

Teacher Utilization of Classroom Environment to Enhance Effective Learner Engagement in Ghana

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ABSTRACT: This study investigated how early childhood education (ECE) teachers in Ghana's Lower Manya Krobo District utilise their classroom environment to enhance learners' effective engagement and how they modify their teaching strategies in response to changing conditions. Guided by Reggio Emilia approach, this study employs the exploratory sequential mixed-method design involving 122 ECE teachers. Data were collected using questionnaires and semi-structured interviews. The quantitative data were analysed using descriptive statistics with multiple regression analysis testing the hypothesis, while qualitative data were subjected to thematic analysis. The findings revealed that although educators, especially those with more experience and higher education, intentionally planned classroom environments and modified them, age was the only factor that significantly predicted classroom utilization when it came to teaching strategies to maintain effective engagement. Teaching experience and educational attainment had no discernible effects. Notably, while new teachers frequently used replication and reactive tactics, seasoned educators showed proactive adaptations like differentiated instruction, noise control, and innovative use of local resources. The study comes to the conclusion that teacher maturity, contextual flexibility, and intentional practices are more important for effective classroom utilization than mere formal credentials and tenure. It suggests ongoing professional development with an emphasis on classroom management, peer mentoring between more and less experienced educators, expanding the availability of affordable and culturally appropriate resources, and integrating ICT tools to maintain learner interest and engagement.

KEYWORDS: Early Childhood Education, Classroom Environment, Learner Engagement, Teacher Utilisation Strategies

INTRODUCTION

The physical environment of an early childhood classroom significantly influences learners' focus and engagement. Many studies highlight the importance of organizing the learning space to boost attention and cognitive engagement in young children (Montessori, 2019; Woolfolk Hoy & Hoy, 2020). Early childhood education (ECE) is considered as the foundation for lifelong learning and cognitive growth, covering children's experiences from infancy until age eight. According to UNESCO (2021), ECE prepares children for primary school and promotes their overall development in physical, emotional, cognitive, and social areas. During this critical period of brain development, learners' ability to concentrate and engage plays a vital role in their educational involvement and future success. The classroom environment, both physical and social, is crucial in supporting or hindering young children's focus (Mashburn, 2018; Pianta et al., 2020).

Learner engagement in ECE is influenced by factors like the teacher's interaction style, classroom layout, sensory input, resource availability, and peer dynamics (Trawick-Smith et al., 2019; La Paro et al., 2021). An engaging and well-structured environment, featuring visually appealing displays, flexible seating, designated learning areas, and chances for exploration, has been linked to improved attention in young learners (Barrett et al., 2015; van den Berg et al., 2022). This implies that a thoughtfully designed and stimulating learning space allows children to connect meaningfully with their teachers, peers, and learning materials, fostering focus, motivation, and sustained interest in educational tasks.

Worldwide, the role of classroom environments in shaping ECE learners engagement is well documented. Research by Oppong Frimpong (2019), Bergen (2015), and Gore et al. (2016) indicates that bright colours, natural light, flexible seating, and hands-on materials can significantly impact children's cognitive and emotional engagement. Additionally, Vygotsky's (1978) sociocultural perspective points out that meaningful teacher-learner interactions in a supportive space are essential for building engagement and promoting higher-order thinking. In early learning settings, the classroom is more than just a space; it is a lively environment where teaching methods and environmental features come together to influence learners' behaviour.

Studies have shown a strong connection between engagement and executive function development, academic achievement, and emotional regulation (Diamond & Ling, 2016; Blair & Raver, 2015). Thus, it is important to understand how ECE teachers use classroom environments to maintain and promote learners' focus for creating relevant interventions.

Teacher Utilization of Classroom Environment to Enhance Effective Learner Engagement in Ghana

This study is based on the Reggio Emilia Approach to education introduced by Loris Malaguzzi (1993). Malaguzzi believed that a thoughtfully designed classroom and a well-organized space encourage exploration, support focus, and foster effective engagement and attention, making the classroom the “third teacher” (Oppong Frimpong, 2019). This theory suggests that the physical and aesthetic aspects of classrooms can be used purposefully to improve engagement in child-centred practices. Since this study focuses on how teachers use classroom environments to enhance learners’ effective engagement, it aligns closely with Reggio Emilia’s idea of the environment as a teaching tool.

Utilisation of the classroom environment refers to how teachers intentionally and strategically adjust physical and social elements within the learning space to enhance learners’ engagement and focus. This includes arranging furniture, using instructional materials, designing learning areas, interacting with learners, and incorporating play-based learning. Effective engagement, in this context, refers to a learner’s ability to concentrate and maintain interest in classroom tasks and activities. It is a precursor to learning and is shaped by internal and external factors, including the environment, teaching strategies, and learner motivation.

Strategies used to Utilize the Classroom Environment to Enhance Engagement

Research indicates a strong link between the physical classroom environment and students’ effective engagement, confirming that the classroom setting affects learners’ focus. For instance, Byers et al. (2018) found that organized learning spaces and visually appealing materials boost learners’ engagement and concentration. Barrett et al. (2015) and Gore et al. (2016) revealed that natural light, ergonomic furniture, colour schemes, spacious layouts, and noise control collectively affect learning outcomes in primary-age children and significantly influence their motivation and engagement. van den Berg et al. (2022) found similar results in preschool settings, showing that sensory design features directly impacted how long students stayed attentive and engaged.

Bergen (2015) examined how play-based methods enhance cognitive engagement and concluded that flexible classroom design encourages creativity and focus. Similarly, Lehrer et al. (2022) showed that classrooms that incorporate movement and interaction result in higher levels of attentiveness among preschoolers. Additionally, visual and auditory stimuli, such as colourful posters, sound cues, and manipulatives, engage multiple senses and reduce off-task behaviour (Tonge et al., 2022). Flexible classroom arrangements, including learning centres and activity-based zones, have also been shown to enhance engagement (La Paro et al., 2021).

Thus, teachers often purposefully design classroom spaces to promote focus, minimize distractions, and support active engagement. For example, spatial arrangement is a common strategy where teachers organize furniture and learning centres for clear sightlines and easy movement, allowing children to navigate between objects and activities easily. According to Hyun (2021), spatial organization aligned with teaching goals increases children’s independence, reduces behavioural disruptions, and supports attention. Not only these but also, lighting, colour, and wall displays are other physical aspects teachers manipulate to enhance focus. Bright, natural lighting is associated with higher alertness in learners; while overstimulating colours or cluttered walls can decrease concentration (Barrett et al., 2019). Consequently, teachers counter this by using calming colours and changing wall displays to keep things fresh and relevant (Maxwell, 2020).

Noise control is also crucial. Teachers use rugs, curtains, and acoustic panels to absorb sound and limit auditory distractions (Evans et al., 2021). Creating quiet areas or reading corners with soft furnishings allows learners to escape noise, improving their ability to concentrate. Another strategy involves using flexible seating arrangements, such as beanbags, floor cushions, or standing desks, which have become popular in early childhood classrooms. These flexible seating options affords learners the opportunity to choose positions that are comfortable for focusing, as noted by Parker & Thomsen (2022).

Moreover, including material-rich learning centres like blocks, sensory tables, and role-play zones leads to hands-on engagement and sustained attentiveness. Studies by Aljabreen (2019) and Tarman (2021) show that intentional use of such centres promotes exploratory learning, essential for developing attention in young learners. In general, early childhood teachers employ a variety of environmental manipulation strategies to foster and maintain effective engagement.

Adaptation of Instructional Approaches by ECE Teachers

Teachers’ responsiveness to environmental factors significantly affects how they modify their teaching strategies and interactions with learners. A growing number of studies show that effective early childhood teachers observe learners’ focus and adjust their teaching in real-time to keep them engaged (Copple & Bredekamp, 2020; Jones & Bub, 2022).

One approach involves differentiated instruction based on learners’ attention levels and environmental triggers. For example, if a classroom gets too noisy or chaotic, teachers might switch to more interactive, kinesthetics activities or use storytelling and music to regain children’s focus (Morrison & Connor, 2021). Proximal teaching, where teachers get closer to distracted children and engage them directly, is another common approach. Teachers may lower themselves to the child’s eye level, establish eye contact, or use touch (when appropriate) to redirect attention (Denham et al., 2019). They also modify their verbal and non-verbal cues, including voice tone, gestures, and pacing, to recapture learners’ focus. Research by Whitebread & Bingham (2020) found that early childhood teachers who used exaggerated facial expressions and enthusiastic tones were more successful at engaging distracted children.

Teacher Utilization of Classroom Environment to Enhance Effective Learner Engagement in Ghana

Additionally, responsive teachers often use cues from the environment to adapt their teaching engagement. For instance, if the room's temperature or lighting affects learners' behaviour, teachers may open windows, change lighting, or adjust schedules to include more outdoor time or quiet breaks (Barrett et al., 2019). Setting up classroom routines and expectations that encourage self-regulation is a proactive method to improve learners' engagement. When learners are aware of what to expect, they are more likely to stay focused and involved (Pianta et al., 2018). Teachers model and reinforce attention-sustaining behaviours through visual schedules, cue cards, and positive reinforcement strategies. Importantly, the use of technology and digital tools has become a helpful way to maintain focus in today's classrooms. Interactive whiteboards, tablets with learning apps, and visual timers assist in managing transitions and keeping engagement high, especially in distracting environments (Suh & Hargis, 2020).

In short, early childhood teachers should adjust their instructional strategies dynamically based on feedback from the environment, using methods that prevent distractions and respond to learners' attention needs. Nevertheless, these do not happen automatically and that, teaching experience, age and teacher qualification all play a key role in achieving these. This implies that in classrooms where teachers cannot effectively adapt the environment or their strategies, possibly due to their ages, inexperience and qualifications, learners may appear disengaged, which can hinder their learning.

Statement of the Problem

In classrooms, young learners can show signs of disengagement, from distractibility and aimless movement to difficulty following instructions. While some of this behaviour is normal for their development, ongoing disengagement can disrupt early learning and social-emotional growth (Blair & Raver, 2015). Teachers act as facilitators of learning spaces; their choices in layout, teaching materials, classroom routines, and interaction styles have a direct impact on learners' ability to stay focused and engaged. Therefore, they must use available resources and teaching methods to create welcoming learning environments that encourage effective learner involvement.

However, their ability to do so depends on various factors, such as their teaching experience, qualification, age, understanding of environmental influences, resource access, and ability to integrate environment-based strategies into daily teaching. In sub-Saharan Africa, including Ghana, limited resources often restrict what teachers can do. However, studies show that teachers can create effective learning environments through low-cost measures like thematic bulletin boards, recycled educational materials, and rotating activity centres (Agyeman et al., 2023; Adjei & Osei-Poku, 2022). Mashburn (2018) emphasizes that the intentional use of available resources by teachers has a greater impact on effective engagement than the sheer quantity of resources.

Despite increasing interest in enhancing early childhood environments, there is little empirical evidence on how ECE teachers in resource-limited settings use their classrooms to maintain learner engagement. Few studies have examined these teacher-led strategies within the Ghanaian ECE system. Most research has focused on resource availability or infrastructure quality, neglecting how teachers apply these limited resources into intentional strategies that promote effective engagement. Research by Oppong Frimpong (2019) highlighted the need for adequate space, ventilation, and instructional resources to support attentiveness in ECE settings but did not explore how teachers actively use or adjust their environment to boost learners' engagement. In terms of research methods, the studies conducted did not use exploratory sequential mixed methods, nor were they done in the selected district.

This study, therefore, aims to investigate how ECE teachers in the Lower Manya Krobo District utilize their classroom environments to manage and improve learners' effective engagement. The findings will provide insights that are valuable for practitioners in similar low-resource contexts and have important implications for policy development and teacher professional development in Ghana's early childhood education sector and beyond.

Research questions and hypothesis

To achieve the stated objective, the study sought to answer the following research questions:

1. What specific strategies do early childhood teachers use to utilize the physical classroom environment to enhance learners' effective engagement?
2. How do early childhood teachers adapt their instructional approaches in response to environmental factors that affect effective engagement?

Hypothesis

H₀: Years of teaching experience, age and educational level do not significantly predict ECE teachers' utilization of the classroom environment in addressing learners' effective engagement in the Lower Manya Krobo District of Ghana.

METHODOLOGY

Research Design

This study used exploratory sequential mixed-methods design, which involves two distinct phases (i.e. qualitative and quantitative). This design is sequential, meaning one phase follows the other, and exploratory, as it aimed to understand how teachers use the classroom environment before measuring or testing. The research started with collecting and analysing qualitative data through a semi-structured interview guide. This was followed by designing and implementing a quantitative phase, which was shaped by the results of the qualitative work. Using this design was justified by its strength and relevance to ensure that the study was rooted in

Teacher Utilization of Classroom Environment to Enhance Effective Learner Engagement in Ghana

participants' real experiences and perspectives, which improved the authenticity and validity of the research. The quantitative phase did not only offer the generalizability that qualitative research alone could not provide, but it also allowed for triangulating findings, thus increasing the overall robustness of the study (Creswell & Plano Clark, 2018).

Sampling and data collection procedures

After obtaining permission from the relevant authorities, the researcher followed the designated 8 circuits for the 46 ECE schools in the district. To ensure fair representation of each circuit, two ECE schools were conveniently selected, and a teacher was chosen from each school to participate in the study. The ECE teachers were specifically selected because they had the relevant knowledge to answer the research questions effectively, based on all the demographic descriptions (teaching experience, age, and educational level). When the school gatekeepers were contacted for an official introduction and declaration of the study's intention, potential participants were informed about the research. All ethical considerations regarding confidentiality, voluntary participation, anonymity, and informed consent were strictly observed. Interview sessions were scheduled based on the convenience of the participants. Each interview session lasted between 25 and 30 minutes. During data collection and analysis, principles of trustworthiness such as confirmability, credibility, transferability, and dependability were maintained.

Data analysis procedures

The qualitative data were transcribed and thematically analysed using Braun and Clarke's (2019) method. The qualitative analysis showed a trend indicating that the educational level, age, and years of teaching experience influenced how teachers utilized the classroom environment. This finding led the researcher to proceed with a quantitative data collection using a structured questionnaire. A similar participant selection procedure for the qualitative phase was followed for the quantitative phase. As a result, 148 (out of the 178) teachers were randomly selected, and 122 returned their questionnaires within two weeks. All the schools and teachers included in the qualitative phase were automatically part of the second phase. The quantitative data from the questionnaires were analysed using descriptive statistics, including means, standard deviations, and frequency distributions, to summarize teachers' responses. Multiple Linear Regression was used to test the hypothesis formulated for the study. The data were then triangulated with the interview data and this triangulation promoted credibility and consistency across data sources.

DATA ANALYSIS

After the qualitative analysis, emerging themes that captured the strategies and adaptive behaviours of early childhood teachers concerning the classroom environment and learner engagement were outlined. The analysis also accounted for differences in teacher experience and educational qualifications, as these factors seemed to influence the depth and sophistication of responses. The information in the brackets represent descriptions of the participants (See Annex, Table 5). Thus, experience, age and educational level respectively.

Analysis of research questions

Research Question 1: Specific strategies teachers use to utilize the physical classroom environment to enhance learners' effective engagement?

Five themes emerged from this question: strategic classroom layout and seating arrangement, use of learning centres, integration of visual and interactive displays, access to age-appropriate learning materials, and incorporation of technology.

Theme 1: Strategic classroom layout and seating arrangements

This theme looked at how teachers organized furniture, space, and groupings to encourage movement, visibility, and interaction. These conditions are associated with children's effective engagement. Participants agree on the role of space in promoting participation and their responses that emerged under this theme were:

I always arrange the furniture to let more space for the children to move. I have seen that when children can move freely, they participate free in group work. (P1)

I am still learning how best to set up the classroom for interaction. Sometimes, I follow how the other teachers have arranged their classrooms and the chairs (P2)

I intentionally use circular seating during storytelling to promote eye contact and peer interaction. It keeps the learners' alert. (P3)

The layout must match the lesson objectives. For hands-on activities, I put the tables to support cooperative play and learning. (P4)

The responses indicate that free movement aids group work (experienced - Diploma holder), circular seating fosters eye contact (experienced – Degree holder), and clustering aligns layout with hands-on objectives (experienced - Master's holder). In comparison, novice SHS teachers tend to stick to inherited or copied layouts, reflecting uncertainty about how to design for interaction.

The responses acknowledge the importance of classroom layout in fostering learner engagement. More experienced teachers, especially those with higher qualifications, showed purpose in rearranging classroom furniture to encourage interaction and group

Teacher Utilization of Classroom Environment to Enhance Effective Learner Engagement in Ghana

work. For example, one master's degree holder pointed out the need to match layout with lesson objectives. On the other hand, less experienced teachers expressed uncertainty and often copied other arrangements without much thought.

Theme 2: Use of learning centres

Learning centres like pretend play, literacy, and science offer choices, help maintain focus, and provide various ways to engage. There was strong agreement among experienced teachers about the benefits of learning centres for promoting independence and engagement. These teachers described themed centres as focused on literacy, science, or role play, and that changing often keep interest high. Inexperienced teachers either didn't know how to set them up or faced challenges with materials and resources.

Participant responded thus:

I created a play corner, a literacy centre, and a science area. Learners choose based on interest and stay focused and longer. (P5)

I have heard of learning centres but haven't set them up fully because I don't have many materials. But I try to do what I can with the little materials I have. (P2)

I rotate the learning centres weekly, and this makes the classroom look new every time. In fact, I do that based on the theme for the week and I have seen that this motivates learners to explore the classroom and stay on task. (P6)

I put some toys in the corner, but I need help planning what each centre should do. Because of that, I am not able to change the centres. So the same arrangement is used for a long time. (P7)

The experienced teachers emphasized multi-centre classrooms that rotate to enhance novelty while novice teachers noted that they didn't implement centres fully due to materials or planning knowledge gaps. This pattern shows that centres serve both structural and motivational purposes.

Theme 3: Integration of visual and interactive displays

Walls, displays, and interactive charts were used to capture attention, celebrate work, and allow hands-on participation during instruction. Participants in this study stressed the importance of interactive displays and visuals in engaging learners. Unlike the inexperienced, the experienced and educated participants used displays on their classroom as teaching tools instead of them being mere decorations. They had these to say:

I hang learners' artwork and posters to make the classroom look stimulating and attractive. Some of the works are also pasted on the classroom walls. (P8)

I have a few posters and some of the work the children have done, but I don't really change them often. I don't think it is a problem. I am not sure if that matters. (P2)

Interactive wall displays like number charts with movable parts get children involved during transitions. (P1)

I am beginning to learn how to use the classroom walls for more than decoration. I know that the classroom should look beautiful, if I can. (P7)

Teachers agreed that visuals displayed in the classroom shape the learning environment and concentration. Experienced teachers went beyond decoration by using movable parts to engage learners, while novices showed uncertainty about updating displays.

Theme 4: Access to age-appropriate learning materials

Teachers curated and created materials that were safe, culturally relevant, and developmentally appropriate to maintain effective learner engagement. Their responses are presented in the following statements:

I use local materials like beads and stones for counting activities. Children are able to relate to these even more than the imported toys. (P5)

Although I believe in the foreign materials, we make our own puzzles using Ghanaian symbols and tools. This improves both cultural mindfulness and focus. (P11)

As a beginner, I am just starting to collect materials, and I often borrow from other teachers in the other class. (P12)

I intentionally select my material to make it reflect the cultural relevance, safety, and developmental appropriateness of the learners. (P4)

The responses suggest that experienced teachers emphasized cultural relevance and thoughtful selection of materials, while the inexperienced described borrowing and beginning to collect their own materials for use. The common theme is that materials need to fit their intended purpose to capture attention and create meaning for learners.

Theme 5: Incorporation of technology

The use of technology, including tablets, projectors, audio, phones and apps, makes presentation of concepts easy, varies teaching strategies, and grabs learners' effective engagement in the ongoing classroom activities. Participants' responses generated from this theme are presented below:

Sometimes I use my phone to show pictures or play counting songs, but I wish we had more proper devices for teaching. (P12)

I sometimes use a tablet to show short educational videos to the children. They enjoy the visuals, and it keeps their attention. The tablet is my personal because the school doesn't have the gadgets. (P5)

Teacher Utilization of Classroom Environment to Enhance Effective Learner Engagement in Ghana

So far, I have used my mobile phone sometimes for alphabet songs and number rhymes. Though I don't do it often. We don't have any technology material in the school. (P13)

I integrate audio recordings for storytelling to make lessons more engaging. These are done on my mobile phone or sometimes on my laptop. The truth is that lesson would be better if the school had this technology. (P15)

From the responses, it is realised that the experienced and well-qualified participants did not only use technology, but they also described the purposeful use of technology that aligns with their lesson plans. The inexperienced and the experienced alike used some form of technology. The contrast was that, save what the teachers used as their personal, those equipment were not in the schools for use. In sum, across themes, intentionality sets experienced and higher-qualified teachers apart from novices.

Research Question 2: How ECE teachers adapt their instructional approaches in response to environmental factors that affect effective engagement?

Six themes emerged from this research question after the analysis. They were adjusting to space constraints; differentiated instruction; managing noise and distractions; adapting to availability (or lack) of teaching resources; enhancing positive teacher-learner interactions, and incorporation of technology.

Theme 1: Adjusting to space constraints

Teachers emphasized how the arrangement of space helps keep learners focused. The responses were:

For me, I redesign the day's schedule when the space is so tight. I try to do more storytelling, and less movement. (P9)

When space is limited, I do more floor activities and rotate small groups instead of large groups. (P16)

I just ask the learners to manage and squeeze themselves in. I am still trying to figure out how to adjust for this small room. (P13)

To be able to have some space, sometimes I move desks outside or pack them at the back to create more space, though it is not always easy. (P10)

Participants described using flexible grouping and floor activities to adapt to limited classroom space. In this regard, the experienced teachers showed skills like modifying schedules or rotating groups (more storytelling) or shift to floor activities, while less experienced teachers struggled with the space implementation by resorting to packing desks at the back when possible.

Theme 2: Differentiated instruction

The analyses suggest that teachers altered their instruction based on learners' attention signals. Participants with more experience or higher education described using differentiated instruction and real-time adjustments based on learners' behaviour. In contrast, newer teachers often ignored signs of disengagement or responded with limited flexibility. Responses are presented below:

During my instruction, I differentiate tasks for some learners to do drawing while others read. This keeps all of them involved. (P3)

When I see learners losing focus, I switch to songs or quick games to regain attention. Sometimes, I move closer, call their name gently, or involve them in a task. (P1)

Sometimes, I just let the active children finish early because I don't know what else to do. We will all be waiting for the rest of the class. (P12)

I plan and make my plan flexible. What I do is to observe the behaviour and adjust the pacing and activity structure in real-time. (P4)

This flexibility in managing the classroom showed strong awareness of learner engagement as a changing behaviour. The experienced teachers used proximity, prompts, songs, and flexible pacing. In terms of education, the degree holders differentiated tasks (e.g. drawing vs. reading). A novice admitted to letting more active children finish early, signalling limited differentiation strategies.

Theme 3: Managing noise and distractions

Responses under this theme points out that teachers used routines, classroom design, and socio-emotional strategies to control noise and learners' engagement. The experienced participants demonstrated their experience in relation to design and signals that prevented distraction. The inexperienced, however, resorted to reactive control. Responses are presented in the subsequent statements.

I design my classroom to reduce distractions. What I do is to create quiet zones, and structured routines where each learner is given something to do. (P16)

Sometimes I stop the lesson when it is too noisy and wait until they calm down. (P10)

I use songs to refocus attention when the lesson or the classroom gets noisy. It calms them down quickly. (P8)

I try to shout at them, but it doesn't work well. I leave them sometime or I pull the cane. (P3)

It can be inferred from the analysis that experienced teachers used songs, visual cues, and structured routines to manage noise to keep learners focused. On the other hand, inexperienced teachers expressed challenges in maintaining control and often raised their voices and or used the cane.

Teacher Utilization of Classroom Environment to Enhance Effective Learner Engagement in Ghana

Theme 4: Adapting to teaching resources

ECE teachers are supposed to change their teaching strategies when materials are scarce to using improvisation or discussion-based learning. In this study, participants who were experienced improvised with simple materials and shifted to exploratory discussions. The novices borrowed or skipped parts of lessons when they were constraint with materials. Their responses are stated below:

When resources are limited, I improvise with local material in the form of bottle tops, sticks, or cardboard to make learning a fun. (P6)

Sometimes when I realise I don't have materials, I remove that part of the lesson and teach it later. By then I will prepare the little I can get. (P10)

I adapt the lesson to be more discussion when resources are lacking. In that case, I use storytelling, group discussions and activities as my teaching strategy. (P14)

I try to borrow from other teachers, but I wish we had more of these materials in the school so that we will have materials to use. (P13)

It can be understood from the responses that experienced teachers showed creativity and resilience when adapting to available materials. While less experienced teachers sometimes skipped lessons due to shortage of relevant materials, bachelor and master's holders who were experienced also described how they mobilized resources from the community to augment what the school could provide.

Theme 5: Enhancing positive teacher-learner interactions

Socio-emotional practices in the form of genuine praise, proximity at children's level, and warm guidance, which help sustain learner engagement were some issues that emerged from the responses that are presented below.

Sometimes I forget to encourage the learner, especially when I am under pressure. (P10)

I have made it a habit to give specific praise, like saying 'Well done for sharing' to encourage learner participation. (P15)

Sometimes, I try to kneel to the level of the learner when speaking or based on an activity and this small gesture is able to increase their engagement. (P6)

I give instructions rather than to praise them, but I know I should work on building better relationship. (P7)

The responses seem to suggest a nuance between the experienced and the inexperienced. Whereas the experienced teachers commonly knelt to the eye level and gave specific praise when relevant, the novices recognized a tendency to focus on instruction when under pressure.

Theme 6: Incorporation of technology

Issues that emerged after analysing this theme suggest that teachers adjusted their use of technology to regain attention, differentiate, and present content suited to the context. The responses are:

When I want to get my learners back to do something, I sometimes play educational songs from my phone. (P12)

When the class becomes restless, I show something like short educational animations. After that, it is able to get them back to what we were doing. (P14)

I mix technologies like videos, and audio to fit the learners' moods and needs, especially during long lessons. I do this either from my phone or my laptop. (P9)

I adapt my technology use depending on the topic and the activity. For instance, for literacy, I use recorded reading sessions. (P15)

Participants' responses suggest that experienced teachers adjusted the choice of their tools (videos, audios) based on the topic, the activity or energy levels of learners. The inexperienced participants rather used phones for songs as simple ways to refresh focus. In summary, the findings indicate that early childhood teachers in the study area actively engaged in adaptive instructional strategies and interactions with learners. These adaptations ranged from behaviour management and sensory engagement to spatial design and instructional changes, and it depended on the breadth of approaches. Although the use of technology received lower emphasis, the overall data suggest a responsive and professionally engaged group of educators. Their practices reflected possible theoretical understanding and practical responsiveness to the learning needs and environmental realities of young children.

The analysis clearly reveals a dichotomy between the highly educated, experienced and relatively older participants via a vis those who were not. With this analysis and findings, the researcher was prompted to conduct a hypothesis to establish whether certain demographic traits, in this instance, educational attainment, years of teaching experience and age, significantly predict ECE teachers' capacity to use the classroom setting to encourage learners' effective engagement. The argument is that teachers' pedagogical decisions and classroom management abilities are influenced by demographic factors (Darling-Hammond, 2000).

From the qualitative analysis, teachers with greater academic credentials were more knowledgeable about best practices in classroom organization and behaviour management, while older or more seasoned educators might be assumed to have superior classroom control or environmental design abilities.

H₀: Years of teaching experience, age and educational level, and do not significantly predict ECE teachers' utilization of the classroom environment in addressing learners' effective engagement

Teacher Utilization of Classroom Environment to Enhance Effective Learner Engagement in Ghana

A multiple linear regression analysis was carried out in order to test this hypothesis. The predictive power of several independent variables on a single dependent variable can be evaluated simultaneously using this statistical technique. In this instance, the use of the classroom environment by teachers to increase learners' effective engagement was predicted by factors such as, years of teaching experience, highest level of education and age.

Levene's Test was used to assess the assumption of homogeneity of variances prior to the regression analysis, and the results show that all p-values exceed the 0.05 threshold, confirming that the assumption of homogeneity of variances was not violated (See Annex Table 7). Thus, it was appropriate to proceed with the regression analysis. After this, the descriptive statistics of the variables involved were determined and are shown in Table 1.

Table 1: Descriptive statistics

Variable	N	Mean	Std. Deviation
Utilization of classroom environment	122	2.23	1.13
Age category	122	2.72	0.56
Highest qualification	122	2.93	1.19
Years of teaching in KG	122	3.09	0.50

According to these statistics, classroom environments are used to encourage engagement relatively frequently ($M = 3.09$), and sample-wide variation exists in demographic characteristics.

Table 2 presents the multiple regression model summary. The dependent variable was the use of the classroom environment, while the predictors were the age group, highest level of education, and years of teaching experience.

Table 2: Regression model summary

Model	R	R Square	Adjusted Square	R	Std. Error	Sig. F Change
1	.229	.052	.028	.480	.095	

The table shows that only 5.2% of the variation in teachers' use of the classroom environment can be explained collectively by age, education, and experience, according to the model's R of .229 and R^2 of .052. A very low explanatory power is indicated by the adjusted R^2 (.028). The predictors collectively did not significantly affect the outcome variable, as indicated by the overall model's lack of statistical significance from the ANOVA results in Table 3. ($F(3, 118) = 2.171, p = .095$).

Table 3: ANOVA Results

Source	Sum of Squares	df	Mean Square	F	Sig.
Regression	1.498	3	0.499	2.171	.095
Residual	27.133	118	0.230		
Total	28.631	121			

The regression model is not statistically significant, according to the ANOVA results ($p = .095$). Therefore, taken together, the demographic factors do not significantly predict how teachers use the classroom setting to affect students' effective engagement. To gain a deeper understanding of each predictor's unique contribution, the coefficient of each of the predictors was calculated and the results are presented in Table 4.

Table 4: Coefficient results

Predictor	B	Std. Error	Beta	t	Sig.	Tolerance	VIF
(Constant)	3.000	0.244	—	12.316	.000	—	—
Age Category	0.102	0.044	.237	2.304	.023	0.759	1.317
Highest Qualification	-0.021	0.078	-.024	-0.271	.787	0.993	1.007
Years of Teaching in KG	-0.010	0.042	-.025	-0.241	.810	0.761	1.314

Age was the only one of the three predictors that significantly predicted how teachers used the classroom environment ($B = 0.102, p = .023$). According to this positive coefficient, older teachers were more likely to use classroom environmental strategies to

Teacher Utilization of Classroom Environment to Enhance Effective Learner Engagement in Ghana

encourage learners' effective engagement. Years of experience and the highest level of education, however, did not significantly predict outcomes. The predictors' independence is confirmed by the Variance Inflation Factor (VIF) values, which all show no multicollinearity problems (all < 1.5).

In conclusion, the null hypothesis is kept in part based on the regression analysis. Age was found to be a significant predictor, but years of teaching experience and highest qualification were not. The model's overall lack of statistical significance suggests that these demographic factors do not significantly predict how teachers would use classroom environment to facilitate learners' engagement.

DISCUSSION OF RESULTS

The results derived from both qualitative interviews and quantitative hypothesis testing are examined in the light of the background, theoretical framework, and body of existing literature. The two research questions serve as the framework for the conversation.

Specific strategies used to utilize the classroom environment to enhance learners' effective engagement

The study found that teachers employed strategies like technology integration, culturally relevant materials, visual display integration, learning centre establishment, and intentional classroom layout. The ideas of the Reggio Emilia method, which sees the environment as the "third teacher," are strongly supported by these findings (Oppong Frimpong, 2019). Byers et al. (2018) and Barrett et al. (2015) highlighted the importance of flexible layouts and sensory stimulation in maintaining focus, which is consistent with teachers' deliberate seating arrangements to encourage interaction and the use of thematic centres to maintain interest. The presentation of learners' works and interactive charts also supports the claims made by Bergen (2015) and Lehrer et al. (2022) that interactive and visual stimuli can decrease off-task behavior and increase engagement.

The focus on age and culturally appropriate materials also supports the findings of Tarman (2021) and Aljabreen (2019), who demonstrated that contextualized learning resources improve engagement and create deeper contacts. Teachers' creative use of beads, stones, and puzzles with Ghanaian symbols reflects Maxwell's (2020) contention that educational resources don't have to be expensive to be effective; instead, they should speak to learners' real-world experiences.

The findings, however, somewhat deviate from Gore et al. (2016), who emphasized the significant impact of educational qualifications on teachers' capacity to create stimulating learning environments. The study revealed that classroom utilization was not significantly predicted by highest qualification. While some older, less formally educated teachers showed strong environmental management skills, many inexperienced, formally trained teachers still struggled with practical strategies. This implies that, particularly in settings with limited resources like Ghana, academic credentials by themselves might not always translate into successful teaching. Other factors like the classroom size, teacher-learner-ratio, and furniture could impede their ability to translate their knowledge into skills.

By demonstrating how intentionality distinguished seasoned educators from newcomers, the study offered a fresh perspective. Inexperienced teachers frequently relied on replication and expressed uncertainty, whereas those with bachelor's and master's degrees made clear connections between classroom design and educational goals. For instance, experienced and highly qualified teachers showed proactive redesign (space, pacing, groupings), preventive environmental management (zones/routines), creative use of limited resources, relationship-building moves, and targeted technology interventions. The inexperienced leaned on quick fixes (squeezing in, shouting, skipping lessons) and expressed needs in planning, differentiation, and managing calm behaviour. Previous literature, which tends to assume a linear relationship between qualification, experience, and classroom utilization, does not adequately capture this nuance. The results emphasize the necessity of mentoring programs that impart implicit knowledge from seasoned teachers to newcomers (Gyekye & Ampiah, 2021). Thus, structured mentoring and practical routines would help close these gaps.

Adapting instructional approaches in response to environmental factors that affect effective engagement

From this study, teachers used socio-emotional techniques like proximity and targeted praise, resource improvisation, noise control, and differentiated instruction to adjust to environmental constraints. These findings corroborate those of Copple & Bredekamp (2020) and Jones & Bub (2022), who observed that proficient early childhood educators adapt their lessons in real time in response to attentiveness cues. Denham et al. (2019) and Whitebread & Bingham (2020), who also emphasized the significance of non-verbal cues and socio-emotional engagement in maintaining attention, are in conformity to the use of proximity and music to regain learner engagement. Agyeman et al. (2023) and Adjei & Osei-Poku (2022), who emphasized the value of improvisation in low-resource ECE settings, also find resonance in the adaptive use of local resources in the midst of scarcity.

Nevertheless, years of teaching experience did not significantly predict environmental utilization, according to the regression results. This runs counter to the claims made by Fraser (2015) and Darling-Hammond (2000) that experience has a significant influence on how well a classroom is managed. While some experienced educators in this study exhibited resistance or a dependence on antiquated methods, others who were new to teaching displayed innovative approaches. This implies that effective adaptation might not be guaranteed by experience alone in the absence of ongoing professional development.

Teacher Utilization of Classroom Environment to Enhance Effective Learner Engagement in Ghana

This study's unique contribution is the discovery that classroom utilization was significantly predicted by age rather than years of teaching experience or highest level of education. Teachers who were older showed greater propensities to maintain focus, control noise, and modify spaces. This presents an intriguing distinction: beyond formal training or teaching tenure, maturity and life experience may contribute to the patience, adaptability, and confidence required to implement environmental strategies. In the Ghanaian ECE context, where the role of age has rarely been examined, this offers new empirical evidence that is consistent with Yilmaz (2011).

Additionally, the disparity between reactive tactics (yelling, skipping lessons, or asking learners to "manage") by new teachers and proactive tactics (like storytelling schedules, structured routines, and innovative technology use) by seasoned educators highlights the lack of professional support. This emphasizes how, in addition to formal training, mentorship, peer learning, and supervisory guidance are necessary to provide new teachers with adaptive strategies.

Triangulation of findings was made possible by the sequential mixed-method design. According to the qualitative phase, strategies were influenced by age, education, and experience; intentional practices were generally associated with more experience and higher qualifications. Regression analysis, however, revealed that the only factor that significantly predicted utilization was age. This highlights the intricacy of teacher qualities and backs up the notion that mentoring and professional development are essential for closing the knowledge gap between classroom instruction and training. It also questions the notion that experience or qualifications by themselves ensure efficient classroom management.

CONCLUSION

In sum, the results show contradictions about the predictive role of experience and qualification, but they also support a large portion of the literature on the significance of environmental design, improvisation, and socio-emotional strategies for maintaining active engagement. The study makes a novel contribution by demonstrating that the most important predictor of effective classroom utilization in this situation is age rather than education or years of experience. This highlights the importance of contextual flexibility and maturity in teaching. In Ghanaian ECE settings with limited resources, it emphasizes the value of mentorship programs, resource provision, and structured professional development to guarantee that both new and seasoned teachers can use classroom environments to improve learners' engagement.

RECOMMENDATIONS OF THE STUDY

1. The ICT Directorate of the Ghana Education Service (GES) should liaise with interested NGOs to provide massive support to the ECE teachers to integrate digital tools (e.g. tablets, projectors, and mobile phones) in their teaching to sustain attention and engagement. Offline content libraries in the form of, songs, audio stories, and videos, could be created for schools in the district.
2. Headteachers and circuit supervisors should strengthen supportive supervision that emphasizes the use of the classroom environment as a pedagogical tool. That supervision should transcend beyond inspection to coaching, where supervisors observe lessons, provide constructive feedback, and model strategies for classroom arrangement, noise control, and learner engagement.
3. The District Education Directorate should establish peer-learning communities where older teachers share practical strategies with younger colleagues. There should also be periodic in-service workshops at the district level to be followed by mentoring programs where experienced teachers are paired with novices to provide coaching and model effective strategies. Establishing peer-observation programs where teachers learn from each other's classroom practices is highly recommended.
4. With the identification of resource scarcity in the district, the ECE teachers should be trained and mentored on the development of teaching and learning resources, particularly from the local materials. The DED together with the Local Government (LG) should mobilize artisans in the communities within the district to design affordable, and culturally relevant materials (e.g., beads, puzzles, posters) for the schools, either as part of their cooperate social responsibility or at affordable prices.
5. Investment in classroom infrastructure should be given high priority by the DED and LG. This should be done first by conducting a comprehensive infrastructure audit across ECE schools and by integrating ECE classroom infrastructure into the district development plans with focus on expanding classroom space, improving ventilation and lighting, and ensuring noise-minimizing designs.

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