

Variables	X	SD	r-value	p-value
Content differentiation	16.6543	2.9889	.708*	.000
Academic achievement in Mathematics	23.8762	3.7865		

* Significant at .05, df = 38

The result in Table 1 above revealed a positive relationship between content differentiation and Mathematics achievement ($r = 0.708$, $p < 0.05$). Since the p-value of 0.000 is less than the 0.05 level of significance, the null hypothesis was rejected. This implies that the more teachers differentiate Mathematics content to suit gifted learners, the higher the learners' academic achievement.

Hypothesis 2: There is no significant relationship between enrichment activities and gifted learners' academic achievement in Mathematics. To test this hypothesis, Pearson Product Moment Correlation was applied to analyse the information collected on enrichment activities as the independent variable and gifted learners' academic achievement in Mathematics as the dependent variable. The results of this analysis are presented in Table 2.

Table 2: Pearson Product Moment Correlation for the relationship between the enrichment activities and gifted learners' academic achievement in Mathematics in inclusive schools (N=40)

Variables	X	SD	r-value	p-value
Enrichment activities	15.7653	2.8765		.000
Academic achievement in Mathematics	23.8762	3.7865	.812*	

* Significant at .05, df = 38

The result of the analysis in Table 2 showed a significant positive relationship between enrichment activities and Mathematics achievement ($r = 0.812$, $p < 0.05$). Since the p-value of 0.000 is less than 0.05, the null hypothesis was rejected. This means that when gifted learners are exposed to enrichment activities such as problem-solving tasks, projects, puzzles, and advanced exercises, their achievement in Mathematics improves.

Discussion

The findings indicate that curriculum adaptation strategies contribute significantly to Mathematics achievement among gifted learners in inclusive schools. The strong relationship between content differentiation and achievement supports the view that gifted learners perform better when classroom instruction is modified to suit their readiness and ability levels. The finding aligned with Onyishi and Sefotho (2021) whose findings showed that students exposed to adapted and differentiated mathematics content demonstrated significantly higher self-efficacy and improved achievement compared to those taught using conventional methods. The study concluded that content adaptation through differentiated instruction supports both high-ability and average learners, thereby enhancing mathematics achievement in inclusive classrooms.

The finding agreed with Özdemir and Işıksal-Bostan (2021), who found that intentional adaptation of mathematical content is essential for meeting the advanced learning needs of gifted students and for sustaining their academic growth. The finding is in line with Otieno (2025) who found that students in the differentiated instruction group performed significantly better in mathematics than those in the control group, with high-ability and gifted learners showing marked improvement in problem-solving and conceptual understanding. The study concluded that content adaptation within differentiated instruction frameworks is an effective strategy for improving mathematics achievement in inclusive learning environments.

Similarly, enrichment activities provide learners with challenging and stimulating experiences that improve their understanding of Mathematical concepts. Renzulli, (2012) noted that for gifted learners, enrichment is particularly important in Mathematics because it provides the depth, complexity and novelty needed to sustain their interest and intellectual growth. A systematic review of interventions for gifted students further revealed that enrichment-based instruction consistently improves academic achievement, especially in Mathematics and Science. Students who participated in enrichment activities outperformed their peers in Mathematical problem-solving, creativity and conceptual understanding (Kim, 2016). Leikin, (2021) listed the enrichment activities commonly associated with improved Mathematics achievement among gifted learners to include

Mathematics clubs, Mathematical Olympiads, project-based learning, inquiry-based tasks, use of technology such as GeoGebra and advanced puzzles and modelling activities.

Conclusion

Curriculum adaptation strategies are critical determinants of gifted learners' academic achievement in Mathematics. Differentiation and enrichment enhance cognitive engagement, conceptual understanding, and problem-solving ability in inclusive classrooms. Therefore, the strategies should be deployed and used in teaching gifted and talented learners and also should be replicated across all schools that practice gifted education system. Conclusively, the effective and application of curriculum adaptation enhances academic performance of gifted learners in inclusive settings in the study area.

Recommendations

1. Mathematics teachers in inclusive schools in Calabar Metropolis should regularly employ content differentiation strategies like curriculum compacting, advanced exercises and higher-order problem solving tasks to meet the learning needs of gifted learners.
2. Educational authorities in Cross River State should develop policies that require schools to incorporate enrichment programmes and differentiated instructional strategies into Mathematics teaching for gifted learners.

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