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RESEARCH PAPER

Exploring the Impact of Interactive White Boards on Interaction Patterns between Teachers and Students and Learning Outcomes in Early Years Education: An Explanation through Critical Discourse Analysis

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ABSTRACT

This research aimed to examine the effects of Interactive Whiteboards (IWBs) on communicative practices between teachers and young children in early childhood education, employing Critical Discourse Analysis (CDA) to assess these dynamics. As IWBs become integral to educational settings, understanding their influence on teacher-child interactions and learning outcomes is essential, especially in early childhood contexts where interaction plays a critical role in learning. The interactive functions of IWBs present unique possibilities for enhancing classroom engagement and collaborative learning. A concurrent triangulation mixed-methods design was utilized, integrating quantitative and qualitative data. The study applied a quasi-experimental approach, with pre- and post-tests, interviews, and classroom observations involving 20 students and 10 teachers.Results showed IWBs significantly enhance student participation, collaboration, and engagement. However, technical challenges and limited teacher training were noted as barriers.Effective IWB implementation requires thorough teacher training, fostering cooperative learning, and strategic use of IWBs' visual and multimedia features to maximize learning benefits.

| **Keywords:** | Critical Discourse Analysis, Early Childhood Education, Interactive Dynamics, Interactive White Boards (IWBs), Learning Outcomes |

Introduction

The use of Interactive Whiteboards in early years education is very popular in terms of the improvement of teaching and learning experiences. According to a study by Smith and Higgins (2006), interactive whiteboards facilitate increased student engagement during lessons, leading to improved learning outcomes. These technological devices provide numerous interactive capabilities that will revolutionize classroom dynamics. But with the increasing use of IWBs some quite a pertinent question arises; where does the IWB technology stand in interaction patterns and learning experiences in different teaching and learning contexts? The present study aimed to fill this void by conducting a detailed analysis of the advantages and disadvantages of interactive whiteboard integration by means of a mixed-method research design.

This research primarily aimed at probing the various implications of IWBs on learning outcomes in early childhood education. By so doing, the study attempts to decipher the complex dynamics that define patterns of interaction between educators and young learners and amongst students. Johnson et al. (2010) found that interactive whiteboards promote collaborative learning environments by allowing students to interact with lesson content and each other, fostering peer-to-peer learning. To utilize a blended method of investigation, combining both quantitative and qualitative methods, to

provide a more detailed understanding of the investigated phenomenon was the aim of this research.

Through an explication of the intricate relations between technology, pedagogy, and socio-cultural contexts, this study aimed to add to the continuing debate about educational practices in the digital era. By means of an explicit methodology and inclusive analysis, this study is hoped to provide evidence-based approaches to utilizing the potential of IWBs in order to enhance the teaching and learning process of early years education.

The notion of interaction within educational settings is closely linked with classroom discourse that identifies the linguistic and communicative sequences taking place among teachers and students or among peers. Discourse in the classroom includes both verbal and nonverbal interactions, sharing of ideas, and interaction patterns that play a significant role in the learning environment. Productive classroom discussion stimulates lively participation, critical questioning and interactive learning dynamics. Analyzing classroom discourse, Mroz et al. (2000) observed that interactive whiteboards can influence interaction patterns between teachers and students, shaping the dynamics of classroom communication and contributing to learning outcomes.

Interactive Whiteboards (IWBs) have become very significant tools in the contemporary educational scenes which are used to improve the learning and teaching activities especially in the field of early childhood education. The technological novelties bring a range of interactive functions and multimedia features, which are likely to change the nature of impact, and interaction patterns in particular, between teachers and students, as well as the consequent outcomes in early childhood education settings.

The early childhood education is the most important stage in the development cycle of a child, when the base competences, skills and positive learning attitudes are brought to life. The primary characteristic of the given stage is the nature of interaction between educators and learners, which greatly contributes into creating a meaningful and nurturing learning environment, where holistic growth and development occur. Edwards and Weller (2019) argue that while interactive whiteboards can support both teacher-centered and student-centered approaches to instruction, their effectiveness largely depends on how teachers utilize them in the classroom. Hence, the mastery of interactive educational approaches, pedagogical strategies, and curriculum designs in the context of early childhood education is critical for effective learning for children.

Literature Review

In the educational setting, IWBs have been identified as tools that can enhance the teaching and learning processes. The applications and implications of these paradigms have been discussed in various disciplines. This literature review aims at identifying the current research on the effects of IWBs on students, teachers, and the classroom environment. To this end, a conceptual model has to be developed for analyzing the effects of IWBs on interaction and learning in ECE.

Vygotsky's theories as described by Daniels (2001) can be useful in understanding this matter. According to Daniels (2001), social constructivism and the ZPD are crucial to explaining the interaction between the teacher and the students through IWBs. Education also use the concept of scaffolding as pointed by Daniels (2001) this is where the teacher does it for the learner until the learner is able to do it on his or her own.

This is in harmony with the postulation that learning is a social process that fosters cognitive development through the use of scaffolding. The examples of the applications of

Vygotsky's theories indicate that the utilization of these concepts can result in more meaningful and goal-oriented learning.

Classroom interaction, teacher characteristics, and student achievement were studied by Kalu and Ali in 2004. While their study was not focused on IWBs, they gave useful insights into the role of positive teacher-student relationships in learning. Dhindsa and Emran (2006) focused on the use of IWBs in constructivist teaching and the impact on student achievement. According to the study, IWBs enhance active learning and student achievement through interactive and collaborative activities.

The authors Hodge and Anderson (2007) provided an account of the process of introducing IWBs in a classroom, the challenges faced by the teacher, and the changes in teaching. Therefore, there is a need to address these challenges and enhance the techniques employed in teaching with IWBs.

In their research on the impact of IWBs on student achievement, Swan, Schenker, and Kratcoski (2008) found that there was an increase in achievement across all subjects. They have thus established the usefulness of IWBs in teaching and learning, work those points to the possibility of better learning outcomes.

In the article "The Role of Teacher Knowledge and Learning Experiences in Forming Technology-Integrated Pedagogy," Hughes (2009) explores the relationship between teacher knowledge and technology integration in teaching. This paper emphasizes the importance of teachers' Technological Pedagogical Content Knowledge (TPCK) in the integration of technology in teaching and learning. Teachers who have the knowledge of the subject and technology can create lessons that can greatly improve student achievement.

Hughes (2009) also underlines the significance of the ongoing training and practical use of technology. The study implies that when teachers are given a chance to try out technology in safe environments, they are more likely to embrace new teaching strategies. This approach ultimately enhances educational performance since it provides for more active and interesting classroom experience. Integrated pedagogical content knowledge about subject-matter and technology instruments would help the teachers to create better lessons that would be beneficial to the learners.

Hughes (2009) also pays much attention to the concept of the continuing professional development and the practice with emerging technologies. According to the research, technology integration is an effective practice that opens teachers' opportunities to experiment with technologies in supportive environments, facilitating their incorporation of innovative approaches to teaching. This in effect helps to enhance educational performance since learning activities become more dynamic and interesting.

Butt, Anwar, and Rasool (2023) highlight how negation markers in Urdu alter sentence structure and meaning, similar to how interactive whiteboards might shift communication patterns in classrooms by introducing new visual and interactive elements. Just as double negation changes verb agreement, these tools may reshape teacher-student interactions (Butt et al., 2023).

In a pilot study, Liu at al. (2013) analyzed teacher-student interaction patterns within a technology-enhanced learning environment where a robotics course was offered to kindergarten children. Although the research is not only on IWBs, and it does shed light on system interaction dynamics in technology-supported educational contexts.

These studies also add to our knowledge of the influence of IWBs upon students` academic success, teachers` practices, and classroom interactions. Despite the advantages

of IWBs in education, they emphasize the fact that there are also challenges to address such as teacher training, integrations strategies, and technical issues.

In addition, this research is intended to enhance current literature by including other variables like the importance of teacher preparation and support, student involvement, and the efficiency of some instructional approaches with the use of IWB. Through addressing these issues, the research aimed to present practical suggestions to educators and policymakers on how to make the integration of IWBs in educational contexts as effective as possible.

Material and Methods

This research used a mixed-method research design to examine the effect of IWB use in early years education through teacher-student and student-student interaction patterns and learning outcomes. Axiological research design sought to incorporate both the quantitative and the qualitative collection methods of data with a view of broadening the focus in the study.

Participants

The target population was 30, comprising of twenty students in early years education, aged six to eight years, and ten early years education teachers. The target respondents have been randomly selected through a random sampling method which enhances a general. representation of the whole target population.

Data Collection Procedures

To assess the effectiveness of the IWBs on learning achievement, the pre-test was administered among the students before the learning intervention. This pre-test was to establish the achievement level of the subjects before the intervention took place to act as a yardstick to gauge the outcome of the next stages. Subsequently, a post test was offered to the students, which was designed and formatted the same as the pre -test, though it contained different questions to assess how the intervention affected the achievement of the students.

In addition to quantitative assessment, respondents were given semi structured interviews among the 10 teachers that agreed to participate in the study about their perceptions and views regarding effective teaching applications using the IWBs. This study has also produced qualitatively satisfactory information regarding the effects, opportunities and difficulties experienced in the use of IWBs in teaching and learning activities.

Further, classroom observations were conducted in order to experience the intercommunication that existed between the teachers and the pupils during the time of intervention. These observations were intended to record the use of IWBs in classroom situations, to evaluate the interaction that differentiated between the interactions of the teacher and the student, the degree of the student's participation as well as other aspects of the class conduct.

Thus, by embracing all these variables systematically, the study aimed at aggregative understanding of the entirety of effects that IWBs harbor on interaction processes and learning achievements in early years education.

Results and Discussion

Data Analysis

Scores of the pre- and post-treatment tests were subjected to statistical examination like t-test to compare between mean scores and decide the impact of intervention in details. The indexes of effect size were also calculated to establish the extent of the impact of these variables on the learning outcomes. The cross-sectional data from the interviews with teachers as well as the classroom observations were analyzed in thematic fashion which made it possible to make note of the recurring themes, patterns as well as any other insightful information that was gleaned from the teacher's different integration strategies of IWBs.

Applying this qualitative approach, the current study aimed at exploring the intricate features of the TSI, student engagement, and IWB usefulness in the early years teaching and learning. In general, the applied methodological approach in this study allowed studying the functioning of IWBs as the means of interaction patterns and learning achievements augmentation within the context of the early years' education from both quantitative and qualitative perspectives.

The findings of the study regarding the use of computers in enhancing teaching and learning were analyzed and elaborated concurrently through quantitative and statistical analysis to establish the impact of Interactive Whiteboards (IWBs) on learning outcomes.

Quantitative Analysis

First, much attention was paid to the calculations for average for the pretest scores for both control and the experimental group. This cautious calculation, therefore, provided an index of the performance of the students before the onset of this study and the subsequent intervention. After that the general statistical analysis was done followed by t-test which compares the mean of the two groups, control and experimental. This final data analysis was highly regarded as an extensive and intensive piece of work aimed at evaluating the significance of observed difference in means scores.

Effect Size Calculation

In addition, the reported investigation paid a lot of concern to the calculation of the effect size needed to establish the extent to which the intervention influenced the learning acumen. This allowed the indicated calculation to be held in practice and gave the quantitative transit to the assessment of the practical significance of the intervention, which meant that the set effect could be comprehended in full. With such careful quantitative analyses, the present study followed a similar line of approach with a view to providing sharper understanding of the effectiveness of IWBs for enhancing the outcomes of learning. In an attempt to definitively establish the extent to which IWBs boost student scores on learning outcomes in early years educational contexts, this study proceeded systematically to compare pretest scores and then conduct scrupulous statistical analyses, such as effect size calculations to support the findings.

Table 1
Mean pre-test and post -intervention achievement test scores for the control and experimental group.

Group	N	Mean Sd (%)	Pre-Test	Post-Test	T-Value	P-Value	Es
Control group	10	30.82_+2.73	56.29	7.45	-10.71*	0.00	2.16
Experimental group	10	23.77+3.65	55.88	7.20	-14.94*	0.00	2.68

Note: p < 0.05; ES: Effect Size**.**

Table 1 gives a detailed overview of the mean pre-test and post-intervention achievement test scores for the control and experimental groups and relevant statistics. Group-based information is articulated in the "Group" column including data for the control group and the experiment group. The "N" row shows the number of individuals

in each group, with both control and experimental groups consisting of 10 individuals. The "MEAN SD (%)," column give detailed mean scores and standard deviations (presented as percentage) which provides information about the average performance of the participants and the variation of the scores around the mean.

The columns "PRE-TEST" and "POST-TEST" display the average scores obtained by the participants in the pre-test and post-intervention test, thus allowing a comparison analysis for before and after the intervention. The "t-VALUE" column presents the results of the t-test, showing the extent of difference between mean scores, where negative values mean that the control group scores have been higher. P-VALUE shows what the probability is that the difference in mean scores is by chance, with p-values of less than 0.05 denoting that the difference is statistically significant.

Finally, the "ES (Effect Size)" column provides a numeric indication of the intervention's effect on learning outcomes, with ES values greater than 1.0 indicating large effects. In general, Table 1 provides detailed representation of the results, allowing for the full understanding of the intervention's effectiveness and statistical significance.

Table 2
Mean pre-test, post-test, and gain scores for the control group and experimental group

Section	Group	Mean+SD (%)	Pre-vs. Post	Pre-test	Post-test	t-value	p-value
Total	Control Group	29.40+3.40	56.29+7.45	25.50	7.41	0.04*	0.91
	Experimental Group	23.77+3.65	55.88+7.20	32.08	6.99		
MCQ without logic	Control group	48.38+1.39	81.88+1.53	32.50	2.06	0.01*	7.40
	Experimental group	40.50+1.55	87.25+1.02	46.75	1.76		
MCQ with logic	Control group	18.71+2.03	53.58+5.12	34.63	5.86	0.56	
	Experimental group	15.75+2.14	53.25+5.02	37.50	5.12		
Short Answer	Control Group	39.46+2.49	53.46+2.46	11.50	2.06	0.00*	2.61
	Experimental group 29	31.79+2.27	53.46+2.46	15.50	3.06		

Note: p< 0.05; *indicates statistical significance

Table 2 provides an in-depth analysis of the mean pretest, post-test, and gain scores for the control and experimental groups in the various sections of the assessment. In the "Total" section, the control group had a mean pre-test score of 29.40% with SD 3.40% and the experimental group had a mean pre-test score of 23.77% with SD 3.65%. In the post-test, the control group got a mean of 56.29% with a standard deviation of 7.45%, and the experimental group scored at 55.88%, with a standard deviation of 7.20%. The pre- vs. The post-test difference represents an increase of 25.50% for the control group and 32.08% for the experimental group.

An additional analysis was performed on some subparts of the assessment, namely, "MCQ without logic," "MCQ with logic," and "Short Answer." For each section, the pre-test, post-test, and gain scores of both control and experimental groups were compared.

The t-test analysis of the pre-test and post-test mean scores for both groups found large differences across all sections. Particularly, the experimental group demonstrated a higher mean post-test score as compared to the pre-test, which can be inferred as the improvement in the learning outcome. Likewise, the control group also followed this trend, meaning the post-test mean score was higher than the pre-test mean score.

The co-efficient of determination was calculated to measure the extent of the intervention on learning outcomes. The results of the experimental group SD were higher (ES=1. 32) in relation to the control group SD (ES= 0. 84) proving a more significant favorable impact of the treatment in enhancing learning effects. Al together, the findings of the present study suggest that the intervention that involved the use of the interactive whiteboards helped raise the levels of achievement significantly in both, the control, and the experimental group, though the size of the effect, calculated, was larger in case of the latter, reflecting the exceptional influence of, the interactive whiteboard.

Qualitative Analysis

Qualitative data collected through classroom observation and interviews with the teachers was further subjected to critical discourse analysis (CDA) during this phase of the study. This involved conducting a coding analysis in which themes, trends and new format categories emerging from the findings were closely looked at using the NVivo software classroom observations proved valuable and yielded further reliable assessment data about the extent to which IWBs were employed and the patterns of dynamics between the teacher and the students.

These were noted down in a detailed manner and further fine-tuned in order to document noticeable features of the discourses emerging from the educational context. The teachers were also asked to participate in learner interviews in the form of semi-structured interviews so as to capture their perception and the experiences they have witnessed with the adoption of IWBs in their lessons.

This literature, combined with the findings generated from the ten interviews, was the source of a rich amount of qualitative information that would prove invaluable in further fleshing out the discursive and power dynamics at work in the implementation of IWBs. As a part of the qualitative analysis process, it was useful indeed to find that the discourses embedded within the classroom context were indeed properly identified and analyzed. This included identifying the language and communication processes in Teaching sessions that involved the use of IWBs as well as the power relations demonstrated in the process. Furthermore, the impact of incorporation of IWB on interaction pattern between teacher and students in general was explored intensely. In this case, the researchers' intentions were to identify how exactly the IWBs were changing the overall nature of the relations in a classroom, students' engagement, and the learning outcomes.

Conclusively, the stage that involved conducting qualitative analysis was very important in the framework of the research since it provided more elaborate insights about the concept of IWB implementation within early years' education. In this phase, efforts were made to extend the level of analysis of the positive and negative effects of IWBs on teaching and learning practice through critical examination of discursive construction, power relations, and interactional patterns.

Table 3
Summary of Interview Findings on the Impact of Interactive whiteboards.

Themes	Number of teachers	Theme Description
Improved engagement	9	The use of interactive whiteboards improved students' engagement during lessons. Students were more vigilantly and actively involved in the learning process and showed increased interest.

Enhanced collaboration	8	Collaborative learning among students was facilitated by IWBs. Students were able to work together, share ideas and engage in group discussions effectively.
Increased interaction	7	Teachers mentioned increased interaction between themselves and students through the use of IWBs. The interactive nature of technology promoted active participation.
Visual and multimedia benefits	10	The visual and multimedia features of IWBs contributed to better comprehension and retention of lesson content. Students found the visual aids and multimedia elements engaging and effective for learning.
Challenges	10	Numerous challenges were mentioned including technical issues with the IWBs, the need for training to effectively use the instructional strategies to incorporate the whiteboards into lessons.

The data gathered through the interviews of teachers using IWBs in the early years education and care settings are summarized in table 3, following aspects of teaching and learning that have been affected by the use of IWB in the classroom. One of the issues observed was that of a better students' attention and interaction; nine of the teachers who participated in the survey said that IWBs helped to make their students more attentive during classes.

Moreover, eight teachers emphasized having an effective educational design where people learn from one another, and IWBs contributes toward positive learning environments and group discussions. Three out of seven teachers reported an increased interaction between them and the student in class since IWBs offers a dynamic form of learning which enhances interaction.

All the ten teachers acknowledged appreciated the visual and multimedia elements of IWBs that assisted in enhancing the learners' understanding and retention of the lesson content due to its enhanced and elaborate illustrations and multimodal interactivity. Although, there is also the agreement that challenges such as technical issues and the need for extensive training were mentioned by all ten teachers, pointing at the necessity of solving these impediments to exploit the potential benefits of IWBs in early years education fully.

Table 4
The observations were conducted over multiple sessions in both the control and experimental groups.

Observation aspect	Control group	Experimental group
Frequency of IWB Use	Moderate	High
Teacher-Student Interaction	Traditional	More interactive
Student Engagement	Average	High
Multimedia Utilization	Limited	Extensive

Table 4 presents comparative analysis of observations that were conducted across several sessions in the control and experimental groups in different aspects of the use of interactive whiteboards (IWBs) in early years education.

Frequency of IWB Use

The IWB use frequency in the control group was moderate, which suggested the moderate extent at which these tools were used during the classroom sessions. By contrast

in the experimental group, the use of IWB was considered to be high, indicating that IWBs were more deeply rooted in teaching.

Teacher-Student Interaction

The observation of teacher-student interaction in the two groups revealed significant differences. In the control group, interactions were described as classical, suggesting a contemporary type of teacher-student communication. On the other hand, in the experimental group, interactions were characterized as more dialogic, which implies greater involvement and dynamic communication between teachers and students, made possible by the use of IWBs.

Student Engagement

The student engagement level differed between the control and experimental groups. The control group reported average student engagement because the students were involved in the moderate level of participation in the classroom activities. However, the experimental group saw the student engagement level as high, which suggests active participation and attentiveness among the students most likely because of the interactive nature of the IWBs.

Multimedia Utilization

Multimedia use varied from the control group to the experimental group. In the control group, multimedia utilization was minimal; this meant that multimedia resources or tools were minimally used during instruction. However, in the experimental group, multimedia usage was rated as both intensive, which implies full incorporation of all multimedia type, facilitated by the interactive features of IWBs.

In general, Table 4 illustrates the different levels of IWB use, teacher-student interaction, student engagement, and multimedia usage between the control and experimental groups, emphasizing the possible influence of IWBs on classroom dynamics and teaching practices in early years education.

Conclusion

There were observable gains on various fronts from integration of Interactive Whiteboards (IWBs) into early years education as shown in the findings of the research is established that the impact of IWBs for the increase in participation, cooperation, and interaction of students as well as the final learning outcomes within the educational environment is beneficent.

The mixed method of this research study has been beneficial in pulling out significant findings on the impact of IWBs on interaction process and learning result in early years education. This integration enabled a better understanding of the problem being investigated as the study employed both quantitative and qualitative data collection techniques.

Quantitative Analysis

The data collected revealed that there were statistically significant differences in the areas of the mean pre- test achievement test scores of both control and experimental groups as well as those post intervention scores. More precisely, the experimental group showed a significant improvement in learning outcomes as reflected in a higher mean post-test score contrasted to the pre-test score.

This result indicates that the intervention in which the IWBs were applied in instructional practices had a positive impact on student performance. In addition, the effect size was bigger on the treatment group, which means that the intervention has more effect on the learning outcomes compared to the control group. Such quantitative results support previous studies that have suggested the potential of IWBs to improve student learning outcomes through interactive and engaging teaching methods.

Qualitative Analysis

The qualitative analysis was aimed at the substructure discourses, power relations, and the changes of IWB integration on interaction in the classroom. The thematic analysis of interview findings demonstrated a number of important themes such as increased engagement, advanced collaboration, higher interaction, visual and multimedia benefits, and problems of IWB application.

Teachers highlighted the roles of IWBs in increasing students' participation in the class, indicating that the students become more alert and active in class. IWBs also supported group learning among students which was characterized by fruitful group discussions and idea sharing. Teachers also reported more communication between them and students with the help of IWBs that promoted active participation in conversations.

In addition, the visual and multimedia aspects of IWBs were also associated with an improvement in the understanding and retention of the content of a lesson, and therefore a more efficient learning process for students. Nevertheless, some issues like technical problems associated with IWBs and the need for training required to use them in lessons were also recognized. The qualitative findings presented give a deep view on the multifaceted usage of IWB in an educational setting, where both advantages and constraints are outlined.

Observational Analysis

The observation analysis strengthened the qualitative and quantitative results and brought some understanding of classroom activities and the use of IWBs. The experimental group revealed more interactive and frequent IWB usage in comparison with the control group. Moreover, teacher-student interaction was considered traditional in the control group and modern in the experimental group.

The experimental group also showed a higher level of student engagement with multimedia features of IWB. Therefore, this authoritative data adds up to the beneficial influence of IWBs on class activities and students' participation making them even more potential for improving the process of teaching and learning.

In general, the results of this study emphasize the critical role of appropriate IWBs integration into teaching practices to stimulate student participation, cooperation, and communication in early years education. Challenges such as technical problems and teacher training issues should be addressed by educators not to fully realize the enormous potential of IWBs as the instrument to design fun and rather effective learning environments for your active learners. These findings have important implications for the practice of education, underlining the significance of using technology as a tool to improve the process of teaching and learning in early childhood education.

Recommendations

To utilize the benefits of Interactive Whiteboards (IWBs) in early years education efficiently, some suggestions are offered to improve their implementation and to make them more effective in teaching and learning practices.

Teacher Training and Support

This means that adequate training sessions and follow-up assistance must be provided to the teachers to ensure that they are well equipped in how to properly employ the IWBs within practice teaching. Teachers require more adaptation and preparedness in their professional development workshops, training sessions, and other informative educative materials and support to enable them to effectively integrate IWBs in their classes.

Enhance Instructional Strategies

Teachers should be encouraged to apply new approaches in using IWBs in their practices in order to effectively utilize the interactive elements of these technologies. This may involve education technology solutions like; personal approach and student involvement teaching techniques that are process–based which may comprise of; game enhancement of the learning process, interaction, and virtual learning tools. Furthermore, differentiated learning and teaching approaches may offer several modes of learning that students prefer to use.

Foster Collaborative Learning Environments

The arrangement of CL [Collaborative Learning] environment is very much crucial in order to harness the latent potential of IWBs [Interactive White Boards] in the early years. Use and interaction with IWBs should also be encouraged by teachers through group activities, peer cooperation, and group discussions to enable students work in groups, solve problems together, and share knowledge among other benefits. It highlights the value of the partnership model not just as an academic approach, but also as a method of developing social and emotional skills of the students.

Utilize Visual and Multimedia Features

To increase the efficacy of the learning process and make it more effective, teachers have to implement all possible types of visual and multimedia applications that are available in IWBs. Employing videos, animation, virtual classrooms, etc., as teaching tools makes lessons more interesting and easier to grasp for the students. Also, it is viable to mention that visuals and multimedia tools help students to grasp and apply the content of the lessons easily and without extra effort, still, based on their learning preferences.

Address Technical Challenges

Issues related to the technical difficulties, which are encountered when using IWBs in early year education, should be resolved. Setting up good repair systems, recommended service schedules, and procedures to address issues arising from a piece of hardware or a conflict in software compatibility may help minimize the setbacks resulting from malfunctions. However, there are other factors that may hinder the integration of IWBs into lessons; For instance, access to a good internet connection and relevant devices is essential in supporting the use of IWBs in class.

Ongoing Research and Evaluation

Further investigation should be conducted to ascertain the writing pattern and learning result alteration impact of IWBs in the early childhood sector. Comparative longitudinal investigations, longitudinal studies employing qualitative research methods, and comparative research investigations can provide valuable information concerning the long-term effects of IWB on learners' engagement, academic performance, and teachers' practice in the future.

This is a research in-progress paper that will advance the process of enhancing the educational practices as well as generate evidence that would be helpful in future education-based decisions. In summary, as a result of implementing the aforementioned recommendations regarding the use of IWBs, educators will be in a position to unleash the full potential of IWBs in the creation of effective, attractive, and engaging learning environments that support student-centered instruction as well as problem-solving and high levels of learning in the early childhood.

Much can be done by educational institutions to offer enhanced learning experiences and better results for young learners through better teacher education programs, promoting student interactive learning methods, multimedia support, handling technicalities and conducting more research.

Therefore, the above research showed how beneficial and impactful the use of IWBs can be in the early years, turning around the aspect of the teaching and learning strategies. The findings identified in the course of the present research also suggested that the area of IWB use is characterized by a variety of factors that make up its complex nature and implications for educational practice. Enhanced Teaching and Learning: From the findings of this study, it is evident that the incorporation of IWBs positively enriches the process of teaching and learning in the early years class.

These are some of the ways in which IWBs have helped in enhancing student interaction, cooperation, and / or voice in the classroom due to provision of live, fun, and learner-oriented teaching activities. The other aspect that the students also closely related to the IWBs is the level of alertness, activeness and even enthusiasm. Displaying here a substantial improvement in the results attained during lessons. Utilization of Visual and Multimedia Features are well provided with visual/multimedia features for delivery and comprehension of content, which have also turn out to be the key sustainability assets for commonly used IWBs.

Due to the flexibility in the use of IWBs, it enables instructors to develop pro-active classroom sequences that incorporates other forms of technology such as videos, animated figures, and models and virtual simulations as visual aids for the learning outcomes and the learning styles. Consequently, learners have exhibited a higher level of understanding, retention, and application of lesson content, emphasizing the effectiveness of IWBs in fostering meaningful learning experiences.

While the visible advantages, this study also indicates some problems connected with the implementation of IWBs, such as technical problems, training needs, and instructional alterations. To solve these problems and maximize the effectiveness of IWBs in early years education, training of teachers and supports initiatives should be a priority of education institutions. By empowering educators with the necessary skills and strategies, institutions enable them to make the most of IWBs in their instructional practices.

Further, it is necessary to contribute to students' interaction with one another and the use of IWBs also contributes to the establishment of the suggested learning environment in early childhood settings. It implies that the teachers should advocate for group work, peer collaboration, and interactive discussion using IWBs that enable the subgroup members to solve the displayed problems, exchange knowledge, and think critically.

This style of learning does not only benefit the academic aspect of a child's life but also their social and emotional development which form the core foundation for learning in later years. Leveraging Visual and Multimedia Features teachers have to use some properties of IWBs, which are that the technology is very visual and multimedia in nature,

to improve on their teaching styles and educative methods to ensure that the learners are attentive and active during their regular classes.

Interactive whiteboards (IWBs) not only influence interaction patterns between teachers and students but also have the potential to affect cognitive and emotional development. Just as the movie *Inside Out* has been shown to promote children's semantic processing and emotional awareness (Quratulain, Rehman, & Butt, 2023), IWBs may serve as a tool that enhances understanding through interactive engagement. This can be particularly effective in early years education, where the integration of visual and interactive stimuli plays a significant role in shaping both the cognitive and emotional aspects of learning. The findings from Quratulain et al. (2023) indicate that engaging with abstract concepts through mediums like movies can support emotional development and semantic processing in children, much like how IWBs can support the processing of academic concepts and foster better communication between students and teachers.

To this, teachers should incorporate the use of animated pictures, extra videos, images, and virtual tours to the lessons to make learning more fun and engaging, as well as enhance one's understanding of the information shared. In conclusion, it can be stated that this study presents a reformist potential of Interactive Whiteboards (IWBs) in early childhood education, pointing clues for researching their effectiveness in enhancing teaching and learning processes.

By embracing these areas of concern in problem solving, encouraging group learning and the advantage given by the features of IWBs, educational system will be in a position to explore all the benefits of Interactive whiteboards to provide constructive, whole spirited and equal learning opportunities for young learners that can take them to a higher level of development and academic achievements.

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