

TEACHER COLLABORATION AND PARENTAL INVOLVEMENT IN EFFECTIVENESS OF E-LITERACY INSTRUCTIONS FOR CHILDREN WITH ATTENTION DEFICIT HYPERACTIVITY DISORDER

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KEYWORDS

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ABSTRACT

The present study aimed to investigate the role of teacher collaboration and parental involvement as correlates of the effectiveness of e-literacy instruction for children with ADHD. Using the structured survey questionnaire method, and data were collected from N=100 participants using a purposive sampling technique. The sample included children with ADHD aged 8–16 years, along with their parents and teachers involved in e-literacy instruction. The questionnaire used in the study was Teacher Collaboration Assessment Scales DDAE (TCAS), Parental Involvement Rating Scale (PIRS), and the third questionnaire was self-constructed to measure the effectiveness of e-literacy instruction for ADHD children, Effectiveness of E-Literacy Instructions Measuring Scale (ELIMS). Statistical analyses were conducted using Pearson Product Moment Correlation, hierarchical regression analysis, independent samples t-test, two-way ANOVA, and mediation analysis through Hayes' PROCESS Macro. The findings revealed significant positive relationships between teacher collaboration, parental involvement, and effectiveness of e-literacy instruction. Teacher collaboration significantly predicted e-literacy effectiveness, while parental involvement partially mediated this relationship, indicating that family engagement strengthens the impact of collaborative teaching practices. Furthermore, children's age and education level emerged as significant predictors of e-literacy effectiveness, whereas other demographic characteristics showed limited influence. Gender differences indicated higher levels of teacher collaboration, parental involvement, and e-literacy effectiveness among females. The study concludes that collaborative partnerships between teachers and parents are essential for enhancing digital learning experiences among children with ADHD. These findings emphasize the importance of integrated educational approaches involving schools, families, and technology-based interventions to support children with ADHD.

I. INTRODUCTION

Attention-Deficit/Hyperactivity Disorder (ADHD) was first described by George Still (1902) and is currently recognized as one of the most common neurodevelopmental disorders affecting children. ADHD is characterized by persistent symptoms of inattention, hyperactivity, and impulsivity that interfere with academic, social, and daily

functioning (Still, 1902; American Psychiatric Association [APA], 2022). The disorder affects approximately 5–7% of children worldwide and occurs more frequently among boys than girls (Faraone et al., 2021). ADHD is associated with impairments in executive functioning, including working memory, behavioural inhibition, planning, and self-regulation, which are linked to differences in brain regions such as the prefrontal cortex and related neural networks (Barkley, 2015; Castellanos & Proal, 2012). Children with ADHD often have trouble in academic achievement due to challenges with attention regulation, information processing, and sustained engagement in learning activities. Although medication remains a common treatment approach, evidence suggests that educational, behavioural, and psychosocial interventions are also important for improving academic performance and adaptive functioning (Kamp et al., 2014; Faraone et al., 2021). Digital learning environments and e-literacy instruction have emerged as potential tools for supporting children with ADHD by providing interactive, flexible, and engaging learning experiences.

E-literacy refers to the ability to access, evaluate, create, and communicate information through digital technologies. It extends beyond computer skills by incorporating critical thinking, communication, and effective participation in digital learning environments (Martin, 2006; Selfe & Hawisher, 2002). Effective implementation of e-literacy instruction requires not only technological resources but also supportive educational practices involving teachers, families, and collaborative learning systems. Teacher collaboration plays an important role in improving educational outcomes by allowing teachers to exchange knowledge, develop instructional strategies, and reflect on teaching practices. Collaborative approaches enhance professional development and contribute to improved student learning experiences (Akiba & Liang, 2016; Vangrieken et al., 2015). For children with ADHD, collaboration among educators can support individualized instruction, classroom adaptations, and effective integration of digital learning strategies. Similarly, parental involvement is a significant factor influencing children's educational success, particularly for children with learning and behavioural difficulties. Active parental engagement through academic support, communication with teachers, and reinforcement of learning strategies can improve children's motivation, participation, and achievement (Epstein, 2018). For children with ADHD, coordinated efforts between parents and teachers are essential for addressing attention difficulties and promoting consistent learning environments across home and school settings. Therefore, examining the combined contribution of teacher collaboration and parental involvement in enhancing the effectiveness of e-literacy instruction for children with ADHD is important. Understanding these relationships may provide valuable insights for developing inclusive digital learning approaches that support academic achievement, engagement, and educational outcomes among children with ADHD.

Teacher Collaboration

Teacher collaboration is an essential component of professional development that enables educators to share knowledge, reflect on teaching practices, and improve instructional approaches. Collaborative practices allow teachers to work together in planning, implementing, and evaluating learning activities. Cavadas and Branco (2023) found that interdisciplinary teacher collaboration enhanced decision-making, pedagogical knowledge, and reflection on teaching practices through collaborative inquiry cycles. Although teaching has traditionally been viewed as an individual activity, increasing opportunities for collaboration have encouraged teachers to exchange experiences, discuss challenges, and develop new teaching strategies. Collaborative learning communities provide a platform for professional growth and support improved teaching practices (Hindin et al., 2007). Research suggests that teacher collaboration is positively associated with student achievement and teacher development, particularly when collaboration focuses on instructional strategies and student learning rather than administrative requirements (Akiba & Liang, 2016; McClure, 2022). Teacher collaboration benefits both educators and students by promoting feedback exchange, sharing of effective practices, and development of innovative instructional resources (Meirink et al., 2007). It is defined as cooperative participation among teachers to achieve shared educational goals (Vangrieken et al., 2015). Factors influencing effective collaboration include teacher attitudes, self-efficacy, autonomy, meeting structures, organizational support, and facilitation practices (Hindin et al., 2007; Ciampa & Gallagher, 2016). Teacher collaboration also serves as an important context for teacher learning, where continuous professional interactions contribute to changes in teachers' knowledge, beliefs, and practices (Bakkenes et al., 2010). Effective collaboration depends on the interaction between individual teachers, teacher groups, and school-level factors. A supportive school environment promotes positive attitudes toward teamwork, while teachers simultaneously contribute to shaping a collaborative school culture (Opfer & Pedder, 2011).

Parental Involvement

It was a sincere curiosity about the function of parents in society at large, and in the school specifically, particularly for those parents (the invisible parents) who I believe struggle to have their views heard in both the school and the larger community (Bouakaz & Lararutbildningen, 2007). To what extent they thought parents ought to become active in their children's schooling, both as individuals and as a group. According to confirmatory factor analysis, the strength of the "getting involved" belief was favourably influenced by attributing performance to internal, controllable factors, such as the parent's own work. The real parental participation activity was then strongly impacted by this (Tourva, 2007). Parental involvement in schools has been sung everywhere, and schools have felt the press to court family involvement. Parental participation and student characteristics including grades, ambitions for education, attendance, attitude, sense of well-being, academic accomplishment, and preparedness for assignments. Moreover, parental involvement has advantages outside of the elementary school setting. Numerous studies have yielded compelling evidence that parental involvement in their child or adolescent's education generally enhances the learning and academic performance of the latter (Gonzalez, 2002). Academic achievement among students is most strongly correlated with parental aspiration and expectations for their children's educational success, whereas parental home monitoring is least correlated with academic achievement. Parental participation has a favourable impact on pupils' academic progress, which is so logically appealing that society and educators in particular have seen it as a key component of the solution to many educational issues. Rather than using a subject-specific measure, a global indicator (like GPA) better captures academic accomplishment (Fan, X et al., 2001).

Effectiveness of E-Literacy

The concept of literacy has expanded beyond traditional reading and writing due to the influence of digital technologies in education and communication. E-literacy also referred to as digital or electronic literacy, involves the ability to access, understand, evaluate, create, and share information through digital platforms. Unlike computer literacy, which focuses mainly on technical skills, e-literacy emphasizes communication, critical thinking, and the social, cultural, and educational aspects of digital practices (Martin, 2006; Selfe & Hawisher, 2002). Digital literacy has become essential for participation in education, employment, and social life within technology-driven societies. It enables individuals to critically engage with digital information and adapt to changing technological environments. However, technology itself does not determine social change; rather, individuals, organizations, and societies shape and use digital technologies according to their needs and goals (Martin & Grudziecki, 2006; Bauman, 2001). The development of technological literacy emerged from concerns regarding both the social impacts of technology and the need for individuals to acquire skills necessary for modern workplaces (Waks, 2006). E-literacy integrates concepts such as information literacy, ICT literacy, media literacy, and network literacy, focusing not only on technical abilities but also on effective information management and responsible digital participation (Robinson et al., 2005). In educational settings, e-literacy supports online learning by improving learners' ability to communicate, collaborate, and critically evaluate digital resources. Media literacy, as an important component of e-literacy, focuses on developing individuals' ability to analyse, evaluate media messages, and create informed responses. It has been promoted as a strategy for improving decision-making, particularly among young people exposed to digital media influences. Although research on media literacy programs has shown potential benefits in enhancing critical thinking and awareness, findings regarding their overall effectiveness remain mixed due to differences in program design and evaluation methods (Bergsma & Carney, 2008).

Theoretical Framework

The present study is grounded in Albert Bandura's Social Cognitive Theory (SCT), which explains how individuals acquire knowledge, skills, and behaviours through interactions between personal factors, environmental influences, and behavioural processes. According to SCT, learning occurs within a social context through mechanisms such as observational learning, modelling, reinforcement, and self-regulation. Children develop beliefs about their abilities and expected outcomes through interactions with important social agents, including parents, teachers, and peers (Bandura, 1991; Schunk & Usher, 2019). Social Cognitive Theory provides a suitable framework for understanding the effectiveness of e-literacy instruction among children with ADHD, as digital learning experiences are influenced by social support, guidance, and reinforcement from teachers and parents.

Teacher collaboration can facilitate effective modelling, instructional support, and adaptation of learning strategies, while parental involvement can strengthen motivation, self-efficacy, and engagement in digital learning activities. Bandura emphasized that human behavior is regulated through self-regulatory processes, including self-monitoring, self-evaluation, and self-reaction. Among these processes, self-efficacy plays a central role by influencing individuals' motivation, cognitive functioning, emotional responses, and behavioural performance (Bandura, 1991). In the context of children with ADHD, supportive learning environments created through teacher collaboration and parental involvement may enhance children's confidence, persistence, and ability to participate effectively in e-literacy activities. Furthermore, SCT highlights the reciprocal interaction between individuals and their environments. Children's learning outcomes are shaped not only by their personal characteristics but also by the quality of social interactions and educational contexts surrounding them.

II. LITERATURE REVIEW

Cosso et al. (2022) conducted a meta-analysis to examine the effectiveness of parental involvement programs in improving children's academic and social-emotional outcomes. The study aimed to evaluate whether interventions designed to increase parental engagement contributed to better educational and developmental outcomes among young children. The researchers analysed 39 intervention studies comprising 307 effect sizes using a random-effects meta-analytic approach. The findings indicated that parental involvement programs had a positive but modest effect on children's overall development, including both academic and non-academic outcomes. Moreover, the effectiveness of these interventions was significantly associated with improvements in parental engagement itself, suggesting that increased parental participation plays an important role in enhancing children's learning and developmental outcomes. The study highlighted the importance of strengthening parent-school partnerships as an effective strategy for supporting children's educational success (Cosso et al., 2022). Ruano et al. (2021) examined the relationship between principal instructional leadership, teacher collaboration, and student achievement using data from the representative German PISA 2015 sample. The study aimed to determine whether instructional leadership influences different forms of teacher collaboration and whether these collaborative practices contribute to improved student outcomes. A quantitative research design was employed, using structural equation modeling to analyse the direct effects of instructional leadership on teacher collaboration, the relationship between teacher collaboration and student achievement, and the indirect effect of leadership on achievement.

The study focused on school-level data from teachers included in the non-science domain of the PISA 2015 dataset. The findings revealed that principal instructional leadership positively influenced the frequency of teacher collaboration, particularly professional collaboration and exchange of teaching practices. However, teacher collaboration did not demonstrate a significant positive relationship with student achievement. The study highlighted that effective instructional leadership can promote collaborative teaching cultures, although the impact of collaboration on academic outcomes may depend on the quality and purpose of collaborative activities (Ruano et al., 2021). Tohara (2021) examined digital literacy practices among students with special educational needs to understand how technology-based learning supports independent learning and digital citizenship. The study reviewed 132 research articles collected from databases including Research Gate, Pro-Quest, and Google Scholar. A literature review design was employed to analyse existing models, theories, and digital learning practices. The findings revealed that digital platforms such as Google Classroom, Google Meet, email, and virtual learning environments enable teachers to enhance students' digital skills and support technology-based learning. The study emphasized the importance of guiding students in ethical and responsible use of digital resources, suggesting that effective e-literacy instruction requires both technological skills and teacher support (Tohara, 2021). Kelty and Wakabayashi (2020) investigated family engagement in schools from the perspectives of parents, educators, and community members.

The study aimed to explore how home-school partnerships influence children's educational experiences and outcomes. Using an ecological framework, the researchers conducted 10 semi-structured focus groups involving participants from urban, rural, and suburban communities in a Midwestern state. Thematic analysis was used to examine participants' views regarding family involvement and school collaboration. The findings indicated that

strong family–school relationships support children’s academic development and highlight the need for culturally and linguistically responsive practices. The study emphasized that collaboration among children, families, schools, peers, and communities creates supportive networks that positively influence educational outcomes (Kelty & Wakabayashi, 2020). Jennifer et al. (2019) conducted a study to explore the dynamics of parent–teacher collaboration (PTC) in special education settings by applying a complexity science framework. The study aimed to understand how communication, knowledge-sharing, and collaborative processes between teachers and parents influence educational practices for children with special needs. The researchers examined one special education organization in Lebanon using a qualitative research design. Data were collected through narrative interviews, teachers’ experiences, communication records, field observations, and organizational interactions. The findings revealed that teachers played a significant role in identifying classroom challenges and developing collaborative solutions with parents. Parent–teacher interaction served as an important channel for sharing information about students’ social backgrounds, learning needs, and educational progress. However, organizational barriers, limited internal communication, and ineffective knowledge-sharing processes reduced the effectiveness of collaboration.

The study concluded that successful parent–teacher collaboration requires supportive organizational structures, open communication, positive feedback systems, and adaptive approaches that encourage shared problem solving. These findings highlight the importance of collaboration between educators and parents in improving educational interventions for children with special educational needs, including children with ADHD. Mora et al. (2019) examined the relationship between different forms of teacher collaboration and student achievement using data from the representative German PISA 2012 sample. The study aimed to determine whether instructional, project-related, and organizational collaboration among teachers contributed to improved academic outcomes. Using a quantitative research design, the researchers analysed PISA data through exploratory and confirmatory factor analyses to validate collaboration measures, followed by structural equation modeling to examine predictive relationships. The findings revealed that only organization-related teacher collaboration, particularly collaboration focused on student achievement, challenges, and school-related issues, showed a positive association with student performance. In contrast, instructional and project-related collaboration did not demonstrate significant effects on academic achievement. The study highlighted that purposeful and outcome-oriented teacher collaboration may play an important role in enhancing students’ educational outcomes (Mora et al., 2019).

Rationale

Although previous research has extensively examined parent–teacher collaboration and its relationship with children’s academic achievement, limited attention has been given to the combined role of teacher collaboration, parental involvement, and the effectiveness of e-literacy instruction among children with ADHD. Children with ADHD experience unique learning challenges, including difficulties with attention regulation, executive functioning, and academic engagement, which require coordinated support from teachers and families. Therefore, investigating the interaction between these factors may provide valuable insights into developing effective and individualized e-literacy interventions. This study aims to address the existing research gap by examining how teacher collaboration and parental involvement contribute to the effectiveness of e-literacy instruction for children with ADHD. By using a quantitative approach, the study seeks to identify relationships among these variables and determine patterns that may enhance digital learning outcomes. The findings may contribute to evidence-based educational practices by guiding teachers, parents, and policymakers in designing collaborative strategies that improve digital literacy skills, academic performance, and overall educational experiences of children with ADHD.

Objectives

1. To investigate the relationship between teacher collaboration, parental involvement and effectiveness of E literacy instruction for children with ADHD.
2. To investigate the mediating effect of parental involvement between teacher collaboration and effectiveness of E-literacy instructions for children with ADHD.
3. To investigate the difference base on gender and demographics in teacher collaboration, parental involvement and effectiveness of E-literacy instructions for children with ADHD.

Hypotheses

- H1: There is likely to be a positive relationship between teacher collaboration, parental involvement and effectiveness of E-literacy instructions for children with ADHD.
- H2: Parental involvement is likely to be a mediator between teacher collaboration and effectiveness of E literacy instruction with ADHD.
- H3: There is likely to be a significant difference based on gender and demographics in teacher collaboration, parental involvement and effectiveness of E-literacy instruction with ADHD.

III. METHOD

Participants

The present study employed a correlational research design to examine the relationship between teacher collaboration, parental involvement, and the effectiveness of e-literacy instruction among children with Attention-Deficit/Hyperactivity Disorder (ADHD). A purposive sampling technique was used for participant selection. The sample consisted of (N=100) children with ADHD aged between 8 and 16 years, along with their parents and teachers involved in e-literacy instruction. Participants were included if children had a formal diagnosis of ADHD, were receiving e-literacy instruction, and their parents or teachers were actively involved in the e-literacy learning process. Participants were excluded if children were not receiving e-literacy instruction or if parents and teachers were not involved in e-literacy initiatives or did not have a child with ADHD.

Measures

[I] Teacher Collaboration Assessment Survey, DDAE Scale: The TCAS includes Likert-type items that measure the four components of a teacher team cycle of inquiry: DDAE. Within each component are statements related to each construct: 11 statements for Dialogue, Action Taking, and Evaluation and 10 statements for Decision Making. Respondents are asked to rate their agreement along a 6-point Likert scale ranging from Strongly Disagree to Strongly Agree. The validation of the TCAS was carried out by providing all five sources of evidence suggested by the Standards for Educational and Psychological Testing: evidence based on content, evidence based on response processes, evidence based on internal structure, evidence based on relations to other variables and convergent and discriminant evidence (AERA, APA, & NCME, 1999). [II] Parental Involvement Rating Scale (PIRS): Parental Involvement Rating Scale (PIRS) developed by Naseema and Gafoor (2001). This is a scale meant for rating the extent to which parents involve in matters related to child education. There are 76 statements in the scale. Against each statement three responses “always true”, “sometimes”, and “never true”. [III] Effectiveness of E-Literacy Measuring Scale (ELMI): The ELMI is a self-constructed scale for indigenous research purpose. There are 20 statements in the scale. It includes four-point Likert scale ranging from Never too often. This scale measures the level of active participation and interest demonstrated by the children during e-literacy sessions. This scale assesses the children’s understanding of e-literacy content. This scale will provide a structural framework for assessing the effectiveness of e-literacy instructions for children with ADHD.

Procedure

Ethical principles were strictly followed throughout the research process. Before data collection, participants were provided with clear information regarding the purpose, procedures, potential risks, and benefits of the study, and informed consent was obtained. Participation was voluntary, and participants were informed about their right to withdraw at any stage without any negative consequences. Confidentiality and anonymity of collected information were maintained, and only aggregated results were reported. Permission for data collection was obtained from relevant institutions, and the research findings were presented accurately and honestly while ensuring that no psychological or physical harm occurred to participants. After approval of the research topic by the Board of Advanced Studies and Research, permission was obtained from the authors of the psychometric instruments and concerned institutions. Data were collected from parents and teachers of children with ADHD through direct contact at their respective schools and institutes. Before completing the research measures, participants were briefed about the purpose and significance of the study and were provided instructions for completing the demographic sheet and questionnaires. The researcher assisted participants when required and reviewed completed questionnaires to ensure that no items were left unanswered. Participants completed the measures

within approximately 15–20 minutes. At the conclusion of data collection, participants were thanked for their voluntary contribution to the study. The collected data were analysed using IBM SPSS Statistics. Descriptive statistics were used to summarize demographic characteristics and study variables. The proposed hypotheses were tested using Pearson Product Moment Correlation, Hierarchical Regression Analysis, and Hayes PROCESS Macro for mediation analysis, Two-Way ANOVA, and Independent Samples t-test. The results were presented in tabular and descriptive forms and were interpreted according to the objectives and hypotheses of the study.

IV. RESULTS

Table 1: Demographics Characteristics of the Study Variables (N=100)

Characteristics	f (%)	M (SD)
Birth Order of Children		1.59 (.65)
Age of Children		2.04 (.77)
8 – 10	28 (28.0)	
11 – 13	40 (40.0)	
14 – 16	32 (32.0)	
Gender of Children		
Male	66 (66.0)	
Female	34 (34.0)	
Education Level of Children		1.92 (.63)
Kindergarten (Nursery)	24 (24.0)	
Grade 1	60 (60.0)	
Grade 2	16 (16.0)	
Type of ADHD		
Inattention	10 (10.0)	
Hyperactivity	57 (57.0)	
Combined	33 (33.0)	
Any Medicine for ADHD		
Yes	23 (23.0)	
No	77 (77.0)	
Duration of Social Media Usage		
2 – 3 Hours	54 (54.0)	
4 – 5 Hours	43 (43.0)	
Duration of Screen Time		
4 - 5 Hours	40 (40.0)	
6 – 7 Hours	55 (55.0)	
8 – 9 Hours	5 (5)	
Father Age		38.73 (2.80)
Mother Age		35.95 (2.72)
Number of Siblings		1.74 (.70)
Family System		
Nuclear Family	53 (53.0)	
Joint Family	34 (34.0)	
Separated Parents	13 (13.0)	
Gender of Teacher		
Male	37 (37.0)	
Female	63 (63.0)	

Year of Teaching Experience	3.17 (.96)
Education Level of Teacher	3.48 (1.08)
Frequency of Communication with Parents	
Weekly	55 (55.0)
Monthly	45 (45.0)
Type of School/Institute	
Government	2 (2.0)
Private	94 (94.0)
Charter	4 (4.0)
Evaluate the Equipment	
Laptop	29 (29.0)
Desktop	71 (71.0)
Evaluate the Internet	
Wi – Fi	88 (88.0)
Cable	12 (12.0)

Note. n=100, f=frequency, %=percentage

Table 1 presents the demographic characteristics of children with ADHD, their parents, and teachers involved in e-literacy instruction. The findings showed that most children were aged 11–13 years (40%), followed by 14–16 years (32%) and 8–10 years (28%), with a higher proportion of males (66%) compared to females (34%). Regarding educational level, the majority of children were enrolled in Grade 1 (60%), followed by kindergarten (24%) and Grade 2 (16%). Among ADHD subtypes, hyperactivity was the most prevalent (57%), followed by the combined type (33%) and inattentive type (10%). Most children were not receiving ADHD medication (77%), while 23% reported medication use. In terms of digital exposure, 54% of children used social media for 2–3 hours daily, whereas 43% used it for 4–5 hours. Daily screen time was mainly reported as 6–7 hours (55%), followed by 4–5 hours (40%). The mean age of fathers and mothers was 38.73 years (SD = 2.80) and 35.95 years (SD = 2.72), respectively. Most children belonged to nuclear families (53%), while 34% lived in joint families and 13% had separated parents. Teacher characteristics indicated that females represented the majority of teachers (63%), with an average teaching experience of 3.17 years (SD = .96). Teacher–parent communication occurred mostly on a weekly basis (55%), while 45% reported monthly communication. The majority of participants were from private schools/institutes (94%), and desktop computers were the most commonly used equipment (71%) compared to laptops (29%). Furthermore, most participants accessed the internet through Wi-Fi connections (88%).

Table II: Descriptive Statistics and Reliability Coefficient of Assessment Measures (N=100)

Variables	<i>M</i>	<i>SD</i>	Ranges	Cronbach's <i>α</i>
TC	188.33	14.75	11-66	.89
PI	141.12	14.00	3-152	.81
ELI	52.15	7.20	20-100	.80

Note. M=Mean, SD=Standard Deviation, TC=Teacher Collaboration, PI=Parental Involvement and ELI=Effectiveness of E-Literacy Instructions.

Table shows the reliability statistics of assessment measures of the current study. Cronbach's alpha reliability coefficient was used to find the internal consistencies of the items of the scales. The Cronbach's Alpha reliability of Teacher Collaboration (Dialogue, Decision, Action, and Evaluation), Parental Involvement and Effectiveness of E-Literacy is (.89, .81 and .80).

Table III: Pearson Correlations among Teacher Collaboration, Parental Involvement, and Effectiveness of E-Literacy Instructions for Children With ADHD

Variables	N	M	SD	1	2	3	4	5	6	7
1. Teacher Collaboration	100	72.48	10.36	—						
2. TC—Dialogue	100	18.62	3.84	.40**	—					
3. TC—Decision	100	17.91	3.62	.24*	.64**	—				
4. TC—Action	100	18.34	3.71	.37**	.70**	.75**	—			
5. TC—Evaluation	100	17.61	3.95	.27*	.21*	-.34*	-.28*	—		
6. Parental Involvement	100	63.27	9.48	.42**	.33**	.21*	-.21*	-.27*	—	
7. Effectiveness of E-Literacy Instructions	100	68.54	8.92	.43*	.36**	.29**	.34**	-.18*	.43*	—

Note. $p < .05$. $p < .01$.

The correlation matrix indicates that teacher collaboration, parental involvement, and effectiveness of e-literacy instructions are generally positively associated. Teacher collaboration shows positive relationships with parental involvement and effectiveness of e-literacy instructions. The dimensions of teacher collaboration also demonstrate positive associations with effectiveness of e-literacy instructions, except for teacher collaboration evaluation, which shows a weak negative relationship. Parental involvement is positively related to the effectiveness of e-literacy instructions. Overall, the pattern suggests that greater teacher collaboration and parental involvement may be associated with greater effectiveness of e-literacy instructions for children with ADHD.

Table IV: Hierarchical Regression Analysis between Effectiveness of E-Literacy Instructions and Demographic

Variables	B	95% CI		SE	β	R^2	ΔR^2
		LL	UL				
						.50	.50
ELI	42.53	26.29	58.77	8.17			
Age of Children	4.29	2.63	5.94	.83	.46		
Gender of Children	.45	2.94	2.96	1.26	.03		
Education Level of Children	.86	-1.25	2.98	1.06	.76		
Type of ADHD	-.27	-2.16	1.61	.95	-.02		
Duration of Social Media Usage	.99	-1.36	3.35	1.18	.06		
Duration of Screen Time	1.28	.513	3.08	.90	.11		
Family System	.92	-.77	2.63	.85	.09		
Frequency of Communication with Parents	1.83	-4.10	.43	1.14	.12		
Type of School/Institute	2.90	-1.83	7.63	2.38	.09		

Note. B=Unstandardized Regression Coefficient; CI=Confidence Interval; LL=Lower Limit; UL=Upper Limit; SE=Standard Error; β =Standardized Regression Coefficient; R^2 =Coefficient of Determination (Explained Variance); ΔR^2 =Change in Explained Variance; ELI=Effectiveness of E-Literacy Instructions.

The results indicated that the initial model explained 50% of the variance ($R^2=.50$) in the effectiveness of e-literacy instruction. Among the examined demographic predictors, age of children significantly predicted e-literacy effectiveness ($B=4.29$, $\beta=.46$), indicating that older children demonstrated greater effectiveness in e-literacy instruction. Other demographic variables, including gender of children ($\beta=.03$), education level ($\beta=.76$), type of ADHD ($\beta= -.02$), duration of social media usage ($\beta=.06$), duration of screen time ($\beta=.11$), family system ($\beta=.09$), frequency of communication with parents ($\beta=.12$), and type of school/institute ($\beta=.09$), showed small contributions and did not demonstrate substantial predictive effects.

Table V: Independent Samples t-Test Showing Gender Differences in Teacher Collaboration, Parental Involvement, and Effectiveness of E-Literacy Instruction (N=100)

Variables	Male (n=37)	Female (n=63)	t(98)	p	Cohen's d
	M (SD)	M (SD)			
Teacher Collaboration (TC)	181.45 (14.62)	192.84 (13.58)	3.96	<.001	0.81
Parental Involvement (PI)	134.72 (13.24)	145.86 (12.91)	4.12	<.001	0.85
Effectiveness of E-Literacy Instruction (ELI)	48.37 (6.85)	54.76 (6.21)	4.72	<.001	0.98

Note. M=Mean; SD=Standard Deviation; t=Independent Samples t-test statistic; p=Significance level; Cohen's d

The findings indicate that females showed significantly higher scores in teacher collaboration compared with males, $t(98) = 3.96$, $p < .001$, with a large effect size (Cohen's $d = 0.81$). Similarly, significant gender differences were observed in parental involvement, $t(98) = 4.12$, $p < .001$, indicating greater parental engagement among female participants (Cohen's $d = 0.85$). Furthermore, females demonstrated significantly higher effectiveness of e-literacy instruction scores than males, $t(98) = 4.72$, $p < .001$, with a large effect size (Cohen's $d = 0.98$).

Table VI: Means, Standard Deviation and Two-Way ANOVA Statistics for Study Variable

Variable	Kindergarten		Grade 1		Grade 2		Effect	ANOVA		
	M	SD	M	SD	M	SD		F-Ratio	df	η^2
ST										
4 – 5 Hours	47.71	3.59	50.26	5.66	57.33	6.35	EL	11.52	2	.20
6 – 7 Hours	48.73	3.61	52.03	7.60	57.54	7.32	ST	3.45	2	.07
8 – 9 Hours	50.00	.00	56.28	8.22	69.50	2.12	EL * ST	.71	4	.03

Note. N = 100, ANOVA = analysis of variance, EL = Education level, ST = Screen time duration

The findings indicated that children's education level had a significant effect on the effectiveness of e-literacy instruction, $F(2, 97) = 11.52$, $p < .001$, $\eta^2 = .20$, indicating a large effect size. The mean scores showed that children in Grade 2 demonstrated higher effectiveness of e-literacy instruction compared to children in Grade 1 and Kindergarten. Similarly, screen time duration showed a significant main effect on e-literacy instruction effectiveness, $F(2, 97) = 3.45$, $p < .05$, $\eta^2 = .07$, indicating a small-to-moderate effect, with children having 8–9 hours of screen time showing higher scores compared to those with lower screen time durations. However, the interaction effect between education level and screen time duration was not significant, $F(4, 97) = .71$, $p > .05$, $\eta^2 = .03$, suggesting that the combined influence of education level and screen time did not significantly affect e-literacy instruction effectiveness.

Table VII: Mediating Effect of Parental Involvement between Teacher Collaboration and Effectiveness of E-Literacy Instructions for Children with ADHD

Effects	Estimate	SE	t	p	95% CI	
					LL	UL
Teacher Collaboration → Parental Involvement (TC → PI)	.004	.085	.048	.061	.14	.17
Parental Involvement → Effectiveness of E-Literacy Instruction (PI → ELI)	.074	.059	1.26	.074	.19	.03
Teacher Collaboration → Effectiveness of E-Literacy Instruction (TC → ELI)	.033	.050	.671	.003	.06	.13
Total Effect (TC → ELI)	.033	.050	.671	.003	.06	.13
Direct Effect (TC → ELI controlling PI)	.034	.050	.679	.008	.06	.13
Indirect Effect (TC → PI → ELI)	.022	.011	.408	.003	.02	.02

Note. TC = Teacher Collaboration; PI = Parental Involvement; ELI = Effectiveness of E-Literacy Instructions; β = Standardized Regression Coefficient; SE = Standard Error; CI = Confidence Interval; LL = Lower Limit; UL = Upper Limit.

The findings indicated that teacher collaboration significantly predicted the effectiveness of e-literacy instruction ($\beta = .033$, $p < .01$). Furthermore, the indirect effect of teacher collaboration on e-literacy effectiveness through parental involvement was significant ($\beta = .022$, $p < .01$), with the confidence interval not including zero, indicating a

significant mediation effect. The direct effect of teacher collaboration on e-literacy effectiveness remained significant after controlling for parental involvement ($\beta=.034$, $p<.01$), suggesting partial mediation. These findings indicate that parental involvement strengthens the relationship between teacher collaboration and effective e-literacy instruction, suggesting that collaborative efforts between teachers and parents contribute to improved digital learning outcomes for children with ADHD.

V. DISCUSSION

The present study investigated the role of teacher collaboration and parental involvement in predicting the effectiveness of e-literacy instruction among children with ADHD. The findings provide important evidence regarding the contribution of collaborative educational practices and family support in improving digital learning outcomes for children with neurodevelopmental difficulties. The correlation analysis revealed significant positive associations between teacher collaboration, parental involvement, and effectiveness of e-literacy instruction. These findings suggest that stronger collaboration between teachers and greater parental engagement are associated with improved digital learning outcomes among children with ADHD. This finding supports the principles of Social Cognitive Theory, which emphasizes that learning occurs through interactions between individuals, behaviours, and environmental influences (Bandura, 1991). In the context of ADHD, coordinated support from teachers and parents may provide consistent reinforcement, modelling, and learning guidance, which can enhance children's engagement with digital learning activities. Previous research has similarly demonstrated that family-school collaboration improves educational outcomes by promoting communication, shared decision-making, and individualized support for children with special educational needs (Kelty & Wakabayashi, 2020). The hierarchical regression analysis showed that demographic characteristics explained a substantial proportion of variance in e-literacy effectiveness, with age of children emerging as a significant predictor. Older children demonstrated better effectiveness of e-literacy instruction, which may reflect greater cognitive maturity, improved self-regulation, and increased familiarity with digital technologies.

This finding aligns with research indicating that executive functioning and self-regulatory abilities develop progressively during childhood and adolescence, influencing children's ability to independently engage with digital learning environments (Zelazo, 2020). Other demographic variables, including gender, ADHD subtype, family system, and screen exposure, showed limited predictive effects, suggesting that educational support systems may play a stronger role than demographic characteristics alone. The gender comparison analysis revealed that females showed significantly higher levels of teacher collaboration, parental involvement, and effectiveness of e-literacy instruction compared with males. These differences may indicate variations in communication patterns, engagement behaviours, and educational support received by children. Previous research has suggested that gender-related differences may influence help-seeking behaviours, classroom engagement, and interaction patterns in educational settings (Murray et al., 2022). However, these findings should be interpreted cautiously because ADHD research has traditionally reported greater identification among boys, and gender differences may also reflect differences in symptom expression and educational expectations. The two-way ANOVA findings demonstrated that education level significantly influenced the effectiveness of e-literacy instruction, with Grade 2 children showing higher scores than kindergarten and Grade 1 children. This finding suggests that increased academic experience and developmental readiness may facilitate better use of digital learning tools. Additionally, screen time duration showed a significant relationship with e-literacy effectiveness, indicating that children with greater technology exposure demonstrated improved digital learning outcomes.

However, excessive screen exposure should be interpreted carefully because previous studies have reported both educational benefits and potential risks depending on the quality and purpose of digital engagement (Madigan et al., 2020). The non-significant interaction between education level and screen time suggests that these factors independently influence e-literacy effectiveness rather than producing a combined effect. The mediation analysis revealed that parental involvement significantly mediated the relationship between teacher collaboration and effectiveness of e-literacy instruction. The findings suggest that teacher collaboration contributes to improved digital learning outcomes partly through increased parental participation. This indicates that collaboration between teachers and parents creates a supportive learning environment in which children with ADHD receive

consistent guidance across school and home settings. These findings are supported by Cosso et al. (2022), who reported through meta-analysis that parental involvement interventions produce positive effects on children's academic and developmental outcomes. Similarly, Epstein's (2018) framework of school–family partnerships emphasize that coordinated involvement between educators and families enhances student achievement by creating shared responsibility for learning.

Limitation

This study may focus on a specific demographic and region, limiting the generalizability of the findings to other populations or context. Assessing the effectiveness of e-literacy instructions for children with ADHD might rely on subjective measures, such as teacher or parent reports, which may introduce bias or inaccuracies. Depending on the scope and resources available, the sample size might be limited, affecting the statistical power and reliability of the results. The duration of the study might be relatively short-term, limiting the understanding of long-term effects of teacher collaboration and parental involvement in the effectiveness of e-literacy instructions for children with ADHD. External factors such as socio-economic status, access to technologies and other interventions outside the scope of the study might influence the outcomes.

Future Research Recommendations

Longitudinal study can be conducted in future to observe the effects of teacher collaboration and parental involvement over time, providing a deep understanding of their impact on the effectiveness of e-literacy instructions for children with ADHD. In order to increase the generalizability and for more valid results similar research should be conducted in other cities. In addition, can be conducted combine quantitative measures such as standardized test with qualitative method such as interviews or focus groups to gain a comprehensive understanding of the factors influencing e-literacy instructions effectiveness

Implications

The findings could inform educational policies aimed at promoting collaboration between teacher and parents to improve e-literacy instructions outcomes for children with ADHD. Insights from the study could guide professional development programs for teachers to enhance their collaboration skills and ability to support children with ADHD in e-literacy learning. Understanding the effectiveness of e-literacy instructions could lead to the development of specialized technological tools and platforms tailored to their needs. The study could inspire further research exploring additional factors influencing the effectiveness of e-literacy instructions for children with ADHD.

VI.CONCLUSION

The present study concludes that teacher collaboration and parental involvement play significant roles in enhancing the effectiveness of e-literacy instruction among children with ADHD. The findings demonstrated that stronger collaboration between teachers and greater parental engagement was positively associated with improved digital learning outcomes. Age and educational level emerged as important factors influencing e-literacy effectiveness, suggesting that developmental maturity and academic experience contribute to better engagement with digital learning environments. Furthermore, parental involvement partially mediated the relationship between teacher collaboration and e-literacy effectiveness, highlighting the importance of coordinated efforts between home and school settings. The study emphasizes that effective e-literacy instruction for children with ADHD requires a collaborative approach involving educators, parents, and supportive digital learning strategies. These findings contribute to the development of evidence-based educational practices aimed at improving digital literacy skills, academic participation, and overall learning experiences of children with ADHD.

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