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The Role of Parents: Investigating the Impact of Parental Involvement in a Digital Age and the Role of Parents in Supporting their Children's Learning in Design and Technology Education: A Case Study in the Zambian Setup

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Abstract

Parental involvement is increasingly recognised as a critical determinant of learners' academic achievement, particularly in technology-oriented subjects. This study investigated the role of parents in supporting learners' Design and Technology (D&T) education in the digital age, focusing on selected secondary schools in Northwestern Province, Zambia. A mixed-methods research design was employed, involving questionnaires, interviews, focus group discussions, and observations. Participants included parents, D&T teachers, school administrators, and Ministry of Education officials. Findings revealed moderate parental involvement, largely centred on material provision and homework supervision, with limited pedagogical and digital support. WhatsApp emerged as the dominant digital communication platform between schools and parents. Major barriers included limited digital literacy, time constraints, inadequate access to digital tools, and misconceptions about D&T as a purely technical subject. Learners who received consistent parental support demonstrated higher motivation and improved project completion. The study concludes that structured parental engagement policies, digital literacy initiatives, and community awareness programmes are essential to enhance parental involvement in D&T education in Zambia.

Keywords: Parental Involvement, Design and Technology, Digital Learning, Zambia, Education

1. Introduction

Parental involvement plays a critical role in learners' academic achievement, motivation, and overall educational development [1]. Active parental engagement—such as monitoring schoolwork, communicating with teachers, providing learning resources, and offering emotional support—has been consistently associated with improved learner outcomes [2]. In the digital age, parental involvement has expanded to include supporting learners' engagement with digital technologies embedded within school curricula.

Design and Technology (D&T) education integrates creativity, problem-solving, and technological skills through the use of

In the digital age, parental involvement encompasses supporting online learning, monitoring digital safety, and assisting with technology-based assignments [11]. Research in Sub-Saharan Africa shows that digital inequality, socio-economic constraints, and limited awareness often hinder meaningful engagement [5, 12]. Studies specifically in D&T indicate that access to materials, supportive home environments, and parental digital literacy are critical for learner creativity, project completion, and skill development [13, 14].

Despite these insights, empirical research on parental involvement in D&T in Zambia remains limited, especially regarding digital support and its impact on learner outcomes. This study is among the first in Zambia to examine parental involvement specifically within Design and Technology education in a digitally evolving secondary school context. Unlike prior studies that focus on general academic subjects, this research highlights subject-specific parental roles, the use of low-cost digital platforms (notably WhatsApp) for engagement, and integrates perspectives from parents, teachers, school leaders, and Ministry officials using a mixed-methods approach.

both physical and digital tools, including computer-aided design software, online research platforms, and digital collaboration tools. Consequently, parents are increasingly expected to support technologically mediated learning activities beyond traditional supervisory roles [3].

Despite the recognised importance of parental involvement, evidence from Zambia suggests that such engagement remains inconsistent, particularly in digitally oriented subjects such as D&T [4, 5]. Many parents experience difficulties supporting their children due to limited digital literacy, inadequate access to devices and internet connectivity, and the absence of structured guidance on how to engage with digital learning environments. This disconnect weakens home–school collaboration and may negatively affect learners' ability to complete project-based D&T tasks and develop innovation skills [6].

This study is significant as it provides empirical evidence to inform policy and practice on strengthening parental involvement in D&T education. It offers insights for educators, school leaders, and policymakers on designing targeted interventions such as parental digital literacy training and structured communication mechanisms. Academically, the study contributes to the limited body of literature on parental involvement in technical and creative subjects within the Sub-Saharan African context [7].

This study provides one of the first empirical, mixed-methods investigations of parental involvement in Design and Technology (D&T) education within a digitally evolving secondary school context in Zambia. Unlike prior studies that predominantly examine parental engagement in general academic subjects, this research uniquely focuses on D&T as a technology-intensive, project-based subject requiring both material and digital support. The study advances existing knowledge by identifying how parental involvement in Zambia remains largely resource-based and non-pedagogical, despite increasing digitalisation of learning environments. It further contributes original evidence on the central role of low-cost digital platforms, particularly WhatsApp, as emerging but informal mechanisms for school–parent engagement. By integrating quantitative and qualitative data from parents, teachers, school administrators, and policymakers, the study offers context-specific insights that inform policy development, parental digital literacy initiatives, and structured engagement models for technical education in Sub-Saharan Africa.

2. Literature Review

Parental involvement is underpinned by several theoretical frameworks. Bronfenbrenner's Ecological Systems Theory emphasises the interaction between family and school environments in shaping learner outcomes [8]. Epstein's Framework of School–Family–Community Partnerships highlights structured forms of parental engagement that support learning [3]. Vygotsky's Social Constructivist Theory, particularly the Zone of Proximal Development, explains how guided support enhances learner achievement [9]. Additionally, the Technological Pedagogical Content Knowledge (TPACK) framework underscores the importance of integrating technology, pedagogy, and content knowledge in teaching and learning [10].

In the digital age, parental involvement extends to supporting online learning, monitoring digital safety, and assisting with technology-based assignments [11]. Studies conducted in Sub-Saharan Africa reveal that socio-economic challenges, digital inequality, and limited awareness often hinder effective parental engagement [5, 12]. Research focused on D&T education indicates that access to learning materials, supportive home environments, and parental digital literacy significantly enhance creativity, design thinking, and project completion [13].

However, empirical research examining parental involvement in D&T education within Zambia remains limited, particularly regarding digital support and its influence on learner outcomes. This gap underscores the need for context-specific investigations such as the present study.

3. Methodology

A mixed-methods research design was adopted to capture both quantitative and qualitative dimensions of parental involvement [14]. The study involved 100 parents, 10 D&T teachers, 5 school administrators, and 2 Ministry of Education officials from selected secondary schools in Solwezi and Mushindamo districts. Stratified random sampling was used for parents, while purposive sampling was employed for teachers, administrators, and officials.

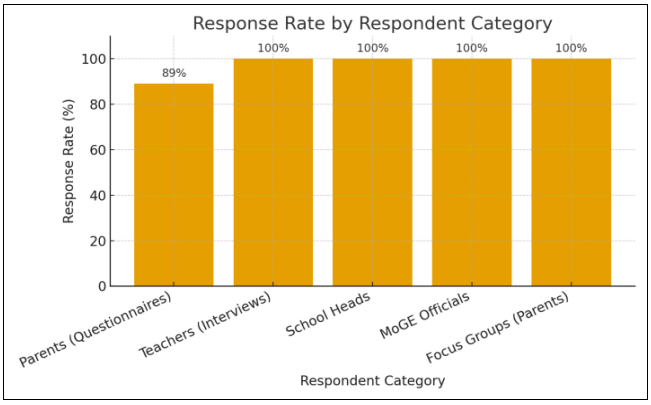

Fig 1: Response rate by respondent category

3.1 Data Collection Methods

- **Questionnaires:** Assessed levels of parental involvement and digital literacy.
- **Interviews:** Explored experiences and perceptions of parental engagement.
- **Focus Group Discussions:** Captured collective views and challenges.
- **Observations:** Documented interactions and use of digital tools.

3.2 Data Analysis

Quantitative data were analysed using SPSS, while qualitative data were analysed thematically using NVivo. Triangulation of data sources enhanced validity and reliability [15].

Ethical approval was obtained, informed consent was secured from all participants, and confidentiality was maintained throughout the study.

4. Results and Findings

4.1 Response Rate

Out of 100 questionnaires distributed to parents, 89 were returned, representing an 89% response rate. All interviews and focus group discussions were successfully completed.

4.2 Demographic Characteristics

Most parent respondents were female (61.8%) and aged between 31 and 50 years. A majority (58.4%) had attained tertiary education, while 68.5% reported having internet access at home.

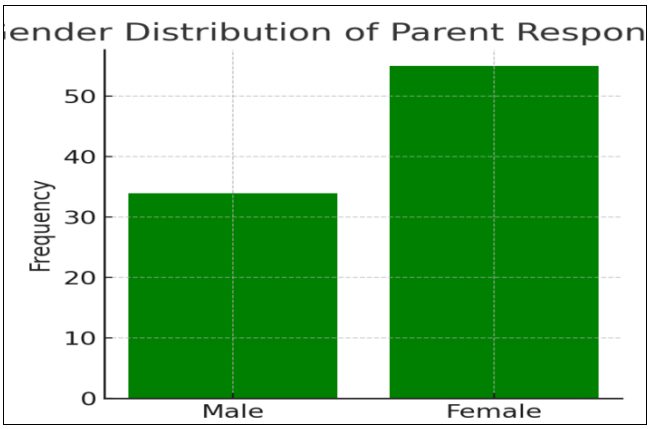

Fig 4.3.1: Gender Distribution of Parent Respondents

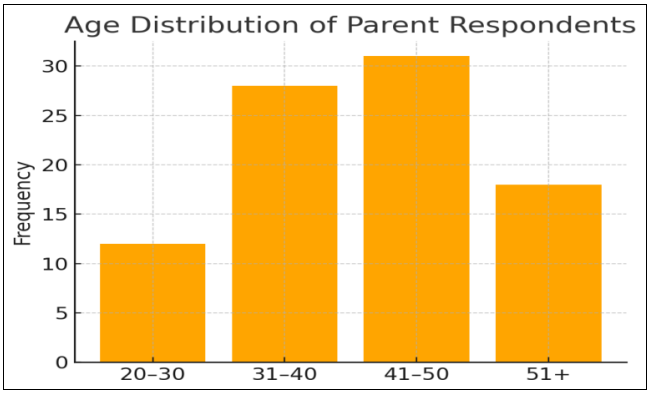

Fig 4.3.2: Age Distribution of Parent Respondents

Educational Level

Most parents (58.4%) had attained tertiary education, followed by secondary (30.3%) and primary (11.2%).

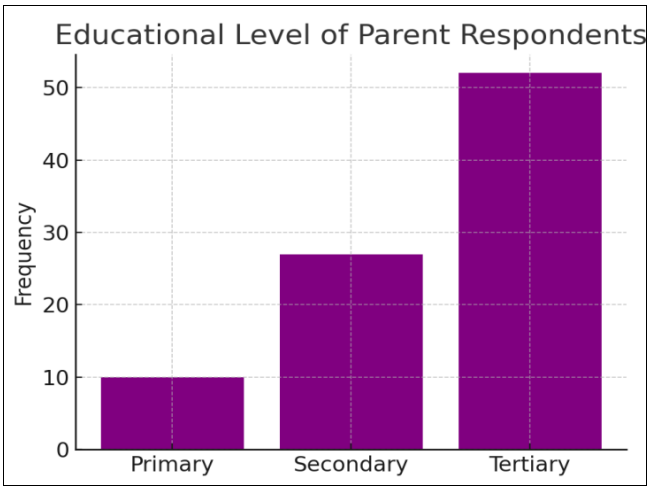

Fig 4.3.3: Educational Level of Parent Respondent

4.3 Levels of Parental Involvement

Parental involvement was mainly centred on material provision (69.7%), homework supervision (61.8%), and basic communication with teachers (48.3%).

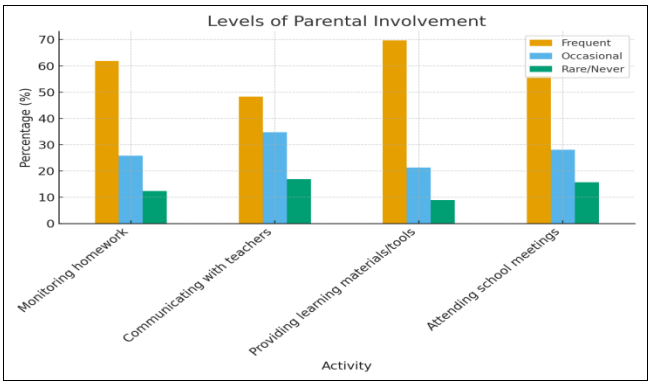

Fig 4.4.1: Levels of Parental Involvement

4.4 Use of Digital Platforms

WhatsApp was the most frequently used digital communication platform (65.2%), followed by educational applications (38.2%) and email (21.3%). A majority of parents (68.5%) reported having internet access at home.

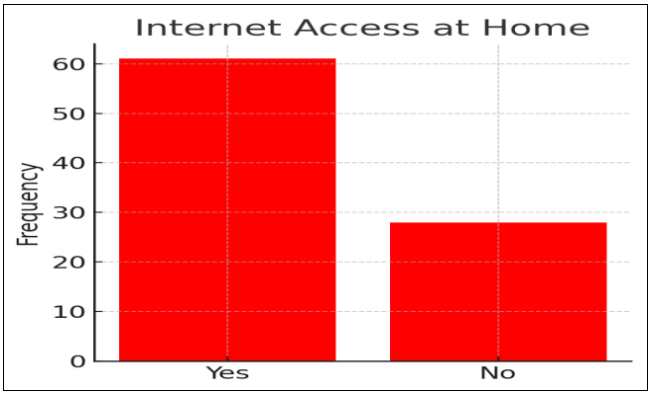

Fig 4.3.4: Internet Access at Home

4.4 Quantitative Findings (Questionnaires4.4.1 Levels of Parental Involvement

Parents reported various forms of engagement in their children's D&T learning, including**:**

4.4.1 Levels of Parental Involvement

Parents reported various forms of engagement in their children's D&T learning. The bar chart below presents the levels of parental involvement in terms of frequently, occasionally and rarely/never.

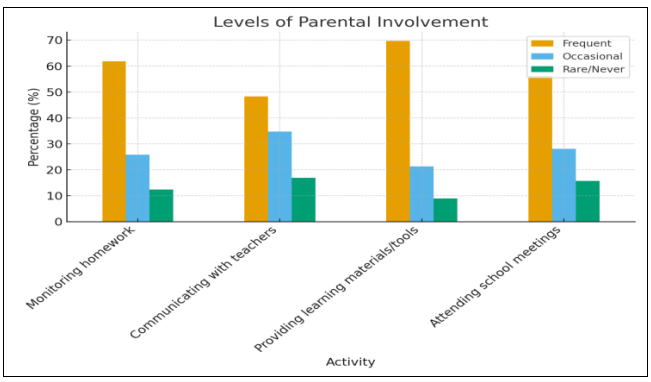

Fig 4.4.1: Levels of Parental Involvement

4.4.2 Use of Digital Platforms

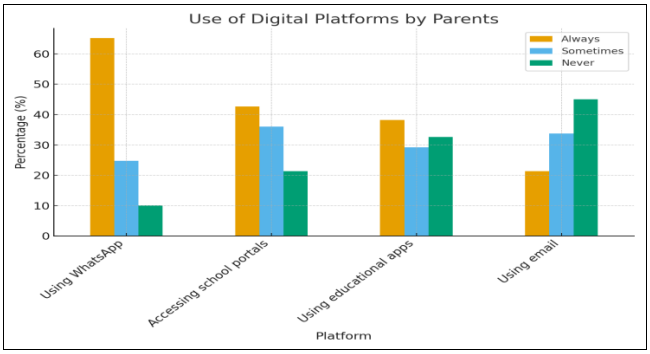

Fig 4.4.2: Use of Digital Platforms by Parents

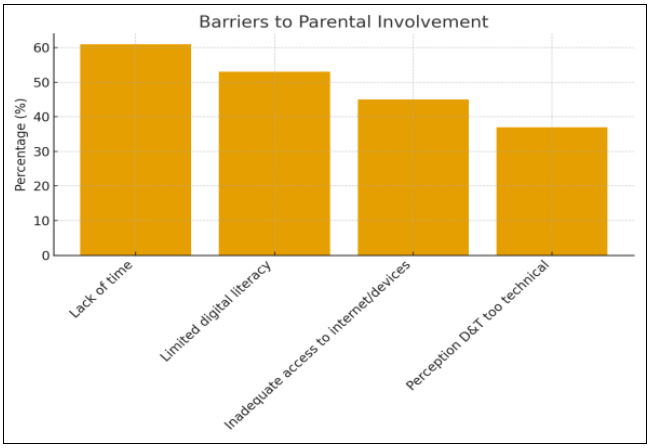

Fig 4.4.3: Barriers to Parental Involvement

The bar chart below presents the percentage of parents using each platform always, sometimes, or never.

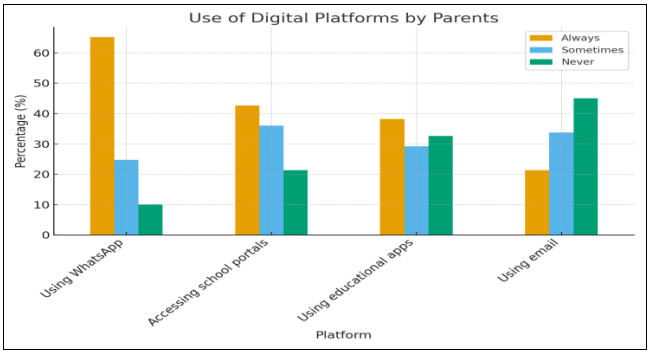

Fig 3: Use of digital platforms by parents

4.5 Barriers to Parental Involvement

Major barriers included limited time (61%), low digital literacy (53%), inadequate access to devices or internet (45%), and perceptions of D&T as overly technical (37%).

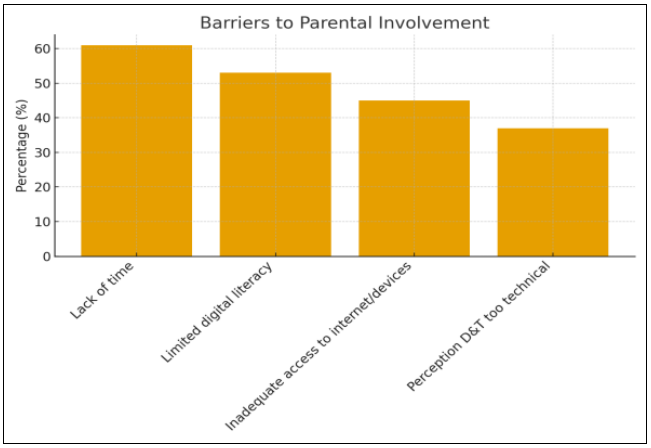

Fig 4: Barriers to parental involvement

5. Discussion

Findings indicate that parental involvement in D&T education remains largely resource-based rather than pedagogical. Parents with higher education levels and greater technological exposure demonstrated more meaningful engagement. Misconceptions about D&T and socio-economic constraints continue to limit parental participation [8, 13]. Nevertheless, even minimal parental support positively influenced learner motivation, creativity, and project completion, aligning with existing literature [2, 3, 9].

A key novel contribution of this study lies in its subject-specific focus on Design and Technology education, a domain that has received limited scholarly attention in parental involvement research. While previous studies acknowledge the importance of parental engagement, this research demonstrates that in D&T education, parental involvement in Zambia remains predominantly logistical rather than pedagogical or digital. The findings further reveal WhatsApp as an emergent, low-cost digital interface shaping parent–school communication, highlighting an underexplored pathway for enhancing engagement in resource-constrained contexts. These insights extend existing theoretical frameworks by illustrating how digital inequities shape parental roles in technical and creative learning environments.

6. Conclusion and Recommendations

This study contributes original, context-specific evidence on parental involvement in Design and Technology education within Zambia's digital learning landscape. Unlike previous research that treats parental involvement as a general educational phenomenon, this study demonstrates how subject-specific demands, particularly in D&T, shape the nature and effectiveness of parental engagement. The findings reveal that while parental involvement positively influences learner motivation and project completion, digital

and pedagogical support remains uneven due to socio-economic and technological constraints. By foregrounding D&T education, this study advances understanding of parental roles in fostering innovation-oriented learning in developing countries.

Parental involvement in Zambian D&T education is moderate but positively influences learner motivation and achievement. Digital engagement is emerging but remains constrained by literacy, access, and structural barriers.

Recommendations:

1. Development of structured parental engagement policies
2. Community-based digital literacy programmes
3. Awareness campaigns to improve understanding of D&T education
4. Increased parental participation in D&T-related school activities

Future studies should examine longitudinal impacts, urban–rural comparisons, and the effectiveness of digital intervention strategies.

7. Acknowledgements

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