PERCEPTIONS OF TSHWANE LEARNERS IN THE 9TH GRADE ON HOME BACKGROUND AS INFLUENCING THEIR PERFORMANCE IN MATHEMATICS IN SOUTH AFRICA

Bamidele Segun Donald, Odeyemi (PhD).
https://orcid.org/0000-0002-4834-414X
National Teachers' Institute
bsd102002@yahoo.com

Abstract

The study probed into the perceptions of the home background factor by the 9th grade learners on their performances in mathematics in Tshwane municipality public high schools in the Republic of South Africa. The study applied a mixed method research approach, that is, the use of both quantitative and qualitative data collection, with a descriptive survey design. The samples in the survey consists of 120 male learners and 280 female learners, totaling 400 public school learners. The data collection was done through a self-developed questionnaire, which also included a few open-ended questions on how mathematics performance can be boosted. The learners' end of the term result in mathematics was appraised for ascertaining learners' degree of academic performance. Data collected quantitatively were analysed using version 24.0 of the Statistical Package for the Social Sciences (SPSS), while the data collected qualitatively were analysed in a narrative form. A null hypothesis was tested in the survey, which was rejected. The study presented that the perceptions of the 9th grade learners on home background was insignificant, therefore, it was not taken as a factor responsible for their poor performances in mathematics.

Keywords: *Academic performance, 9th grade learners, Mathematics, Perceptions, Tshwane Municipality.*

Introduction

Mathematics as a subject, is of a basic necessity to the global society. The global technology intended has been hinged on the need for mathematical competence. Mathematical skills and education has formed the basis of global competition (Kaiser, 2020). Yenmez et al. (2017) discussed mathematics as a major tool that was invented to solve human problems in the areas of stock taking and other calculations for exerting visible technological development. Many countries have formed a notion of importance

for mathematics in their different views. The Americans noted that the wellbeing of America is centered on the knowledgeability of their youths in mathematical skills (Holdren, 2013; Wright & Ellis, 2019). In South Africa, mathematics and sciences have been considered as core subjects needed for higher education, skilled jobs and economic growth progression (Naidoo & Ranchod, 2018).

The degree of failure in mathematics is a global challenge, which has been existing for years (Arends et al., 2017; Pisa, 2018). The American learners who wrote the Programme for International Student Assessment consisting 56 nations in 2009 and 2018 respectively did not reach the average global benchmark (Hanushek & Woessmann, 2009, OECD, 2020). In addition, the 2019 Trends in International Maths and Science Study (TIMSS), where American learners also participated was also very poor. These results clearly revealed the mathematical incompetence of the Americans from global assessment (Mullis & Martins, 2019).

The European nations also understood the place of mathematics in national development, but they have also recorded poor performances (Lithner, 2011). University students in Sweden still struggled in passing mathematics, survey showed that only 20% of the students passed Mathematics in courses where mathematics was a requirement.

Mathematics performance in West Africa was also not impressive and encouraging. Studies reveal that the Gambian learners performances in mathematics is a big threat to the developmental process of their economy (Tomita & Savrimootoo, 2016); Ghana had a similar discouraging mathematics performances (Abreh et al., 2018; Essuman et al., 2021), and Liberia with a more worrisome mathematics performance result (Gbollie & Keamu, 2017), these results have become a huge challenge to the government and stakeholders in the different ministries of education in these nations.

The Southern African Consortium for the Monitoring of Education Quality (SACMEQ) confirmed the situation in Namibia regarding learners' mathematics performances, and lamented the massive failure rate, making them to come behind among other African nations in mathematical competency level (Mateya et al., 2016). In the South African universal ANA reported in 2014, it was established that learners in the 1st to the 9th grade performed poorly, while, the 10th to 12th grade did not actually show an improved performance respectively which was indeed painful to the stakeholders (DoE, 2014). In the 2018 PISA where South African learners participated with 79 other countries, making 80 countries, South African learners were ranked the poorest of the 80 nations represented (PISA, 2018). While the World Economic Forum (WEF) 2018 report also gave a serious

report that, the South African learners were also ranked 128th position out of 137 countries having passed at a 2.6% level of performance from 100% (PISA, 2018). Most South African learners have not been able to attain a desirable level of proficiency in mathematics and sciences when compared with other nations involved in the tests globally, especially the 9th grade learners with the poorest grade globally (Mullis et al., 2012; SNAP, 2014; SNAP, 2017; TIMSS 2015; TIMSS, 2019; UNICEF Education & Adolescent development, 2010).

The South African learners' poor performance in mathematics has generated so much concern from different educational departments since mathematics is taken as a major central subject believed to be necessary for the success of attaining the long awaited new technological age in South Africa (Jojo, 2019), due to this reason, learners are required to undergo the learning of mathematics or mathematics literacy so as to prepare learners for future work life experience in a technologically and scientifically directed global setting.

Having pointed out above the global value of mathematics, learners still have continuous failure in the subject (Arends et al., 2017; Feza-Piyose, 2012; Pisa, 2018). It is a general conception that poor academic performance of any South African learner may be a cog in the wheel of progress for the actualisation of the age long technological age goals (Odeyemi-Bsd, 2020). Department of Basic Education (2014) presented it that the 9th grade learners had 12% out of 100% in mathematics, and in the subsequent year, the learners scored 44% out of 100% which was a little fairer, but still a failure. In 2017, the TIMSS report also indicated that South African 9th grade learners came out having 38th position from 39 countries who participated, which implies scoring 13% of 100% in mathematics (Reddy et al., 2017).

Mathematics has been seen as a human activity involving the use of certain methods applicable in scientific studies, such methods are: observational, representational, investigating events, and establishing measurable relationships noticeable in physical and social experiences between mathematical ideas (Odeyemi-Bsd & Chireshe, 2021). Mathematics has also become a non-negotiable subject in any given society and a tool for the formation of the educated personality (Odeyemi-Bsd, 2020). Mathematics also serves as a tool for the sharpening of a man's mind; it also positions the reasoning ability and the personality of the individual (Chowdhury, 2016, (Odeyemi-Bsd et al., 2021).

Secondary school learners' ability to succeed in mathematics is an opportunity for future career progression (Wang & Degol, 2017). When learners are well grounded in

mathematics, it gives room for building solid background in mathematics which can help in developing innovatory inclinations and makes room for arrays of job options (Wang & Degol, 2017). The differentiations in learners' mathematics performance has brought noticeable consideration and more academic focus by interested stakeholders regardless of the differences in the teaching and learning techniques. This discrepancies were caused by the achievement rates of school learners. Some obvious causes may be linked to the likely factors that may possibly be connected to learners' self-esteem, self-efficacy, motivational inclination, study habits, emotional issues, teacher's discussions and discouraging relationships among learners (Wang & Degol, 2017). Some internal and external causes may impede learners' mathematics performance, and when learners fail to embrace the appropriate rule to achieving success (Acharya, 2017; Ugwuanyi et al., 2020).

Going by the poor performances of South African learners in mathematics from all indications, the government and stakeholders have made it a crucial task to improving mathematics performance of learners at all levels compulsorily (DBE, 2015). From this premise, it became an urgent necessity to find a lasting solution to the problem (Hajovsky et al., 2020).

The poor performances of learners requires a need to investigate how the 9th grade learners perceived the factors influencing their academic performance in mathematics in Tshwane municipality. The 9th grade learners were considered for this survey due to the fact that no studies were done on the 9^{th} grade learners on academic performance in mathematics, while other provinces have been studied. It was also emphasised that the 9th grade learners' mathematics performance was a weak point in mathematics within the basic education system of South Africa generally (DBE, 2015). The sensitivity of the 9th grade learners' class was a cause for concern, this is due to the critical time for the selection of subjects (DBE, 2015). These have been responsible for this present survey in assessing the 9th grade learners' perceptions of factors influencing their mathematics performance in Tshwane municipality, South Africa.

Statement of the problem

The study background has vividly shown the position of mathematics in South African educational system as a very valued subject in the nation, despite their inability to accomplish a desirable level of success in the subject (Naidoo & Ranchod, 2018; Yenmez et al, 2017). A huge number of South African learners had also been unable to reach an acceptable benchmark in mathematics proficiency (DOE, 2014; Feza-Pisoye, 2012; Mullis et al., 2012; Reddy et al., 2016; Tachie & Chireshe, 2013). The study background

pointed out a few studies done on factors militating against the mathematics performance of South African learners in other provinces of South Africa without capturing the 9th grade learners of Tshwane municipality (Feza-Pisoye, 2012; Tachie & Chireshe, 2013). It is based on this backdrop that the survey sought to explain the major research question stating that: What are the 9th grade learners' perceived factors influencing their mathematics performance in Tshwane municipality.

Objectives

i. To determine the perceptions of the 9th grade learners on the relationship between home background and their mathematics performance in Tshwane municipality.
ii. To determine the perceived strategies to be used for improving mathematics performance of the 9th grade learners of Tshwane municipality.

Research questions

i. To what extent do the 9th grade learners perceive home background is influencing their academic performance in mathematics in Tshwane municipality?
ii. What are the perceived strategies that can be used for improving the 9th grade learners' academic performance in mathematics in Tshwane municipality?

Hypothesis of the study

The study quantitatively tested the following hypothesis at $P < 0.05$:

Ho1: There is no significant relationship between the 9th grade learners' perceptions of home background and their academic performance in mathematics in Tshwane municipality.

Theoretical framework

Social Cognitive Theory of Learning

The theoretical framework under which this study was conducted was the Social Cognitive Theory of learning by Bandura. The Social Cognitive Theory (SCT) is centered on the position of the environment. Furthermore, the theory positions individuals as being self-organized, proactive, self-reflecting and self-regulated individuals. The theory presented the interplay of certain elements of the SCT, which were the influence of self-observation and self-evaluation (beliefs and perceptions), role models (modelling), and self-efficacy in learning (Redmond, 2010), thereby discussing the SCT under the three basic components of SCT having in mind that all these happens within the environment. This theory was found appropriate to explore the 9th grade learners' perceptions of factors

Review of related literature

Home background has been described as the bedrock of learners' psychosocial, moral and spiritual foundation (Uwaifo, 2008). The influence of home background on learners' academic performance is crucial. This has made parental support in the home environment a source of influence on learners' academic performance. The nature of parental support and relationship with learners in the home background has been of a great concern to every educator globally (Jeynes, 2017; Uwaifo, 2008). A number of studies, for example, in America (Ravitch, 2016; Jeynes, 2012, 2017), Canada (Deslandes, Barma & Morin, 2015; Kreider & Suizzo, 2009; Codjoe, 2007; Murphy, 2009), India (Radhika, 2019; Kudari, 2016), Ghana (Wolf & McCoy, 2019), Nigeria (Adetayo & Kiadese, 2011; Uwaifo, 2008; Odeyemi-Bsd, 2019), Kenya (Ogola, Maithya & Makungu, 2018) and South Africa (Adesokan & Makura, 2020; Mudau et al., 2018; Karande & Kulkarni, 2005), Zimbabwe (Tawodzera & Themane, 2019) focused on parental support and found that parental support had a positive and significant relationship with learners' academic outcomes. The details of the above studies will be discussed in the following paragraphs.

Studies in America, (Jeynes, 2012, 2017) and other parts of the world as highlighted above established that academic performance of learners whose parents were graduates was perceived better than learners whose parents were non-graduates. Educated parents in America who take time to guide their children on day to day academic assignments can influence learner's educational outcomes (Stevenson & Baker, 2012).

The importance of the family was established by the SCT which informed the present study. The theory states that the family is the child's immediate source of learning. The present study sought to establish the 9th grade learners' perceptions of the influence of supportive home environment and parental support in home background on their performance in mathematics in South Africa.

Similar studies in Nigeria and West Africa established that learners who have parents that are educated have a better platform and opportunity of being a higher academic achievers (Adekola, 2012; Uwaifo, 2008). This may be as a result of the motivation, support and encouragement they have received from their parents; giving such learners an edge over the other learners who have uneducated parents. This is also an indication that educated parents are most times sensitive to their children's educational needs and demands. Uwaifo (2008) further revealed that the home environment and how the family meets the needs of Nigerian learners have a significant influence on their academic performance. This cited study investigated on university students, while the present study focused on South

African secondary school learners. In a similar vein, an empirical study in Nigeria on secondary school students on single-parenthood and academic performance revealed that when a child's need is not promptly taken care of, the child develops some psychological disturbances capable of inhibiting better academic performance (Odeyemi-Bsd, 2019). These studies above confirm the SCT which informed the present study. The theory states that learners are products of their homes.

Home background plays a vital and significant role in the life and education of South African learners (Page, 2016). South African studies (George & Adu, 2018) revealed that home background relationship where parents are supportive in learners' education have been identified as a means by which demographic gaps in learners' performances are closed in order to maximize learners' potentials. It was further established that most educated parents, especially the mothers are mostly concerned about their children's education and make sure that they are given a positive orientation necessary for a high academic performance (Mathias, 2009; Topor et al., 2010). In addition, (Ntekane, 2018; Kwatubana & Makhalemele, 2015) established that educated parents in South Africa most times make room for relationship with their children's teachers in order to provide necessary additional reinforcement to encourage learners' academic performance. It was also established that South African learners whose parents have strong value for science were perceived capable of performing better in mathematics and sciences (Perera et al., 2014). Several learners living in a single-parent household across the globe were also identified with possible challenges in their academic pursuits (Odeyemi, 2019; UNESCO, 2003). This was also established in South Africa and its suburbs (Adesokan & Makura, 2020; Mudau et al., 2018; Ogola, et al., 2018; Tawodzera & Themane, 2019).

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Home background and parental support have also been seen not to positively affect academic performance. Examples of such studies are in America (Marschall & Shah, 2016), Kenya (Muola, 2010), Nigeria (Alade & Idowu, 2017) and South Africa (Mattingly et al., 2015; El Nokali, et al., 2010). These studies findings show that home background relationship was not a strong factor that can influence learners' academic performance. In a similar development, it was also found that there are many learners without parental support, yet they still excel academically in America (Marschall & Shah, 2016). The present study focused on home background relationship on the 9th grade learners' perceptions of factors influencing their academic performance in mathematics in South Africa.

Methodology

This study was done within the parameters of post positivism paradigm which dwells on thoughts of objective reality. This paradigm was appropriate for the study because it makes possible for the 9th grade learners to express their feelings and perceptions in a real life situation, this is also due to the fact that the open ended items in the questionnaire requires the learners' real experience. The study samples were four hundred/400 9th grade learners who were selected following a random sampling technique from the sum population of 143,175 9th grade learners in Tshwane municipality. With 10 clusters identified, while the 400 learners were selected systematically with consideration to sex and classes; the study was also descriptive in nature and applied a mixed method approach, using a few open ended items combined in the researcher made questionnaire consisting 5 items called: Questionnaire on Student Academic Performance (QSAP), this was used for eliciting data from participants, and the questionnaire sectioned into two parts, A and B, the A section was for participants' demographic information, while the second section was meant for eliciting information from the participants on their perceptions regarding the factors influencing their mathematics performances. The learners' termly result in mathematics was also used in place of an achievement test to ascertain their performances alongside the questionnaire.

The responses followed a 4-point Likert scale, ranging from strongly agree, agree, disagree and strongly disagree, scored 4, 3, 2 and 1 according to each item in terms of scoring positive items, and a reversal of direction in scoring negative items. The validity of the instrument was achieved through experts in the field of measurement and evaluation, and psychology of education; while the reliability was achieved through a pilot test at schools of different location from the schools in the study. With test re-test method the reliability was empirically done with the intervals of four weeks, which gave a coefficient value of 0.65. The correlation of the variable on mathematics performances of learners was founded using Pearson Product Moment Correlation. The study instrument was personally administered by the researcher. The quantitative data were analysed quantitatively using SPSS (Statistical Package for the Social Science), while the trustworthiness, credibility, dependability and transferability of the qualitative data were ascertained, and the open ended questions section on strategies perceived for improving learners' performance were analysed in narrative forms. The mixed method approach shows objectivity in descriptions, interpretation and relates with the learners' perceptions and meanings in a natural setting.

Results

Hypothesis Analysis

A null hypothesis was formulated for this study, and had to undergo statistical testing in order to accept or reject the hypothesis. Pearson Product Moment Correlation statistics was applied in testing the hypothesis, and was tested at a significance of 0.05 level.

Hypothesis 1: There is no significant relationship between the 9th grade learners' perceptions of home background and their academic performance in mathematics in Tshwane municipality.

Data Analysis

Table 1: Relationship between home background and academic performance in mathematics

Variable	Mean	sd	n	df	r-cal	r-crit	Sig. Level
H. Background	14.44	2.26	400	398	0.16	0.20	0.05
Performance	54.96	13.51					

Not significant

Significance

Evidence from Table 1 shows a calculated r-value of 0.16 as the relationship between home background and academic performance of 9th grade learners in mathematics in Tshwane Municipality. This calculated r-value is not significant since it is less than the critical r-value of .20 given 398 degrees of freedom at .05 significant level. This means that there is no significant relationship between home background and academic performance of 9th grade learners in mathematics in Tshwane Municipality.

Discussion of findings

It was revealed from the present study that 9th grade learners perceived that there is no significant relationship between home background relationship and their academic performance in mathematics in Tshwane municipality. The learners negatively rated their satisfaction on home background, meaning that Tshwane 9th grade learners' perceptions of home background relationship was perceived to be insignificant to their academic performance in mathematics.

It was further perceived by the learners that most of the 9th grade learners' parents were not financially buoyant to adequately provide for their children's educational needs, especially the single-parent homes, yet the learners were able to cope with the little they had. Hence, there was no perceived significant relationship of the home background influence on the 9th grade learners. The finding of the present study on home background relationship corroborates these studies from America (Marschall & Shah, 2016; Tobin, 2013); Nigeria (Alade & Idowu, 2017); Kenya (Muola, 2010) and South Africa (Mattingly et al., 2015; El Nokali et al., 2010), all found that home background relationship was not a strong factor that can influence learners' academic performance. These studies established that there were several learners in different households, who had neither parents nor any parental support in their studies, yet they still performed well academically. In contrast, some literature such as (Jeynes, 2017; Ravitch, 2016:) in America, (Deslandes et al., 2015) in Canada; (Niklas et al., 2016) in Europe; (Radhika, 2019; Kudari, 2016) in Asia, India; (Li & Qiu, 2018) in China; (Odeyemi, 2019; Adetayo & Kiadese, 2011; Uwaifo, 2008) in Nigeria, and (George & Adu, 2018; Odeyemi-Bsd, 2020; Page, 2016; Perera et al., 2014; Topor et al., 2010; Mathias, 2009) in South Africa revealed that home background relationship was perceived as increasing the performances of learners' academic performance. The possible reasons for the differences between the literature and the findings of this current study that home background did not increase 9th grade learners' performance could be that learners stayed back in school to study with groups of learners before going home. It might also be possible that their teachers have been helpful in their studies after school hours because the learners may not have supportive parents and guardians at home. In addition, some of these learners may possibly enjoy learning and studying independently without their parents' involvement.

Perceived possible strategies for improving the 9th grade learners' academic performance in mathematics in Tshwane municipality, South Africa

The Grade 9 learners' perceptions of educated parent who is supportive in the learner's homework will help the learner to be more dedicated to his or her academic tasks. Due to the poor mathematics performance of learners and the necessity of the subject in all facet of academic endeavours, most educated parents have taken up the responsibility for the success of learners at school, due to the meaningful academic engagement given to their children. Educated parents also have a high level of occupational expectations from their children, hence they have to make it a duty helping their children to achieve their desired educational and occupational goals. The Grade 9 learners believed that when parents' level of income increases, such parents may be able to provide for their children's needs adequately in order to motivate them in their academic pursuits. Learners who do not have

adequate funding tends to be distracted and emotionally unstable, especially learners who lack regular provision of basic needs, both at home and at school. It was also established from the learners' view that when parents do not provide for their children's needs adequately, this may make the learners lose concentration on their studies. From the finding of the current study, it was perceived by the learners that parents should endeavour to be more actively involved in their children's home works and make periodic checks on learners' class work which may also make the learners to be more committed to their academic tasks. In the same vein, the learners perceived that fathers and mothers should live together as a family in order to be able to take care of their children collectively. This is perceived as capable of motivating the learners positively in their studies.

The following extracts from the open-ended questionnaire items confirm the above statements.

> *I believe that parents that are educated should be able to help their children* **(9th grade learner 130).**
>
> *I believe that parents' income level should be increased to enable them adequately provide for their children's need* **(9th grade learner 136).**
>
> *I believe that parents must live together and nurture their children together to achieve academic success* **(9th grade learner 200).**
>
> *I believe that parents that are good in Mathematics must give enough time to helping their children in home assignments* **(9th grade learner 204).**

From the responses given by the 9th grade learners on the open ended questions in the questionnaire, the following possible suggestions perceived by the learners that may be put in place to improve their academic performance in mathematics: 1. Educated parents should help learners in their school home works; 2. Increase in the level of parents' income; 3. Living together of both parents. These were also summed up as familial-cum-socioeconomic adjustment strategy.

The study also revealed the importance and need to proffer solutions to improve the 9th grade learners' academic performance in Tshwane municipality, South Africa. The finding of the current study concurs with Hajovsky et al. (2020) who established that there is an urgent need to find possible solutions to the problems of mathematics failure among South African learners.

The learners suggested in the present study that if there is adequate familial-cum-socio-economic adjustment strategy, the 9th grade learners' mathematics performance may be improved. Familial-cum-socio-economic adjustment is the ability of parents coming

together as an intact family which may improve their financial strength, thereby facilitating help for their children's academic performance. With familial-cum-socio-economic adjustment of parents, educated parents would rise up to expectation by cultivating the habit of guiding their children in their home works. This may encourage the learners and further assist the learners to put in their best in their studies, especially in mathematics. The finding of the present study on familial-cum-socio-economic adjustment corroborates the studies by Jeynes (2012; 2017) in Europe, Li and Qiu (2018) and Kudari (2016) in Asia that educated parents whose children had their support in their studies performed better than other learners who did not have educated parents that could help or guide them in their studies. Niklas et al. (2015, 2016) also revealed that supportive educated parents in Europe helped their children in the timely accomplishment of school home works and assignments frequently, thereby giving a high impact for better academic outcomes.

It was further suggested in the present study that when there is adequate familial-cum-socio-economic adjustment, parents' income improves, learners' educational and personal needs can be taken care of and as a result, such learners are encouraged and propelled to do better. Learners may also perform better due to the fact that the learners may have gained some psychological stability unlike when the learners' needs got them overwhelmed and discouraged which was a source of failure among learners. The findings of the present study on familial-cum-socio-economic adjustment strategy for improving mathematics performance concurs with Lacour and Tissington (2011) who revealed that American learners whose needs are adequately met by their parents perform better academically than other learners whose needs are not adequately provided for.

It was also suggested by learners in the present study that familial-cum-socio-economic adjustment should be in place (in which case, the parents will be together and their attention for the child will improve). Familial adjustment could make parents to live together so as to train their children collectively and adequately love the child. This may in turn make the child happy at all times, which is necessary for classroom concentration, not only this, but it will also help in getting learners' need met adequately. The findings of the present study on familial-cum-socio-economic adjustment strategy for improving mathematics performance concurs with Odeyemi-Bsd (2019) in Nigeria, and Radhika (2019) in India who all established that when both parents live together, they are a major form of security to the child. When parents live together, it makes the learners to share their feelings and challenges with their parents, believing that solutions would be proffered to their academic challenges.

Conclusion

The focus of the present study was to establish the 9th grade learners' perceptions of factors influencing their academic performance in mathematics in Tshwane municipality, South Africa. From the findings of this study, it can be concluded that learners' perceptions of home background relationship did not influence 9th grade learners' performance in mathematics.

Recommendations

A number of recommendations were also made as a matter of policy, these were: stakeholders should expose learners to the reality and importance of mathematics as a subject of global importance needed for South African economic and national growth, rather than embracing maths literacy as an option. Parents of 9th grade learners may be required to adequately take care of their children, by providing for their basic and academic needs. The provision of these needs may make the learners to be emotionally and psychologically stable. This may make room for learners' alertness and readiness to learn as well.

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