American Journal of Alternative Education
ISSN: 2997-3953 (Online)
Vol. 2, No. 8, Aug 2025,
Available online at: https://scientificbulletin.com/index.php/AJAE

Instructional Adaptation and Teachers' Productivity in Inclusive Education Classrooms with Learners with Autism

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Article information:
Manuscript received: 26 Jun 2025; **Accepted:** 28 Jul 2025; **Published:** 26 Aug 2025

Abstract: Students in our schools are educated in inclusive settings now more than ever before. Autism spectrum disorders are lifelong developmental disabilities that can impact how people understand what they see, hear and otherwise sense. The present study that was carried out in Mezam Division of the North West Region of Cameroon, was aimed at examining the effects of instructional adaptation on teachers' productivity in classrooms with learners with autism. Specifically, the study was guided by three objectives, namely, to examine the effects of ipsative assessment on teachers' productivity in classrooms with learners with autism; to assess the effects of one to one instruction on teachers' productivity in classrooms with learners with autism; and to investigate the effects of collaborative learning on teachers' productivity in classrooms with learners with autism. Theoretically, the study made use of Vygotsky's social constructivist theory of cognitive development; Tchombe's theory of mediated mutual reciprocity; Bandura's self-efficacy and social cognitive theory. Methodologically, the study made use of mixed research method with the use of both quantitative and qualitative methods of data collection and analysis. A concurrent nested design was used for the study. A sample of 15 teachers who had children with autism was selected from inclusive schools within the Division. The study was conducted using three instruments for data collection, namely questionnaire for teachers, observation guide for children with autism and focus group discussion guide for teachers. The findings of the study revealed that collaborative learning significantly predicts productivity, explaining 87.9% of its variation. For every unit increase in collaborative learning, productivity increases by 0.603, while age negatively affects productivity ($\beta = -2.064$, $p = 0.006$). One-to-one instruction significantly predicts teacher productivity, explaining 83.7% of its variation. For every unit increase in one-to-one instruction, productivity increases by 0.597 ($\beta = 0.597$, $p = 0.004$). Ipsative assessment has a positive and statistically significant impact on teacher productivity. The coefficient for ipsative assessment is 0.631 with a standard error of 0.166 and a p-value of 0.004. It is therefore recommended that teachers should provide children with autism with clear assessment rules that do no lead to competition with other learners but concentrate on their previous and current learning outcomes.

Keys words: Instructional Adaptation; Collaborative Learning; One-to-one Instruction; Ipsative Assessment; Teachers' Productivity; Autism.

INTRODUCTION

Teachers in the general education setting are expected to implement both curricular and instructional adaptations in an effort to meet the needs of diverse learners. Two definitions of adaptations are addressed in this article. Curricular adaptations are defined as: any adjustments or modifications in learning expectations, curriculum, content, the environment, instruction, or materials used for learning

that enhance a person's performance or allows at least partial participation in an activity (Baumgart et al., 1982; Udvari-Solner, 1992). Deschenes, Ebling, and Sprague (1994) define instructional adaptations as: "The practice of changing the manner in which instruction is delivered in order to meet the needs of individual students including grouping strategies, formats for evaluation, and methods of presenting lessons" (p. 7).

Eilam and Poyas (2006) explain that teaching is complex. Teachers who are effective in this complex and unpredictable context are adaptive, Effective teachers constantly monitor students' understanding and adjust their instruction accordingly. Duffy and Hoffman (2002) stated, "Instruction is a complex orchestration of techniques and materials that teachers creatively adapt from one instructional situation to another. Glossing over this complexity is misleading".

Children with special needs often experience a stressful life than those children developing normally. They go through a variety of stress due to their disabilities. curriculum in the regular education class is adapted, when necessary, to meet the needs of any pupil for whom the standard curriculum is inappropriate. Autism spectrum disorders are lifelong developmental disabilities that can impact how people understand what they see, hear and otherwise sense (Alberta, 2003). This can result in difficulties with social relationships, communication and behaviour. The Diagnostic and Statistical Manual of Mental Disorders, DSM-IV (American Psychiatric Association, 1994) defines autism spectrum disorders as pervasive developmental disorders characterized by: qualitative impairment in social interaction; qualitative impairment in communication; restricted, repetitive and stereotypic patterns of behaviour, interests and activities.

There is considerable variability in how learning and behavioural characteristics affect a particular individual with autism spectrum disorders so programming must be individualized. Knowing how autism spectrum disorders affect students' abilities to process information and communicate are critically important to planning. Students' educational programming may include a combination of instructional activities from the regular curriculum, as well as activities based on goals and objectives that are unique to the individual and set out in an individualized program plan (IPP)

Adaptations encourage the inclusion of all students by addressing individual learning styles and needs. Within the context of inclusion, teacher acceptability of various adaptations is a critical issue in understanding why accommodations are made or not made for students facing difficulties (Subban, 2006). Consequently, it is also important to note that managing to understand why teachers tend to implement or avoid the implementation of certain adaptations in their classrooms is a difficult and demanding process, mainly due to: a) the complexity underpinning teachers' decisions over instructional practices, b) the multifaceted aspects of teaching, and c) the impact that the unique contextual and educational characteristics of different national systems exert on teachers' decision-making processes (Kohler et al, 2008). Despite these complexities, analysing teachers' acceptability of routine adaptations is a key variable for understanding their compromise in teaching diverse students in inclusive classrooms and for learning to what extent they are ready to adapt and differentiate instruction. Moreover, studying how teachers approach adaptations may contribute not only to identify teacher preference, but also the various barriers and impediments to implementing them (Molton, 2003; Scott, et al., 1998). The current study therefore examined instructional adaptation strategies and its impact on teachers' productivity in classrooms with learners with autism. The study was carried out in Mezam Division of the North West Region of Cameroon.

OBJECTIVES AND HYPOTHESES OF THE STUDY

Objectives

1. To examine the effects of ipsative assessment on teachers' productivity in classrooms with learners with autism in some selected primary schools in Mezam Division.
2. To assess the effects of one to one instruction on teachers' productivity in classrooms with learners with autism in some selected primary schools in Mezam Division.

3. To investigate the effects of collaborative learning on teachers' productivity in classrooms with learners with autism in some selected primary schools in Mezam Division.

Hypotheses

Ho1: Ipsative assessment has no significant effect on teachers' productivity in classrooms with learners with autism

Ho2: One to one instruction has no significant effect on teachers' productivity in classrooms with learners with autism

Ho3: Collaborative learning has no significant effect on teachers' productivity in classrooms with learners with autism

CONCEPTUAL CONSIDERATIONS

In this section, we review literature on key concepts of the study, namely, Learners with Autism; Instructional Adaptation; Collaborative Learning; One-to-one Instruction; Ipsative Assessment; Teachers' Productivity.

Learners with autism

Autism Spectrum Disorders (ASD) is a neurodevelopmental disorder that typically affects a person's ability to communicate and interact socially with others (Centers for Disease Control and Preventions, 2015). Most people with ASD also exhibit challenging or repetitive behaviors. Autism can, but does not always, affect an individual's cognitive ability. Because autism is a spectrum disorder, it affects each person differently and presents with varying degrees of severity. According to the Centers for Disease Control and Prevention (2015), one in every 68 children has ASD ("Who Is Affected,"). The disorder affects people from various racial, ethnic, and socio-economic backgrounds, and it occurs in males five times more often than in females. The exact cause of autism is unknown; however, certain factors increase the risk of autism, such as an existing family history of it and children born to parents of an older age Centers for Disease Control and Preventions (2015).

To make a diagnosis of autism utilizing the current diagnostic criteria, deficits must be found in each of the three areas. With the idea that a single cause underlies each of the three areas of difficulty in autism even if this cause may vary among individuals on the autism spectrum, this triad definition resulted in a search for the cause of autism. Happé & Ronald (2008.) Indeed, any mental disorders and anomalies of neurological development should be diagnosed in accordance with the DSM5 criteria, the most recent revision of which was released by the American Psychiatric Association in March 2022 under the name DSM-5 TR (Hyman Susan, Levy Susan & Myers Scott 2020). It is pertinent to note that the diagnosis of pervasive developmental disorders (PDDs), which include the diagnoses of autism disorder, Asperger disorder, pervasive developmental disorder, childhood disintegrative disorder, and Rett disorder, was expanded with the publication of the DSMIV in 1994 (Hyman et al. 2020). To put it another way, the DSM-5 updated the DSM-IV-TR, which formerly classified five distinct diseases under the general category of "Pervasive Developmental Disorders," into a single spectrum known as Autism Spectrum Disorder (ASD). The symptoms are now more broadly defined under the new definition and apply to the entire spectrum, but 8 (47) the severity of the disorder might still vary from person to person. (Faroy Michal, Meiri Gal, & Arbelle Shoshana 2016.)

Instructional Adaptation

Instructional adaptation is conceptualized as any adjustments or modifications in learning expectations, curriculum, content, the environment, instruction, or materials used for learning that enhance a person's performance or allows at least partial participation in an activity (Baumgart et al., 1982; Udvari-Solner, 1992). Deschenes, Ebling, and Sprague (1994) define instructional adaptations as: "The practice of changing the manner in which instruction is delivered in order to meet the needs of individual students including grouping strategies, f9rmats for evaluation, and methods of presenting lessons" (p. 7).

Adapting instruction and curriculum is one component of inclusive schools. The research on effective schools can be linked to making curricular and instructional adaptations for students. Mauer (1996) states: An effective inclusive school is a diverse, problem-solving organization with a common mission that emphasizes learning for all students. It employs and supports teachers and other staff members who are committed to working together to create and maintain a climate conducive to learning. The responsibility for all students is shared. An effective inclusive school acknowledges that such a commitment requires administrative leadership, ongoing technical assistance, and long-term professional development.

Schön (1983, 1987) described how professionals, including teachers, reflected on their practice not only after engaging in their work (reflection-on-action) but also in real time as they work (reflection-in-action). This perspective suggests that teachers, while teaching, constantly monitor their instruction and their students' learning, making adjustments as needed. Thirty years later, researchers still note the importance of Schön's theory of reflection-in-action Zeichner & Liston, (2014). Educational researchers have also described teaching as improvisation Borko & Livingston (1989) Sawyer (2004). That is, similar to an actor on a stage, teachers improvise and make adaptations that "emerge from unpredictable and unscripted dialogue" Sawyer (2004). Researchers have demonstrated that, indeed, teachers are adaptive. For example, Reilly (2009) studied the instructional practices of a high school English teacher and found that the teacher adjusted his language arts instruction by modifying the curriculum to incorporate specific texts to meet his students' instructional needs and interests.

Types of adaptations teachers can make in inclusive classrooms

There are many types of adaptations that can be implemented in the general education setting. A key element that influences the type of adaptations that general education teachers use is the method in which they evaluate students' knowledge base and prior experiential learning (Schumm & Vaughn, 1991). General education teachers tend to implement routine adaptations such as varying materials or adjusting groups (Fuchs et al., 1995). In two effective schools in Pittsburgh, Sizemore, Brossard, and Harrigan (1983) found that teachers actively made adaptations in printed materials such as basal readers and their corresponding assessments. Adaptations made in the regular education setting often include four main categories: time, learning styles and instructional delivery, environment, and adjustments in content (Murphy, Meyers, Oelson, McKean, & Custer, 1995). Teachers in effective schools, where students consistently achieve, adapt instruction to meet students' individual needs (Spartz, 1977). In this study, we consider collaborative learning, one-to-one instruction and ipsative assessment as strategies of instructional adaptions.

Collaborative Learning

According to smith (1992) Collaborative learning" is an umbrella term for a variety of educational approaches involving joint intellectual effort by students, or students and teachers together. One of the major challenges facing inclusive education for children with ASD is the identification and the removal of barriers of learning, ranging from attitudinal barriers to those related to how we organize workspaces and the conception of educational resources. The collaborative approach is one of the most effective ways of learning, and it has the benefit to develop the culture of inclusion in schools. In fact, the major challenge of the system is to personalize the educational therapeutic approach, respectively to create learning environments that generate meaningful learning experiences for each beneficiary.

Collaborative learning activities vary widely, but most center on students' exploration or application of the course material, not simply the teacher's presentation or explication of it. Students collaborate to attain goals through collaborative learning. The idea behind collaborative learning is that students may help each other learn and build a deeper comprehension of the subject matter by working together. Collaborative learning represents a significant shift away from the typical teacher-centered or lecture-centered milieu in college classrooms. In collaborative classrooms, the lecturing/ listening/note-taking process may not disappear entirely, but it lives alongside other processes that are based in students' discussion and active work with the course material. Teachers who use collaborative learning

approaches tend to think of themselves less as expert transmitters of knowledge to students, and more as expert designers of intellectual experiences for students-as coaches or mid-wives of a more emergent learning process. Autistic children are often faced with challenges related to social interaction, communication, and interest during play. This underscores the importance of exploring collaborative play as a potential intervention. Collaborative play, where children engage together towards shared goals, offers promising prospects for improving communication abilities in autistic children.

Ipsaptive assessment

Hughes (2011) defines ipsative assessment as "assessment that compares existing performance with previous performance. Many informal and practical learning experiences are assessed in this way such as sports coaching, music teaching and in computer games. A personal best in athletics is an ipsative assessment. By contrast, in much academic learning, where assessment is made in relation to external attainment criteria or rubrics, credit is rarely given for how far the learner has advanced since the previous piece of work" (p. 353). In an ipsative academic assessment the reference point for judgements about student work is the student's previous work rather than externally set standards and criteria. This means the focus is on learner progress, or lack of progress, rather than meeting external standards, although the notion of progress will be inevitably be framed to some extent by the external context of the course of study.

Ipsative assessment is an approach to evaluating student progress that covers a wide range of assessment and feedback practices Martínez (2021). He further stressed that the evaluation of the quality of the performance of a student by reference to their previous performance(s), not by reference to the rest of the cohort (norm referenced assessment), nor against expected standards based on programme objectives (criterion-referenced assessment). In ipsative assessment, students receive an indication of their achievement that represents the extent of their improvements from their previous assessed task(s) in relation to one or more objectives. In turn, ipsative feedback (formal self-referential feedback) describes and celebrates those specific improvements, identifies areas lacking in progress, and proposes feed forward. Hughes (2011) has proposed that ipsative assessment may offer a solution to learner motivation because this focuses on their development over time rather than meeting competitive short-term outcomes. Success does not then need to be the preserve of the highest achievers, and provided that their course of study is appropriate, all learners at all levels can demonstrate progress.

One to one instruction

Research supports the effectiveness of one-to-one tutoring and indicates that one-to-one instruction may be essential for children who are at high risk. Pinnell (1994), identified stronger reading achievement for Reading Recovery students over those students receiving small group literacy instruction. Similarly, the U.S. Department of Education's Institute of Education Studies (2003) found that one-to-one instruction was effective for at-risk readers. Harrison (2002) studies identified a need for the lowest achieving students in particular to receive one-to-one instruction. One-on-one intervention can lead to a reduction in the number of students identified as struggling or learning disabled (Vellutino et al, 1996). The implementation of individualized instruction, in concert with professional development for the instructor, continuously show promise for students experiencing difficulties with reading (Vernon-Feagans, 2013).

In response to intervention (RTI) model of instruction, interventions for struggling students become more intensive as the student requires additional support to meet academic or behavioral goals. Usually, high-quality core classroom instruction comprises the first tier and the most intensive interventions, such as special education placement, occur at the highest tier. Instructional intensity is increased by using more systematic and explicit individualized instruction, increasing the frequency or duration of instruction, creating smaller student groupings, and utilizing instructors with greater expertise Fuchs & Fuchs (2006). The need for smaller instructional groupings, and at times one-on-one instruction, to support struggling readers is fundamental to the design of the RTI model. Therefore, a need exists for classroom teachers to provide individualized instruction to close the learning gap for certain students,

especially when additional resources for support outside of the general classroom may be lacking.

Teachers' productivity

The quality of output produced by any institution is dependent on the quality of its teachers. It is important to say that teachers play a very significant role in determining the quality of education that children receive. The teachers are great determinant in ensuring good academic performance in public examinations. No wonder that it is often said that teacher is a very important resource in any educational system. According to Aina, Ogundele & Olanipekun (2013), of all the resources in the educational system, the most vital educational resources are the teacher. Obadara (2005) opined that teachers are highly essential for the successful operation of the educational system and serves as a key to productive and educational development. Teacher productivity can be measured by looking at how teachers plan, implement, and evaluate learning. It can also be measured by looking at academic achievement and professional development.

Teacher productivity, as defined by Ndu et al (2007) is the relationship between the total resources input utilized in the production process. In this context a teacher is said to be productive if such an individual is sufficiently motivated, devoted and committed to his or her duties, and demonstrates willingness to stay in the teaching profession. Such an efficient or productive teacher can be seen to produce maximum output with a given quantity of input or produce a given quality of output with the minimum quantity of inputs.

For a highly productive teacher there is an optimal relationship between his output and input. A highly productive teacher makes optimal use of the time available to him to see that the students acquire necessary skills, knowledge and attitudes as specified in the school's curricular and co-curricular activities. He further said that such a teacher demonstrates sufficient interest in the operation of the school in spite of adverse external influences. Teachers that are highly motivated by the principal are found to be associated and committed to school work. It, therefore, suggests that for teachers to be highly productive in the school, the principal has to be dynamic, show good examples and treat teachers as colleagues. Teacher productivity can be seen as all the efforts put in the administration of the duty to bring out teachers' best potentials in teaching their students to have better result in examinations.

THEORETICAL CONSIDERATIONS

The study was guided by Vygotsky's social constructivist theory of cognitive development. According to Vygotsky (1978), individual intellectual development cannot be understood without reference to the social milieu in which the child is embedded. For Vygotsky, children's cognitive development must be understood not only as taking place with social support interaction with others, but also as involving the development of skill with socio-historical development tools that mediate intellectual activity. Hence, where Piaget looked at developing children and saw junior scientists, working by themselves to develop an independent understanding of the world, Vygotsky saw cognitive apprentices, learning from master teachers the skills that are important in the child's culture (Feldman, 2003). This theory is applicable to the present study from the point of view of collaborative learning as a strategy for teaching learners with autism. Research has demonstrated that peers can help teach social skills to students with autism. In order for this to be successful, activities have to be appropriately structured, training has to be made available to peers, and teachers have to actively prompt and reinforce the interactions between students with autism and peers. Peers also benefit by having students with autism in the classroom. When peers of children with autism are educated about autism, and are given an opportunity to act as peer tutors/buddies, they learn acceptance and empathy, act as role models, and become more aware of individual strengths and weaknesses (Wagner, 1999).

Another theory that guided the study was Tchombe's mediated mutual reciprocity theory. The theory of Mediated Mutual Reciprocity (MMR) (Tchombe, 2019) is being proposed, whereby the teacher engages in a one-to-one encounter with children with autism and plays a mediation role. Mediated Mutual Reciprocal theory explains the process in interaction which provokes depth in promoting the

psychosocial wellbeing of children with autism. MMR sees the interaction between the teacher and child from a positive point of view, where each remains invaluable contributors to the growth and development of each other (Tchombe, 2020). The MMR theory equally engages the teacher and the learner with the use of ipsative assessment as learning is not based on competition but rather progress by comparing previous learning task with current state of learners.

The study was equally guided by the Social Cognitive Theory (Bandura 1986), which favours a model of causation involving triadic reciprocal determinism. In this model of reciprocal causation, behaviour, cognition and other personal factors, and environmental influences all operate as interacting determinants that influence each other. Human expectations, beliefs, emotional bents and cognitive competencies are developed and modified by social influences that convey information and activate emotional reactions through modeling, instruction and social persuasion (Bandura, 1986). Self-efficacy can play a role in not only how you feel about yourself, but whether or not you successfully achieve your goals in life. The concept of self-efficacy is central to Albert Bandura's social cognitive theory, which emphasizes the role of observational learning, social experience, and reciprocal determinism in developing a personality. Self-efficacy is part of the self-system comprised of a person's attitudes, abilities, and cognitive skills, according to Bandura. This system plays a major role in how we perceive situations and how we behave in response to different situations. Self-efficacy is an essential part of this this study because it outlines the measures of teachers' productivity in the teaching of children with autism.

METHODOLOGY

Design

A mixed method research design was chosen for the study. This involved the use of both quantitative and qualitative approaches in a sequential process. Hence a concurrent nested design was adopted, whereby quantitative and qualitative data were both collected and qualitative used to further explain the quantitative. The purpose was to use the qualitative findings to further explain and interpret the results from the quantitative phase. The overall purpose of this design is that qualitative data helps explain or build upon initial quantitative results.

Sample and sampling technique

The population of this study included the 15 teachers of inclusive schools in Mezam division who had children with autism in their classrooms. A purposive or judgemental sampling technique was adopted for this study. In this regard, specific elements, which satisfy particular criteria of the study, were selected. Hence, extra care was taken to select those settlements that satisfy the requirements of the research purpose. The following criteria were used to adopt purposive sampling: The teachers should have at least one identified autism child in the classroom; The teacher should have taught the child for at least one academic year; Children should be permanent and regular pupils of the school.

Instruments for data collection

The study was conducted using three instruments for data collection, namely questionnaire for teachers, observation guide for children with autism and focus group discussion guide for teachers. Content validity focused upon the extent to which the content of the instruments corresponded to the content of the theoretical concept they were designed to measure. Content validity was therefore mathematically appreciated using the Content Validity Index (CVI) whereby the instruments for data collection were checked by three experts in the field of developmental psychology. To come out with the statements that an instrument is judged valid, the inter-judge coefficient of validity was computed using the following formula: CVI = (No of judges declared item valid)/ (total No of judges). The above 0.75, CVI obtained for this study was declared satisfactory. A pilot study of the research instruments was carried out on 5 teachers to make sure that they understood the questions and that the questions measured what they ought to measure very well and exhaustively. This led to the revision of some items in the questionnaire. The Alpha reliability coefficients ranged from 0.632 to 0.771 while this was value equally very

satisfactory for the integrated value mapping (IVM) of 0.714.

Ethical considerations

The ethical issues related to this study focused on the research participants, the researcher and sources of secondary data. As far as the participants are concerned, the ethical issues to address to ensure the quality and validity of the data and the study at large consisted of explaining to the participants the significance and helpfulness of the study and justifying why it was important for them to participate in the study. In this line, the researcher made sure the participants were adequately aware of the type of information needed from them, why the information was being sought, what purpose it was put to, how they were expected to participate in the study, and how it directly or indirectly affected them without pressurizing them to consent.

FINDINGS

Ho1: Ipsative assessment has no significant effect on teachers' productivity in classrooms with learners with autism

Table 1 Regression model summary for collaborative learning and teachers' productivity

Productivity	Coef.	St.Err.	t-value	p-value	[95% Conf	Interval]	Sig
Collaborative_Lear~g	.603	.129	4.67	.001	.315	.89	***
Age	-2.064	.587	-3.52	.006	-3.371	-.756	***
YOTE	.803	.436	1.84	.095	-.168	1.774	*
Qualification	.502	.502	1.00	.341	-.617	1.62	
Constant	1.853	.915	2.02	.07	-.187	3.892	*

Mean dependent var	-0.000	SD dependent var	2.867
R-squared	0.879	Number of obs	15
F-test	18.177	Prob > F	0.000
Akaike crit. (AIC)	51.436	Bayesian crit. (BIC)	54.976

**** p<.01, ** p<.05, * p<.1*

The regression analysis results presented in Table 7 reveal important insights into the factors influencing productivity. The model shows a strong overall fit, explaining approximately 87.9% of the variance in productivity (R-squared = 0.879), which is statistically significant as indicated

Table 2 Analysis of Teachers' Differentiated Instruction Strategies in Collaborative Learning Based on FGD

Theme	Sub-Themes/ Strategies	Illustrative Participant Responses	Interpretation
Task Differentiation	Assigning roles based on ability	"When an activity is given, like drawing, those who can't draw are assigned to color. Those who can't write trace 1–10."	Teachers tailor roles in group work to align with individual student abilities, promoting inclusion.
Use of Visual Aids	Graphic organizers, charts, pictures	"We utilize visual aids like graphic organizers, charts, and pictures."	Visual tools are employed to support diverse learners in understanding and engaging with content.
Interactive Learning Strategies	Role play for social interaction	"We do role play to practice social interactions."	Role play encourages collaboration and social skill development, especially for students with ASD.

Student Voice and Agency	Opportunities to express needs	"We provide opportunities for them to communicate their needs."	Promoting self-advocacy among learners supports individualized participation in group tasks.

The FGD analysis reveals that teachers adopt a variety of inclusive strategies to cater to the diverse learning needs of their students within collaborative learning settings. A prominent approach involves task differentiation, where learners are assigned roles based on their individual abilities for instance, students who struggle with drawing are asked to color, while those unable to write independently are supported through tracing tasks. This practice ensures that every learner participates meaningfully without feeling excluded. Additionally, teachers rely on visual aids, such as graphic organizers, charts, and pictures, to simplify content delivery and enhance understanding among students with varied cognitive and linguistic abilities. Another strategy involves the use of interactive learning techniques, particularly role play, which is employed to help learners practice social interactions and build confidence within group settings. Lastly, educators emphasize the importance of student voice and agency, as they intentionally create spaces for learners to express their needs and preferences during collaborative tasks. Collectively, these practices reflect a commitment to fostering an inclusive and supportive classroom environment, enabling all learners to contribute and benefit from collaborative learning experiences.

Ho2: One to one instruction has no significant effect on teachers' productivity in classrooms with learners with autism

Table 3 Regression model summary for one-on-one instruction and teachers' productivity

Productivity	Coef.	St.Err.	t-value	p-value	[95% Conf	Interval]	Sig
One_to_one_Instruc~s	.597	.162	3.68	.004	.236	.958	***
Age	-2.876	.655	-4.39	.001	-4.336	-1.415	***
Qualification	.46	.586	0.78	.451	-.846	1.766	
YOTE	1.267	.529	2.40	.038	.089	2.445	**
Constant	2.665	1.02	2.61	.026	.392	4.938	**

Mean dependent var	-0.000	SD dependent var	2.867
R-squared	0.837	Number of obs	15
F-test	12.791	Prob > F	0.001
Akaike crit. (AIC)	55.962	Bayesian crit. (BIC)	59.502

**** p<.01, ** p<.05, * p<.1*

The results of the linear regression analysis presented in Table 6 examine the impact of one-to-one instructional strategies and demographic variables on teachers' productivity in classrooms with learners with autism. The overall model is statistically significant ($F(4,10) = 12.791$, $p = 0.001$), indicating that the included predictors reliably explain variation in teacher productivity. The model accounts for approximately 83.7% of the variance in productivity, as reflected by the high R-squared value of 0.837.

Table 4 Analysis of Teachers' Differentiated Instruction Strategies in One-on-One Instruction Based on FGD Responses

Theme	Sub-Themes / Strategies	Illustrative Participant Responses	Interpretation
One-on-One Instruction	Physical demonstration of tasks	I usually show them what to do by physically demonstrating the action several times.	Teachers use modeling to facilitate understanding, particularly for learners with limited verbal skills.
	Use of pictures and symbols	We use images or flashcards to explain routines or concepts so they can easily follow.	Visual aids help learners with autism process and retain instructions more effectively.

	Maintaining a calm voice	When working with them one-on-one, I make sure to speak calmly because they get anxious easily.	Calm verbal tone creates a safe and supportive environment conducive to focused learning.
	Motivation	When they do something right, I give a thumbs-up or clap, and they get excited to do more.	Positive reinforcement encourages engagement and builds learner confidence.
	Direct, specific instructions	You have to say exactly what you want them to do—no general instructions.	Learners respond better to precise, clear instructions tailored to their specific needs.

Overall, the findings reveal that one-on-one instruction for learners with autism in Mezam primary schools is thoughtfully adapted through a combination of modeling, visual supports, calm verbal cues, motivational techniques, and highly specific directives. These strategies demonstrate a commitment by teachers to meet the unique needs of these learners, despite the broader challenges of large class sizes and limited resources.

Ho3: Collaborative learning has no significant effect on teachers' productivity in classrooms with learners with autism

Table 5 Regression model summary for ipsative assessment and teachers' productivity

Productivity	Coef.	St.Err.	t-value	p-value	[95% Conf	Interval]	Sig
Ipasive_Assessment	.631	.166	3.79	.004	.26	1.001	***
Age	-2.229	.663	-3.36	.007	-3.706	-.751	***
Qualification	.801	.569	1.41	.19	-.467	2.069	
YOTE	.645	.497	1.30	.224	-.464	1.753	
Constant	2.045	1.038	1.97	.077	-.268	4.359	*

Mean dependent var	-0.000	SD dependent var	2.867
R-squared	0.842	Number of obs	15
F-test	13.340	Prob > F	0.001
Akaike crit. (AIC)	55.433	Bayesian crit. (BIC)	58.973

**** p<.01, ** p<.05, * p<.1*

The results indicate that ipsative assessment has a positive and statistically significant effect on teacher productivity. The coefficient for ipsative assessment is 0.631 with a standard error of 0.166, and the associated p-value is 0.004, which is well below the 0.05 threshold. This suggests that an increase in the use of ipsative assessment where a learner's current performance is compared to their past performance leads to a significant improvement in teacher productivity.

Table 6 Analysis of Teachers' Differentiated Instruction Strategies in Ipsative Assessment Based on FGD Responses

Theme	Sub-Themes / Strategies	Illustrative Participant Responses	Interpretation
Ipsative Assessment	Progress reports	We prepare a progress report every term based on their individual development.	Progress tracking allows teachers to reflect on both learner growth and instructional effectiveness.
	Reference to the IEP plan	We often check the IEP to see what the learner is expected to work on before planning activities.	IEPs guide personalized instruction and ensure alignment with learner-specific goals.

Impact on Productivity	Self-development	These strategies have helped me grow professionally and become more patient and observant.	Differentiated strategies such as one-on-one teaching and ipsative assessment enhance teacher skill and reflective practice.
Recommendations	Parental involvement	Parents should be educated on how to be actively involved in school activities.	Strengthening school-family partnerships can reinforce learning and provide continuity at home.
	Inclusive exam arrangements	To avoid discrimination, more time should be given to autistic children during exams.	Extended time accommodates diverse learning needs and reduces anxiety during assessments.
	Interest-based evaluation	They should be evaluated in their area of interest.	Assessing learners in preferred areas fosters motivation and showcases their strengths.
	Creation of cool rooms	Cool rooms should be created in schools.	Quiet, calming spaces help learners self-regulate and return to learning with greater focus.

In summary, the FGD findings underscore the significance of ipsative assessment as a differentiated strategy that not only supports learner progress but also enhances teacher growth and instructional quality. The suggestions offered by teachers reflect a commitment to inclusive practices that prioritize learner well-being, individualized instruction, and collaborative support systems involving families and school leadership.

DISCUSSIONS

According to findings of the study, the better the collaborative learning, the more the teacher productivity as indicated by the positive sign of standardized coefficient Beta. This falls in line with a study conducted by Webb (1993), who found that the students who worked in groups on computational math problems scored significantly higher than equivalent-ability students who worked individually. The “conditions” paradigm tries to determine the conditions that moderate the effectiveness of collaboration on learning, for instance, individual characteristics of group members, group heterogeneity and size, and task features. Webb’s (1991) study reported significant differences in the collaborative learning experiences of boys and girls. Boys were more likely than girls to give and receive elaborated explanations, and their explanations were more likely to be accepted by group mates than girls’ explanations (Dillenbourg et al., 1996).

According to findings of the study, the better the ipsative assessment, the more the teachers’ productivity in teaching learners with autism as indicated by the positive sign of standardized coefficient Beta. Ipsative assessment was seen to be the most frequently used method by teachers in the teaching of learners with autism with the highest predictive value. This falls in line with a study carried out by Hughes, Wood and Kitagawa (2014), distance learners often rely on written feedback for learning and for motivation. But feedback that is ‘given’ to learners and that relies on praise to motivate does not engage learners in the process of self-development. We propose that an ipsative approach to assessment and feedback based on a comparison with a learner’s previous performance motivates distance learners by developing a self-awareness of progress that encourages learners to interact with feedback and apply this to future work.

According to findings of the study, the better the one to one instruction, the more the productivity of teachers as indicated by the positive sign of standardized coefficient Beta. This means that one to one

instruction demands consideration of the teachers' contribution to the instruction. When teachers engage on one to one instruction their productivity increases in profound ways. This falls in line with Meghan and Steve (2017) who carried out a research on teachers' experiences providing one-on-one instruction to struggling readers. This study examined the experiences of 12 kindergarten, first and second grade classroom teachers who provided one-on-one intervention instruction for struggling readers within the general classroom context. Teachers were interviewed at the end of the project. Interview statements clustered into four themes: managing one-on-one intervention, observing student growth, acquiring knowledge about teaching reading, and discovering specific characteristics of good teaching. Results indicated that positioning the classroom teacher at the center of a reading intervention with support may be a beneficial form of professional development. One-on-one intervention can lead to a reduction in the number of students identified as struggling or learning disabled. The implementation of individualized instruction, in concert with professional development for the instructor, continuously show promise for students experiencing difficulties with reading.

CONCLUSION

Although challenging behavior is not a defining characteristic of ASD, limited social communication skills and the strong adherence to ritual and routine can lead to challenging behaviors for some autistic children and youth (Esteves et al., 2021). The effectiveness of ABA to reduce challenging behavior has been demonstrated through research spanning the previous 40 years (Matson, et al., 1996). Although the characteristics and settings for special education for children with autism have changed over the past 40 years, gaps between research and practice exists. Challenges to implementation of evidence-based practices relate to school structure, characteristics and preparation of personnel, and disparities in education settings and services. Serving autistic students in school settings is a complex undertaking, as the population is notably heterogeneous, which requires individualized programming across a variety of settings and professionals. Selecting practices that are effective across context and feasible for implementation by general educators, special educators, paraprofessionals, and related service providers is difficult (Barry et al., 2020), as is coordinating opportunities for thoughtful collaboration and professional development for the team (Sinai-Gavrilov et al., 2019).

The competing demands for school resources continue to mount, with increased pressure on schools to have students perform well on high stakes testing and meet rigorous academic requirements for graduation. This pressure limits autistic students' access to specialized instruction related to social interaction and communication, transition preparedness, life skills, and coping skills (Snell-Rood et al., 2020). These structural factors may affect overall program quality for students with autism, which has proven to be low in schools across the country (Kraemer et al., 2020). High quality programs serve as a foundation for the implementation of EBPs, and thus poor program quality, as measured by school and classroom climate and instructional features, may itself serve as barrier to EBP implementation (Odom et al., 2018).

RECOMMENDATIONS

Ipsative assessment is a high predictor of teacher productivity. Teachers should provide children with autism with clear assessment rules that do no lead to competition with other learners but concentrate on their previous and current learning outcomes.

Collaboration can give more information about children with autism. Teachers are called upon to form class groupings that inclusive and give leaners with autism the opportunity to interact with their peers.

One to one instruction is an important strategy of how teachers can better the learning outcomes of children with autism. Teachers should organise follow up lessons with learners and implement individualised education plans for each learner.

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