

Effectiveness of Parents' Workshop on Home-School Partnership and Students' Mathematics Performance. The Case of a Public Secondary school in Botswana

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Abstract

It is undisputable that an effective home-school partnership has an impact on their children's learning and subsequent academic performance. However, the extent of parental involvement is found to be lacking due to various reasons according to the literature. This paper reports on the effectiveness of utilizing workshops as an intervention strategy to facilitate a home-school partnership that could enhance student mathematics performance in a public senior secondary school in Botswana. Parents from one, purposively selected public senior secondary school, participated in this study. The study used a pragmatist paradigm to draw on a mixed-methods approach and employ a quasi-experimental research design with experimental and control groups. Questionnaires for parents and their children, parents' interviews, and mathematics tests were the main data collection instruments for this study and were used as pre and post-interventions. The parents' workshop intervention was implemented for 10 weeks in the experimental group. Parents were provided with knowledge and skills through presentations on home-school partnerships. The results demonstrated that the parents' workshop intervention improved home-school partnership. The results showed that the intervention had a large positive impact on home-school communication with an effect size difference of 2.260 between pre-test and post-test mean scores for the parents in the experimental group. Consequently, children's mathematics performance improved after the intervention. The difference between pre-test and post-test within the control students showed a small effect size (0.308) while a large and practical effect size (2.215) was found between pre-test and post-test within the experimental students.

Keywords: Botswana, Communication, home-school partnerships, mathematics performance, secondary

Introduction

Mathematics as an essential subject, calls upon all stakeholders, parents included, to ascertain that student performance is of a high standard. Though it is part of the curriculum, as a core subject in almost all countries, including Botswana, the fact that there is greater pressure for the learners to perform better in mathematics suggests that it is somehow thought to be of special importance. As Norris (2012) states, mathematics is an important subject for many reasons. For instance, Mathematics is recognised as the language that strengthens all fields of science, technology, engineering, mathematics, and the medical and social sciences disciplines (Smith, 2004). The need for a country to increase its students' mathematical skills and proficiency has been stressed by several stakeholders (Mujtaba et al., 2014; Maguire & O'Donoghue, 2018). Jonson (1994) indicated that Mathematics broadens the range of options available to students, as it serves as a pre-requisite for many university programmes. With the increasing value of mathematics education, the performance of mathematics is imperative and requires greater attention. In recognition of this, Botswana, through the Revised National Policy on Education (RNPE) (Republic of Botswana, 1994), called for quality education, including mathematics education. Other reforms to transform the education of Botswana were from Vision 2016 (Statistics Botswana, 2014). Vision 2016 projected a country with a system of high-quality education that would assist individuals to meet the changing needs of the country and

the world. It is a fact that public secondary schools in Botswana are struggling under intense pressures to deliver higher standards of education under the existing conditions characterised by limited resources among others, but school administrators and teachers have to adapt to the challenging conditions and find strategies to provide quality education. Unfortunately, poor performance in mathematics remains a major challenge in Botswana public secondary schools.

In an attempt to address issues surrounding mathematics education, many factors which influence student performance in mathematics have been cited in different and various studies. Among factors that have been studied broadly about mathematics learning and performance are attitudes towards mathematics (Hannula, 2002) and mathematics anxiety (Miller & Bichsel, 2004). There is also no doubt that parents are major stakeholders in education and the burden of responsibility gradually falls on them. According to Weissberg and Dusenbury (2011), both parents and teachers have essential roles to play in promoting students' academic performance including mathematics performance. In other words, when teachers and parents work together as partners, they create opportunities for students to develop academic competencies. Thus, a home-school partnership is an indication of parental involvement in their children's learning process (Hoover-Dempsey et al., 2005; Emerson et al., 2012). According to Stroetinga et al. (2019), home-school partnership refers to parents and teachers working together to promote the academic, socio-emotional, and behavioral outcomes of children. Therefore, when parents and teachers are involved in collaboration, they pool their resources together to create a cooperative interdependence relationship. The concept of home-school partnership is crucial for effective learning (Pianta, 2000). Christenson and Reschly (2009) stated that the partnership of home and school result in more students' participation in their academic activities and better achievement in their attitudes toward learning. Most countries around the world encourage partnerships in education whereby schools and parents come together in the running of schools through PTAs and this is the case with Botswana too. The Government of Botswana has long realized that the involvement of parents in their children's education is very essential as the first Education Commission of 1977 emphasized the importance of parental involvement (Republic of Botswana, 1977). The commission recommended that parents, in particular, should; ensure that their children go to school on time, ensure that their children are not overtaxed with household chores over schoolwork, ensure that they work jointly with teachers to foster learning progress and take care of the general interest in the education of their children by visiting schools and holding discussions with teachers (Republic of Botswana, 1977). Parents and Teachers Associations (PTAs) were also legitimized by the 1994 RNPE. This policy highlighted the importance of involving the community, parents in particular, in decision-making on their children's education issues.

While home-school partnership is important for all children, the aim to have effective home-school partnerships by many schools including public secondary schools in Botswana is a challenging process. Pansiri and Pansiri (2011) investigated the causes of poor parental involvement, in a case study of a public primary school in Gaborone west. The study attributed many factors to poor parental involvement in their children's education, including poor communication between parents and the school. The study indicated that communication between the school and the parents was not adequate. Having found similar challenges in many western countries, different authors suggest several strategies through which schools could improve communication with parents such as conferences and newsletters (Tuinstra & Hiatt-Michael, 2004). Baeck (2010) cites insufficient financial resources and lack of educational attainment as barriers to parental involvement. Davies (1996) found that many parents did not experience academic success in school and therefore lacked the confidence and knowledge to help their children. Parents who did not do well in school may be intimidated by the curriculum and teachers; as a result, they avoid being in contact with the school. Consequently, increased attention needs to be paid to home-school partnerships in educational developments in many countries including those in southern Africa. Hence there is a need for training in an institution's turnaround strategy to provide stakeholders with appropriate information regarding home-school partnership in their children's mathematics education. Parents need to be made aware that their meaningful partnership with schools plays a significant role in developing their children's academic potential and they need to be guided to fulfill their role.

With the persistence of low performance in mathematics at the public senior secondary school level in Botswana, a sense of urgency and purpose needs to be directed towards finding ways to improve the performance. The researcher proposed that understanding of ways in which home-school partnerships in mathematics education might be developed is an important aspect to improve mathematics performance. Improving meaningful communication between parents and teachers has been proposed as one mechanism for building successful home-school partnerships (Emerson et al., 2012; Azad & Mandell, 2016). However, fewer interventions have been tested to improve parent-teacher communication. Against this background, this paper reports on a study conducted in Botswana to explore the effectiveness of a parents' workshop on a home-school partnership that could enhance students' mathematics performance. This workshop was aimed at equipping parents with the skills and knowledge by offering training and support to enhance communication between parents and teachers. Therefore, the purpose of this study was to explore the effectiveness of utilizing a parents' workshop as an intervention strategy to facilitate a home-school partnership that could enhance student mathematics performance in a public senior secondary school. As such, the research questions informing this study were:

- (i) To what extent, if any, does parents' workshop promote effective communication between home and school?
- (ii) To what extent, if any, does parents' workshop influence students' mathematics performance?

The following null hypotheses were tested.

- (i) H1: Parents' workshop does not statistically significantly affect communication between home and school.
- (ii) H2: Parents' workshop does not have a statistically significant effect on students' mathematics performance.

Theoretical framework

It has been recognized that parental involvement appears to positively affect student achievement and academic performance. Moreover, challenges have been noted concerning the implementation of interventions to support parent-school relations. The parent-school relations are the outcome of the theoretical perspective held by the stakeholders, and their particular positions influence the extent to which partnership between the parent, and school occurs. The Epstein model of home-school-community involvement is considered a good example of a comprehensive programme (Barbour et al., 2011).

Epstein, an education researcher developed a framework that describes partnerships between families and schools called Epstein's overlapping "spheres of influence" (Epstein, 1995, 2013). Underlying this, Epstein upholds that teachers usually see the relationship between schools and parents in three different ways. The three different ways enumerated by Epstein include; sequential responsibilities of families and schools, separate responsibilities of families and schools, and shared responsibilities of families and schools. The sequential perspective emphasises the critical stages of parents' and teachers' contributions to a child's development. Parents teach needed skills to children until the ages of five or six when their formal education begins. Educators then assume the primary responsibility for children's education. The shared responsibilities of the families and schools stress the coordination, cooperation, and complementarity of schools and families and encourage collaboration between the two institutions. It assumes that both parties share responsibilities for the socialization of the child. According to this perspective, it is important for parents and teachers to work as a team. In contrast, the third way of separating the responsibilities of families and schools emphasises the inherent incompatibility, competition, and conflict between families and schools. This perspective stress that the distinct goal of parents and teachers is considered to be best achieved when teachers keep a professional distance from parents, while the latter should work with their children at home. When teachers regard students as their children, they are likely to see parents and the

community as partners in the education of these students hence embracing shared responsibilities and overlapping spheres of influence (Epstein, 1995). Subsequently, an overlap of spheres is anticipated.

Epstein's integrated theory of family-school relations is characterized by a set of overlapping spheres of influence that bring together the activities of all stakeholders based on mutual expectation (Epstein, 1995). Epstein ascertains that it is important for families, schools, and communities to work together as partners in the process of educating the learner. The collective effort by parents, schools, and communities brings the spheres of family and school influence together, thus increasing the relations between parents and schools. Epstein and Sanders (2002) indicate that the main aim of the relations is to make schools more effective institutions of learning. The model of overlapping spheres of influence comprises several contexts and interpersonal relations among all the parties involved which include internal and external structures. The external structure consists of representing the family and school environments. Epstein (1987) recognizes that the context in which learners learn and grow depends on three forces; changes in time (which include age and grade level of the learner and historic influence on a learner), philosophies, policies, and practices of the family and philosophies, policies and practices of the school. The three forces determine how much and what kind of overlap occurs at any given period. Therefore, the theory of overlapping influence recognizes that stakeholders appreciate their mutual interest and responsibilities to the child and work together for the benefit of learners' success. The internal structure characterizes the arrangement of the interaction of stakeholders within the area of overlap and that is where the communication occurs. According to Kgafe (2001), the internal model of the overlapping spheres of influence shows how crucial interpersonal relations and patterns of influence occur among the individuals at home, school, and in the community. Schools might conduct numerous communications and interactions which bring all three spheres of influence together. With frequent and effective communication and interactions among the three stakeholders, more children will recognize the importance of school which might lead to them working hard, helping each other, and staying in school. Most parents, however, still need assistance to know how to be effectively involved in their children's education. School initiatives and teacher practices to organize parents and school relations are needed to encourage already active parents and to assist those parents who would not become involved on their own. To realise this partnership, two-way communication between the school and home and the home and school is necessary

Review of Literature

One of the parental involvement aspects is school-based involvement (Hill & Chao, 2009; Hill & Tyson, 2009). School-based involvement includes some activities implemented at school such as communicating with teachers, attending class meetings, and participating in school activities as volunteers. One way to effectively implement these activities is to have an effective partnership between parents and teachers (Epstein, 2001). Many research studies have shown the positive impact of home-school partnerships. According to Epstein (2005), effective home-school partnerships increase motivation to learn among children. Epstein further states that a specific home-school partnership is important for the development of foundation skills that are needed for academic achievement. Christenson and Sheridan (2001) indicate that when efforts are exerted by both parents and schools to support the learning of the children, there is a high chance of success among children in school. According to the above-discussed literature, the cooperation between schools and parents is very important to establish a good partnership. One of the key elements which can be very beneficial to having a strong, functional, and sustainable home-school partnership is timely two-way communication between school and parents (Bull et al., 2008).

Home-school communication as one of the types of parental involvement is critical to home-school partnerships. Various forms of communication are often used between schools and parents as a way to increase parental involvement in their children's education. This can include providing contact information for a child's teacher, sending students' progress reports, or holding workshops to help increase parental understanding and involvement. Grant (2011) indicates that research has shown that schools' frequent communication and interaction with parents are the strongest basis for school practices of parental involvement to support children's learning at home and school. Grant also indicated that home-school

communication is a primary way to enhance trust in the home-school partnership. Trust is an important component of an effective relationship between two parties. However, building trust involves sharing information, ideas, expectations, and feelings (Adams & Christenson, 2000).

Galindo and Sheldon (2012) indicate that communication positively impacts family involvement, students' academic performance, and attendance. For instance, Bergman (2012) found that communicating with parents about missing assignments led to improved GPAs, mathematics test scores, and student engagement. Galindo and Sheldon conducted a study of 16,435 kindergarten students from 864 schools and found that students in schools that provided more opportunities for school-home communication and interaction demonstrated greater gains in mathematics and reading. Similarly, Sheldon et al. (2010) examined 39 schools in the National Network of Partnership Schools. The results showed that students from schools that integrated more mathematics-related partnership activities, such as family workshops, newsletters, and mathematics-centered face-to-face conferences during the school year scored higher mathematics marks on the state standardized mathematics tests. Additionally, an improvement in the class average performance for primary school pupils in Ghana was seen to have improved from 68% to 79% (Mante1 et al., 2015). The author indicated that the fact that parents kept in contact with the teachers in the school regarding their children's academics was a boost to most of the students putting in more effort to achieve better results. Moreover, McConnell and Kubina (2014) note that effective communication results in better attendance. In their study, McConnell and Kubina found that telephone calls were particularly effective to connect families and schools.

Research has also identified several influential factors that act as barriers to effective home-school communication. Hornby and Lafaele (2011) assert that if parents feel that their involvement is not expected and valued by the school staff, they are less likely to be involved. Parents' negative attitudes towards teachers and schools' invitations to them to be involved in their children's education can be caused by different factors including lack of information and communication channels between home and schools (Adams & Christenson, 2000). Because communication methods are increasingly becoming technology-oriented, technology-related barriers may occur. Palts and Kalmus (2015) confirm that many parents lack some skills to use available technology resources to communicate with schools. Palts and Kalmus recommended practical training and workshops to minimize barriers and improve both parents' and teachers' digital literacy skills.

Even though most schools usually spare some time to communicate with parents, most communication between the two parties tends to be one-way; from the school to the parents. One-way communication dominates in the use of written letters and general parents' meetings. Moreover, individual parent-teacher meetings do allow for greater two-way communication, but most of the time they end as brief meetings to allow many parents at a time. If parents and teachers are not well prepared for these meetings, with relevant information about strategies for improvement and opportunities for further feedback meetings, these meetings are rendered less useful for the child's development (Berger & Riojas-Cortez 2012).

Home-school communication in Botswana schooling

Botswana Government through the RNPE (Republic of Botswana, 1994) encourages schools to establish Parent Teacher Associations (PTAs) to promote the involvement of parents in students' academic work and other school activities. Gordon and Browne (2007) confirm that parent-teacher forums are an effective communication tool. This reform has created a conducive environment for home-school partnership in schools, however, home-school partnerships remains a challenge in schools (Kgaffe, 2001). Mannathoko and Mangope (2013) conducted a case study in Botswana on barriers to parental involvement in primary schools. The results of the study indicated that parents are mainly called for PTA meetings to be threatened about failure to pay school development and sports fees. The results also indicated that few parents turn up for their children's report collection. Mannathoko and Mangope noted that despite the interventions provided by the schools, parents still seemed to understand little of their responsibilities and the value of education to their children. Based on the literature, communication between the teacher and the parent should take place as an interaction between two discourses – an exchange of information about the child's academic and social development.

According to the literature reviewed above, communication between parents and the school can contribute to sharing goals to reinforce children's out-of-school learning (Duckworth et al., 2009). There are several ways that schools and teachers can assist parents to support their children's learning at home, for example, by holding parenting workshops that provide advice to parents on how to build a suitable home learning environment (Duckworth et al., 2009). The usage of digital or new technologies can be explored for the efficient purpose of engaging in such home-school communication. Thus, the establishment of strong communication procedures that provide for sharing of vital information will be essential in developing and sustaining meaningful home-school partnerships.

Methods

The study adopted a quasi-experimental design using mixed methods. While the parents exposed to the intervention and control treatments were not randomly selected, the groups were recruited from one public senior secondary school. A matching technique was employed to ensure that the control group and experiment group are as similar as possible at the start of the parents' workshops by eliminating any dissimilarity between them (Stuart & Rubin, 2007). Parents according to their gender, educational qualification, and parental involvement level. Further control of confounding variables was exercised by focusing statistical analysis on difference scores between each participant's pre-test and post-test scores. Quantitative data from pre-post tests were analyzed to establish the effectiveness of parents' workshops on home-school communication and the consequent impact on children's mathematics performance. Qualitative analysis of parents' pre and post interviews helped to provide a deeper understanding of the experience of research participants.

The intervention was conducted with parents and their children of one public senior secondary school in the Kweneng Region, Botswana. The school houses 42 classes and has an enrolment of about 1800 students. The school has two Forms, Form 4 and Form 5 students. Just like other senior secondary schools in Botswana, the school streams their students based on their academic abilities in mathematics and science. There are two streams in the school; the Triple science stream (composed of students who are high achievers and are taught the extended syllabus) and the Double science stream comprising of the majority of students that are low achievers in mathematics and science and are taught the core syllabus. The school also accommodates day students who live nearby and boarding students whose homes are a distance from the school. The school was purposively selected based on its familiarity and easy accessibility to the researcher.

Study population and sampling technique

Double science Form 5 students, staying outside the school and their parents were the target population for this study. Double science day-students were found suitable for this study as they held characteristics that assisted in answering the research questions. This particular group of students was selected for this study because it comprised the majority of students that are classified as low achievers in mathematics. It was assumed that, if at all the intervention would have any effect on students' mathematics performance, it would probably be more explicit for students who need assistance in mathematics the most. Therefore, it was possible to assume that skills for effective home-school partnership would be more helpful for these students to improve their mathematics performance. A stratified sampling method was utilized to select 80 students from the 15 Form 5 Double science classes. The purposive sampling technique was used to select parents of the double science Form 5 day students.

Intervention

The intervention for this study was designed to facilitate a home-school partnership that could enhance student mathematics performance in a senior secondary school. The intervention was in the form of a workshop. The intervention was designed for parents of senior secondary school students and was aimed at providing parents with knowledge and skills that promote a home-school partnership that could improve students' mathematics performance. The workshop included three sessions. The first session was about parental involvement in their children's education, discussing how parents engage in their children's general and mathematics learning. The second session was about the home-school partnership, emphasising the importance of regular, and two-way communication between parents and teachers and what parents can discuss with their children's mathematics and other subjects teachers. The last session of the workshop

discussed the importance of listening and responding in an informative and sensitive manner and exploring different communication styles. These communication styles included the use of Information and Communications Technology especially now as demanded by the existence of the Covid-19 era. For instance, parents were encouraged to use phone calls, social media platforms, and text messages to communicate with teachers.

The intervention was facilitated by the researcher and 38 parents attended. The intervention was spread over a period of 10 weeks beginning with a 1-day workshop, held at the school. The workshop took place on a weekend to allow many parents to attend after their weekly duties. The two official languages, English and Setswana languages were used to benefit all the participants for better understanding. The presentation was delivered through a PowerPoint and the content of the presentation was borrowed from the literature. At the end of the workshop, 60-day parent-student academic goals for their children were set.

Data collection and analysis

Data were collected through questionnaires, interviews, and pre-test and post-test in Mathematics. Quantitative data were entered into the Statistical Package for Social Sciences (SPSS). Paired-samples *t*-test results and paired samples effect sizes results were obtained. Quantitative data were analysed using thematic content analysis.

Parent questionnaire

The pre-questionnaire was designed by the researcher and comprised questions about the respondent's demographic characteristics and the frequency of her/his involvement in communication with the school. All the items were in a multiple-choice format and were scored on a four-point scale with opinions ranging from strongly agree to strongly disagree. The post-questionnaire was the same as the pre-questionnaire except that it did not have the questions about the respondent's demographic characteristics. The questionnaire consisted of 18 home-school communication items. Parents responded to the questionnaire in writing at their convenience and could choose to respond to the English version or to a translated version in the main local language of Setswana, prepared by the researcher, who is a first language speaker of Setswana, with approval from the Research Ethics Committee.

Structured interviews

In addition to the questionnaire, a number of interviews were conducted with parents to establish their understanding of the home-school partnership, and the extent to which they communicated with the school with regard to their children's mathematics learning. The interviews were also conducted to provide a better understanding of the effectiveness of the intervention. Due to the restrictions of Covid-19 that interfere with face-to-face interviews and traveling, it was decided that all interviews were to be conducted through phone calls. Furthermore, for the purpose of accuracy, in agreement with the participants, the interviews were recorded and saved on a computer in audio form.

Student's mathematics performance measure

Students wrote the Mathematics tests at the beginning and end of the intervention. The pre-test and post-test were designed by the researcher to reflect the content of the current syllabus followed by public senior secondary schools. The tests were pilot tested and evaluated in accordance with the criteria for other standardised examinations by the Botswana Examination Council, which is the statutory examining body for all the public educational examinations in the national school system. Each test comprised 15 items with a time limit of 2 hours.

Ethical consideration

The research received approval for ethical clearance through the University of Botswana Institutional Review Board. The researcher adhered to all ethical considerations in order to build trust and respect with the participants. Approval was given before the data collection commenced. The Ministry of Basic Education and the Kweneng Regional Education office also allowed the researcher to conduct the study. The purpose of the study was clearly explained to the participants and consent and assent forms were prepared. Participation was voluntary and participants were free to withdraw at any time if they felt like doing so.

Furthermore, the translation of the forms from English to Setswana was approved by the University of Botswana Research Ethics Committee. No names of the participants were discussed in the study and all the records were kept safe.

Results

Quantitative results

Table 1. Parents' pre-test scores in control and experimental groups

Group	N	Mean	SD	Df	T	P
Experimental	38	2.1809	0.20373	74	0.092	0.927
Control group	38	2.1765	0.20967			

Table 1 above shows the pre-test scores in home-school communication for the experimental parents' group (Mean=2.1809, Standard deviation= 0.20373) were similar to those of parents in the control group (Mean =2.1765, Standard deviation = 0.20967). The results showed that the test for homogeneity was not statistically significant between the parents in the experimental and control groups ($t(74) = 0.092$; $p=0.927$). These results indicate that the two groups were at the same level with regard to home-school communication since the p-output was higher than .05.

Table 2. Paired Samples Statistics on Communication between Home and School

Groups	Pre		Post		N
	Mean	SD	Mean	SD	
Experimental Parents	1.3985	.24667	2.4135	.41055	38
Control Parents	1.3609	.18414	1.4850	.35855	38

Table 2 above shows that the pre-test means score on communication between home and school for the parents in the experimental group was 1.3985 while for the parents in the control group was 1.3609. The post-test mean score for the parents in the experimental group was 2.4135 while for the parents in the control group was 1.4850. To determine whether there was statistical evidence that the mean difference between pre-test and post-test on communication between home and school was significantly different, a paired-samples *t*-test was used. The results are shown in Table 3 below

Table 3. Results of Paired Samples *t*-test on Communication between Home and School

	Mean	SD	Std. error mean	Lower	Upper	df	Sig. 2-sided p)	
Experimental-Parents	1.0150	.44905	.07285	.86744	1.16264	13.934	37	<.001
Control-Parents	.12406	.36861	.05980	.00290	.24522	2.075	37	.045

Table 3 shows that the mean score for the parents in the experimental group improved by 1.0150 while for the parents in the control group the mean score improved by 0.12406. Results indicated that the difference between pre-test and post-test mean scores for the parents in the experimental group was statistically significant ($P < .001$) while the difference between pre-test and post-test mean scores on communication between home and school for the parents in the control group was not statistically significant (0.045). In order to see how much the intervention promoted communication between home and the school, effect size differences were obtained. The results of the effect size differences are shown in Table 4 below.

Table 4. Paired Samples Effect Sizes on Communication between Home and School

Cohen's d			95% Confidence Interval	
Paired sample	Standardizer	Point Estimate	Lower	Upper
Experimental Parents	.44905	2.260	1.652	2.859
Control parents	.36861	.337	.007	.661

The paired samples effect sizes results presented in Table 4 above show that the effect size difference on communication between home and school for the parents in the control group was small (0.337). On the other hand, a large and practical effect size (2.260) was found between pre-test and post-test mean scores for the parents in the experimental group.

Table 5. Paired Samples Statistics for Mathematics Test Scores

Groups	Pre		Post		N
	Mean	SD	Mean	SD	
Experimental Students	47.82	12.812	65.97	10.772	38
Control Students	48.39	13.306	49.95	12.486	38

According to Table 5, the mathematics mean score for the students in the experimental group was 47.82 in the pre-test while the mean score for the children in the control group was 48.39. The results in Table 5 above also show that the mathematics mean score for the students in the experimental group was 65.97 while for the control group was 49.95 in the post-test. Table 5 above shows that both the experimental and control groups reported gains in their post-intervention results. To determine whether there was statistical evidence that the mean difference between pre-test and post-test in mathematics within groups was statistically significant, a paired-samples *t*-test was conducted. Results are shown in Table 6 below.

Table 6. Results of Paired Samples *t*-test for pre and post-test of Mathematics

	Mean	SD	Std. error mean			df	Sig.2-sided p)	
				Lower	Upper			
Experimental-Students	18.158	8.199	1.330	15.463	20.853	13.653	37	<.001
Control-	1.553	5.039	.817	-.104	3.269	1.899	37	.065

Students								
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Table 6 above shows that both the experimental and control groups improved their mathematics scores in the post-test. Results of the paired samples *t*-tests showed that improvement in mathematics performance was statistically significant simply for the experimental group ($P < .001$). In other words, the experimental group made a higher improvement as compared to the control group in the post-test of mathematics. The mean difference between the pre-test and post-test for the control group was 1.553. In contrast, the mean difference between pre-test and post-test for the experimental group came to 18.158. In the control group, there were no statistically significant changes between pre-test and post-test scores ($p=0.065$).

Based on the Table 6 analysis, a significant improvement in pre-test and post-test scores in the experimental group was found since the *p*-outputs were lower than .05. Thus, null hypothesis 2 was rejected. To conclude, there was a significant improvement in students' mathematics performance when their parents participated in the parents' workshop intervention. In order to know how well the intervention affected students' mathematics performance, effect size differences were obtained. The results of the effect size differences are shown in Table 7 below.

Table 7. Paired Samples Effect Sizes for mathematics test

Cohen's d			95% Confidence Interval	
Paired sample	Standardizer	Point Estimate	Lower	Upper
Experimental Students	8.199	2.215	1.615	2.805
Control Students	5.039	.308	-.019	.619

Table 7 above shows the paired samples effect sizes of the pre-test and post-test scores in mathematics. The difference between pre-test and post-test within the control group showed a small effect size (0.308) while a large and practical effect size (2.215) was found between pre-test and post-test within the experimental group. The results showed that parental workshops on parental involvement had a large effect on students' mathematics performance.

Qualitative results

Frequency of communication with the school

Before the intervention, both the experimental and control groups reported that communication between them and the school was a challenge. The majority (75%) of the interviewed parents said that mostly the communication between home and school was a one-way communication and it happened sometimes. They maintained that the school contacted them mostly in the form of text messages informing them what is happening or requesting their attendance at school. In this regard, most of the interviewed parents believed that the school was trying to reach out to them to build a relationship with them. However, they said that the problem appears to be parents themselves. One parent, a mother with a bachelor's degree said, "I don't consider myself to have a good relationship with my child's teachers and I don't know them including her mathematics teacher. In short, I don't know her teachers and we never communicate." (E62, Mother). These parents further indicated that their contact with teachers was limited to annual parent-teacher meetings. For example, a mother with secondary education, said she relies on what her daughter tells her about schoolwork: "She will come home and say "I had a mathematics test" but I never really see the results either from her or from the teacher. Why? Because I never communicate with her teacher nor request to see her test papers."(C22, Mother).

After the intervention, according to the post-interview results with the experimental group, almost all the parents reported that two-way communication between home and school is very important and healthy. Parents reported that they wanted more information regarding children's progress in mathematics; the amount of time spent doing mathematics in school; how much time children should spend doing mathematics at home (including both prescribed homework tasks and additional activities such as preparation for tests). Parents reported that after the intervention they understood that it is also their responsibility to reach out to the teachers. One of the parents who participated, a mother with a postgraduate degree said:

I now know my child's Mathematics, Setswana and Chemistry teachers. Soon I will know others. I made sure that I request to know their names and phone numbers. Through phone calls, we discuss her progress at school and how I can assist at home. That, I find that very good. (E72, Mother)

Similarly, a high proficiency parent with a master's degree, stated that after the intervention she regularly approached her child's mathematics teacher to be updated on her progress, rather than wait for parents and teachers' annual meeting or reports collection day. This parent felt that all parents should do that. She saw this as an area where it is the parents' responsibility to be proactive and approach the school as she said:

I just realized that as parents most of us don't get involved, and then when there is a problem with the child, it's the teachers' fault. As parents, we must learn to not always blame the teacher. I am now determined to at least visit my child's teachers at least once a month and ask "how are things?", "How is it going?" (E77, Mother)

Communication tools

When asked about tools for communication, parents reported that the school does not employ a variety of means to share information, including information about their children's academic progress and inviting parents to visit their offices for a discussion. The majority (87%) of the interviewed parents reported that the school uses only short text messages to communicate with them. One of the parents who participated, a mother with a primary education said, "Now that we are living under restricted conditions because of Covid-19, I expect the school to find more ways to reach out to us as parents. I don't remember the last time I saw my child's academic report." (E69, Mother)

Furthermore, before the intervention, the majority (76%) of the interviewed parents reported that they were reluctant to use digital media to enhance two-way pedagogical communication between parents and teachers. However, these parents reported that while they used digital devices in their daily lives they had a belief that it might not be an acceptable way to use to communicate with teachers. A mother with a primary education said, "To me, it is not a formal way to communicate with the school." (E29, Mother)

After the intervention, all the interviewed parents reported that they realised that using digital channels enables fast and relevant information exchange, as it allows them to immediately catch up on their children's academic progress. These parents indicated after the intervention they have realized that new technological opportunities support the interaction between school and home, making the relationship more open and transparent. One parent said, "Using technology to communicate with my child's teachers has made our interaction more frequent and effective." (E24, Sister)

Interviewed parents also reported that after reaching out to the teachers, their efforts were welcomed and they were able to communicate through different platforms including phone calls, and WhatsApp text messages among others.

Discussion

The first major finding of the study is that parents' workshops on home-school partnership had a positive large impact on home-school communication. This means that the home-school partnership improved after the parents' workshop intervention. These results were determined from the pre-test and post-test effect size

differences of the experimental group. The interview results supported these findings. Post-intervention, many parents reported that after attending workshops they requested their children's mathematics teacher's names, and phone numbers and confirmed that they have since started calling them. These parents reported that the relationship between them and teachers is quite interesting and has positively improved. The results are consistent with previous studies. For example, in 2011, the Centre for Research and Best Practices of Singapore's SEED Institute studied a Singapore school facility with successful parent engagement programmes (Teo, 2011). They found that its most successful strategy to encourage school-home partnerships is having parents' workshops on parental involvement where both parents and children participate. The school also frequently communicates with parents on parental involvement via various platforms to better engage them. Similarly, Henderson and Mapp (2002) indicated that elementary schools that specifically targeted parents of low-achieving students by having teachers holding face-to-face meetings, telephoning parents of low-achieving students on a regular basis, and sending materials home to parents regarding strategies for helping their children, saw an improvement among low-achieving students at a 40% higher rate than schools that reported low levels of such efforts.

Before the intervention, many parents reported that communication was one-sided, from the school only. These parents also reported that communication between the school and parents was more just to inform the parents of what is happening rather than to build a relationship with the parents, where they are treated as equal partners, who can discuss school matters, and parents are treated more like receivers of information. Lindle (1989) reports that, according to surveyed parents in four schools system, parents want teachers to treat them as equals and with respect. Parents do not appreciate the professional and cold approach from teachers. According to Obeidat and Al-Hassan (2009), it is, therefore, essential for teachers to contact the homes to notify parents of a job well done or their child's progress, and how they can assist their child at home, not only when they are lacking in their performances, or when their behavior is causing problems. This, in turn, will promote positive relationships between parents and teachers.

Through the parents' workshop intervention, parents were reminded of the importance of two-way communication between them and their children's teachers to promote their partnership. That is, parent-teacher communication is not supposed to be done in one direction by teachers, but parents are also entitled to listen, and share their thoughts and questions. Parents were encouraged to respond to teachers and to also initiate conversations with their children's teachers. For instance, instead of waiting for an academic report through the post office or from their students, parents could make appointments through telephone calls and visit the school for report collection. This could create more time and space for discussions. On this point, parents reported that it is also important for schools or teachers to be accessible to parents and they should foster a partnership that does not only include one-way communication but rather should establish a partnership that is ongoing, consistent, progressive, collaborative, and beneficial. In order to establish a good parent-teacher partnership, interviewed parents suggested that teachers should be trained on how to deal with parents. Palts and Harro-Loit (2015), point out the difference between one-way communication, which occurs when teachers seek to inform parents about events, activities, or a student's progress through a variety of sources, and two-way communication. They revealed that the latter involves interactive dialogue between teachers and parents through telephone calls, school visits, parent-teacher conferences, and various school-based community activities.

In a process of increasing and encouraging two-way communication between the parent and the school, the intervention provided parents with strategies such as sending a message to the teacher or making a phone call. Parents' post-intervention interview responses revealed that they have begun to use social media, phone calls, and text messages to communicate with teachers. The intervention provided knowledge on the evolution of communication technology such as the telephone and voice message. Interviewed parents said they realized that through technology, teachers are able to provide regular feedback about each student's performance. Aljomaa et al. (2016) said that phones of this era have many advantages through the internet and social media such as WhatsApp and Facebook. Some parents indicated that post-intervention they were able to join WhatsApp groups where they are able to discuss different issues regarding their children's

learning with teachers. They also noted that technology allows communication opportunities not limited by school hours or location.

According to Epstein (2009), research evidence suggests that most parents want their children to succeed in school, and in order for them to be good partners in their children's education, they yearn to obtain more information from schools. Failure to convince parents of what they can do is a problem for parental involvement. Many parents are simply not aware of where their help is required because the school has not advertised the opportunities adequately (Sanders, 2006). Similarly, most students at all school levels, want their parents to be familiar and acquainted partners in schooling. Interviewed parents post-intervention reported that they also realized that the problem is that many of them do not know how to go about getting involved in their children's education. Parents themselves freely admitted their lack of training in working with teachers, especially in the skills they need in order to have effective communication with teachers. Consequently, it should be a top priority for parents and schools to establish and encourage effective communication between schools and homes. This corroborates previous studies by Caspe (2003) which suggest that professional development and preparation programs for teachers and parents should advocate the development of communication skills. Parents' workshop intervention provided training on communication skills to the experimental group. Richardson (2009), reported that in order to enhance the educational achievement of students, educators need to scrutinise possibilities to develop and form partnerships with parents. Such a partnership is, especially, essential in secondary schools, where parents often lack the confidence in their ability to assist their children with their learning (Sheldon, 2019).

The second major finding of the study is that the intervention had a positive effect on the children's mathematics performance. The effect size difference between pre-test and post-test in mathematics was large for the children in the experimental group but there was no discernible improvement in the control group scores. The results from parents' pre and post-questionnaires showed an improvement in communication between parents and teachers. According to the parents' interview, parents used knowledge and skills obtained from the parents' workshops to use different communication strategies to get in touch with their child's teachers which included the use of phone calls and text messages through social media applications among others. Some reported that where they could not reach their child's teachers, they contacted the head of departments. These parents reported that the intervention provided them with an opportunity for improved communication with teachers regarding ways in which they can contribute to the development of positive attitudes to mathematical thinking and learning. Many indicated that access to their children's academic progress has become much easier through the use of social media platforms. In a study conducted by Sirvani (2007), she examined the impact that parent-teacher communication had on students' mathematics achievement by taking a sample of 55 algebra students, Sivani found that parental involvement significantly contributed to the achievement of all students including those in secondary schools, which was supported by other researchers like Epstein (1995), and Henderson and Berla (1994).

During the workshops, parents were encouraged to use communication to collaborate with teachers. Collaboration was defined as a process in which people (parents and the school personnel) with diverse expertise and experience work together and make decisions to generate new solutions to mutually defined problems. Post-intervention, parents reported that they were able to communicate with teachers and set specific goals and objectives for their children. For instance, parents indicated that they were able to agree with their children's mathematics teachers for their children to complete at least two past mathematics examination papers per week. Koonce and Harper (2005) stated that setting specific goals and objectives is one of the most crucial components of parental involvement in their children's education and this is a participatory decision-making process between parents and teachers.

Recommendations

Successful home-school partnerships would help children to benefit and improve their academic performance. However, this study also shows that parents lack knowledge and skills about how to effectively involve themselves in their child's learning both at home and at school. Majority of the parents choose to be involved indirectly, by paying school fees or transporting their child to school. This does not help children; instead they become uninterested in their general and mathematics learning and reluctant to

study, which in turn can affect their overall attitude towards education and academic performance. This issue should be taken into consideration. Parents from different backgrounds need to be informed about how best they can directly get involved in their children's learning. More effective programmes should be arranged by policy makers, schools, or teachers to assist parents. The following recommendations are nevertheless drawn from these conclusion. These are:

Recommendations for practice

The findings of the present study indicated that there are particular challenges to nurturing and maintaining effective partnerships between home and school. However, given the willingness of parents to take more active role, there appears to be a considerable scope to increase parental involvement in their children's general and mathematics learning. In this study it emerged that parents hesitate to become directly involved in their child's learning, because of beliefs about their self-efficacy. Yet parents can help without having prior knowledge and skills, if they receive the right instruction.

Models of effective home-school partnerships emphasise the importance effective communication between home and school, and efforts could be made to increase communication between parents and teachers about such issues as children's academic progress. Currently, communication appears to be largely confined to annual parent-teacher meetings. But parents reported displeasure with this. It is possible that such displeasure is common in many public senior secondary schools in Botswana, but two way, more frequent communication between parents and teachers maybe even more important to senior secondary schools. Where there may be less parent-initiated and less informal home-school communication, secondary schools and teachers may need to explore increasing frequency of this communication in more structured ways. Schools must be clear on the aims of all communication with parents. Moreover, schools must support parents that are already involved in the learning of their children as well as reach out to the parents that are less involved. New ICTs should be used to increase communication with parents.

While the present study was based on a small sample, the findings were encouraging enough to warrant recommending that Botswana's educational policies should have a long-term goal of promoting home-school partnerships in all basic school systems in the country. Furthermore, because many parents are used to having little or no involvement with their children's schools, it is crucial for the Ministry of Basic Education to offer a clear guidance about parental involvement in schools. The Ministry should provide direction to schools about the relationship between forms and purposes for parent involvement. The policymakers must provide policies that clarify the range of ways in which parents and teachers can have a successful partnership. It is acknowledged that the above-mentioned recommendations require some resourcing, effort, and commitment on the part of teachers and schools. Persuading teachers that parents can offer valuable support in their children's academic performance is a necessary first step. It is suggested that more time be devoted to pre-service teacher training regarding the potential benefits of promoting parental involvement, including training in developing and maintaining successful home-school partnerships. It is also suggested that some of these training would need to be aligned to particular challenges on parental involvement in public senior secondary school in the context of Botswana. Furthermore, pre-service training should be accompanied by in-service training. Providing regular training on parental involvement will assist teachers to be aware of these issues and increase their motivation to nurture home-school partnerships.

Recommendations for future research

The research for this study was limited to a single school, it would be beneficial to conduct a similar study involving a large sample of learners across the country using the same experimental setup, which could provide more definitive evidence to strengthen the discoveries of this study. This study focused more on mathematics learning. Similar intervention could be used for other subjects. In addition, children of different levels and their parents could be targeted for further research.

Conclusion

Successful home-school partnership is the key to educational success; all stakeholders involved in education therefore must place more importance on this issue. The improved home-school partnership has shown to result in increased student mathematics success. Schools and educators must make a combined effort to

encourage home-school partnerships. This study used a mixed-methods methodology to explore the effectiveness of utilizing workshops as an intervention strategy to facilitate home-school partnerships that could enhance student mathematics performance in a public senior secondary school. Extending the empirical literature that has linked home-school partnership with child academic performance in cross-sectional and longitudinal studies, the present findings suggest that home-school partnership in their children's general and mathematics learning is malleable. Indeed, the results showed that the parents' workshops on home-school partnership intervention promoted significant gains in home-school communication. The results of this study indicated that there seems to be considerable scope for increasing active home-school partnerships in their children's general and mathematics learning in public senior secondary schools in realistic and effective ways. It is important that this issue continue to be explored so that the potential resources of parents as educational partners are utilized for the benefit of schools, parents, and children. This study established that parents want to be involved. They care about the education of their children but due to circumstances such as lack of knowledge and skills in home-school relations, they experience problems. It is, therefore, necessary for schools to understand and accommodate parents so that greater involvement is possible. Partnership and collaboration are necessary to maintain effective parent involvement.

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