

# Exploring the Challenges of Teaching and Learning of Scarce Skill Subjects in Selected South African High Schools

**Siduduzo Cyprian Dlamini, Bongani T. Gamede, Oluwatoyin Ayodele Ajani**, Department of Social Sciences Education, University of Zululand, Email: [oaajani@gmail.com](mailto:oaajani@gmail.com)

This study explored the perspectives of teachers on learners' performance in scarce skill subjects. A qualitative approach was used to investigate the challenges of teaching and learning scarce skill subjects in King Cetshwayo District. Bronfenbrenner's theory of ecological systems theory was adopted as the theoretical framework to underpin the phenomenon. The theory enables the researchers to understand human development in various social, legal, economic, political and technological environments. A semi-structured interview guide was used for the data collection for the study. Data from the face-to-face individual interviews were thematically analysed to present interpretive findings for discussions. Findings revealed that several factors such as overcrowded classrooms, inadequate infrastructure, and inadequate appointments of teachers contributed to learners' poor academic performance in scarce skill subjects. Seemingly, inadequate necessary support from stakeholders affects the teaching and learning of these subjects in South African high schools. The study recommends collaborative effort among all stakeholders through regular evaluation of teaching to enhance learners' academic performance.

**Key words:** *Scarce skill subjects, learners' academic performance, stakeholders, ecological system, professional development*



## Introduction

Inadequate skills among both private and public employees in various sectors in South Africa's economy has continued to be a serious concern as established in different government documents such as the successive national Skills Development Strategies as well as Critical Skills List (CSL) published by the Department of Higher Education and Training (DHET) (The culture of employee learning in South Africa: towards a conceptual framework; 2017; A Technical Report for the 2020 Critical Skills List, 2020). Scarce skill subjects are crucial to the advancement of science and technology in South Africa, as the country's development is driven by the level of exploits in science and technology (Scarce skills Guideline 2015/2016). Science and technology are critical skills-based subjects that include Mathematics; Physical Science; Technology; Life sciences; Accounting and Agriculture. Science and technology-related subjects are scarce skills subjects that open doors for future growth and jobs for youths all over the world (Ojose, 2011). This means that in any nation, scarce skills subjects are the key to growth, and they are extremely important in our daily lives. They deal with real-life problems from all walks of life. Mathematics and other STEM subjects are important for technical careers in science and technology around the world (Tella, 2008; Pandor, 2006). The subjects are required for the capacity building of future professionals who will provide a solid foundation for successful theories to ensure diverse societies with a vigorous economy.

It appears that rare skill subjects are needed to propel countries forward through technological advancements. Mathematics skills are critical in both preparing arithmetic literate people for jobs and ensuring the continuous development of highly qualified employees who can push industries and different fields of specialisation (Mikulski 2001; Steen2001; House 2006). From home to workplace and almost every aspect of our lives, today's global society is completely dependent on technology. According to Maree, Aldows, Hattingh, Swanepoel, and van der Linde (2003); Maree and Steyn (2003), poor academic performance in these scarce ability subjects, especially mathematics, is unacceptably high in most South African schools. According to Mkgato and Mji (2006), low academic performance in most South African schools necessitates reform. Similarly, Howie (2001, 2003, and 2004), Naidoo (2004), Reddy (2015), and UNESCO/UNICEF -Monitoring Learning Achievement Project (2005) argue that there is a need in South African schools to improve learners' performance in scarce skills subjects.

Scarce skill subjects are vital to South Africa's technical development, as many fields of science and technology depend heavily on learners' comprehension and passing of scarce skill subjects in order to advance into related professions. As a result, more accounting and finance professionals are needed in South Africa to ensure that economic operations run smoothly and efficiently. As a result, feeders to higher education institutions should encourage learners to achieve good grades in mathematics at the matric level. There appears to be a need for the Department of Basic Education and all other stakeholders to provide all appropriate support to

scarce skills subject teachers in order to increase learners' awareness and interest in the vital scarce skills (Engelbrecht, 2009). South African learners, especially Black South African learners, do not perform well in scarce ability subjects (Brodie, 2004). According to Brodie (2004), if learners' poor performance in the scarce ability subject persists, the country's technical development may be hampered. The fourth industrial revolution is a global trend that has engulfed every sector in most developed countries, which is why South African learners need to be well-versed in these subjects.

### **Theoretical framework**

To explain the phenomenon, this research relies on Bronfenbrenner's Ecological System Theory. Human development is explained in terms of social, legal, economic, political, and technical environments, according to this theory. This theory outlines and connects the primary objective of sense, existence, and difficulties associated with phenomena in the real world, where proper experience and understanding to behave in an effective way is more knowledgeable. The capacity of this theory to outline a learner's growth as they evolve and interact with the world around them is its justification. Their learning habits are influenced by their experiences, which is why teachers must be aware of them in order to ensure successful learning. Learners' environment influences the way their cognitive levels develop. The theory of Bronfenbrenner is a systematic approach to individual and social progress. Teachers' use of the theory is to better understand how learning evolve in learners and how their interactions with their surroundings become more complicated as they grow older. As a result, teachers will be able to comprehend how their learners form fundamental relationships, as well as how teachers and learners can work together to develop a rich communication strategy that includes parents.

The theory recognizes five environmental systems with which a person interacts, all of which are related to learners' success in scarce skills subjects in South Africa. These systems are: a) Microsystem, which is the learner's immediate environment, which includes family, schools, and neighbourhood; b) Mesosystem, which connects the family, schools, and neighbourhood; c) Exosystem, which is the learner's indirect environment, which includes the Economic System, Educational System, and Government Agencies; d) Macrosystem, which explains social and cultural values; diverse custodians of customs and Beliefs; and e) Chronsystem which relates to various dynamic changes over time, Historical Events, Biological changes as well as the Physiological change. All these systems are what shape or influence the psychological development of the learners, and they impact their learning in schools.

Bronfenbrenner's ecological system has been widely adopted as a theoretical framework to explain and understand individuals within ecological contexts. The use of Bronfenbrenner's theory to underpin studies on human interactions has provided the basis for human actions within an ecological environment.



## Literature Review

Scarce skill subjects are subjects that provide learners with knowledge and skills, such as Mathematics, Science, Engineering, and Technology (STEM). STEM is a term used to group academic disciplines that are based on scarce skills. The term is commonly used to refer to education policy and curriculum choices in schools that aim to improve competitiveness in science and technology development. Scarce skill subjects are critical in South Africa as the country advances in technology and science and there is recognition of skill shortages (Scarce Skills Guidelines, 2015/2016). Scholars agree that the STEM discipline drives technological advancement and innovation, as well as providing the infrastructure to ensure a prosperous economic future (Watt, Richardson, Klusman, Kunter, Beyer, Trautwein & Baumert, 2012). Critical skills subjects provide the foundation for all scarce skills-related careers worldwide, such as biomedical nanotechnology engineers, who use information from computing, biology, medicine, and engineering to synthesize new approaches and solutions for innovative products and procedures to address global shortages (Yamaguchi, 2012).

One of the challenges confronting the South African education system is the production of adequate qualified, quality, and competent teachers capable of providing quality teaching and learning for all subjects at various stages of education (Centre for Development and Enterprise, 2015). Similarly, the South African government's National Development Plan (NDP) (2011) recognizes the importance and need for adequate "competent, highly qualified, and highly motivated teachers who can effectively teach mathematics and physical science to ensure quality education, training, and innovation" (van Broekheizen, 2015). Dee and Goldhaber (2017) argue that the inadequate scarce skills teachers are predominantly felt in subjects such as mathematics, science and special education in most South African schools, most especially the disadvantaged schools, where hiring and retaining teachers are chronic problems. Hence, schools in remote and disadvantaged areas have a limited number of quality teachers and also inadequate resources to promote quality teaching and learning.

Van Broekheizen (2015) and Dee (2017) in their longitudinal studies affirm that learners are struggling with the Scarce Skill subjects and that is why their performance in these subjects has continuously been worrisome. There are inadequate STEM teachers in most provinces that are rural in South Africa. The schools in these provinces have very few teachers to teach these subjects, and the available few ones are not effectively prepared to teach these critical subjects. While some rural schools sometimes use unqualified teachers who are teaching other non-critical subjects to teach learners, in an attempt not to leave learners behind (Persal May 2017). The quality of STEM-related subjects in schools is determined by the teachers. To meet the demand for STEM graduates, children must be educated by motivated teachers who have content and pedagogical proficiency in scarce skill subjects. According to McCarthy, Bernstein, and de Villiers (2011) of the Centre for Development and Enterprise (CDE), South Africa has a 15 000 new teacher shortage every year. However, the standard of teachers is more



critical than the size of the shortage, and more teachers would not necessarily increase learner results (McCarthy & Bernstein, 2011).

Another major issue affecting teacher supply in the school district is the low number of graduates joining the system. According to Van Broekheizen, the higher education system is still unable to produce enough graduates to fulfil the annual demand for trained new teachers. According to Engelbrecht and Harding (2009), mathematics is a necessary prerequisite for entering tertiary education and pursuing careers in the global knowledge-based economy, and that the youth unemployment rate in South Africa is correlated with low mathematical competency (Engelbrecht, 2009).

Teachers teaching scarce skill subjects face various obstacles, including obsolete teaching methods, a lack of basic content awareness, inadequate teaching standards, a large number of under-qualified or unqualified teachers, overcrowded and under-equipped classrooms, and so on (DoE, 2001a). Inadequate in-service instruction for teachers, according to Ajani (2019), tends to undermine the standard of education in most African countries.

### **Research Methodology**

The interpretivist paradigm was used to guide the qualitative approach used in this study. The interpretive paradigm enabled the authors to comprehend the participants' points of view and lived experiences, as well as to construct and interpret the data gathered (Thanh & Thanh, 2015). The authors were able to gain an understanding of the nature, quality, and needs of teachers teaching scarce skill subjects using this qualitative approach (de Vos, Strydom, Fouche & Delpont, 2011). According to Merriam (2009), qualitative approach inquiry employs richly descriptive language to convey “how people make sense of their world and the experiences they have in it.” This study's population consisted of teachers teaching scarce skill subjects in high schools at King Cetshwayo District, KwaZulu-Natal province in South Africa. The participants were purposively selected from six high schools within the District. The schools represented schools from both rural and urban locations.

The use of a semi-structured interview guide as the research instrument offered a versatile way of data collection, thus allowing the interviewer to use probes with a view for clarity or in-depth responses (Welman, Kruger & Mitchel, 2005). The interview guide was divided into two sections. The first section was used to collect biographic information about the participants such as qualifications and years of teaching experience. The second section was used to answer questions about the experiences of teachers and their expectations of the extent to which they are met. Probe questions were then asked and follow up questions were asked to clarify responses that were not clear. Data from the interviews were audio-recorded with the participants' permissions. The audio-recorded data was transcribed, coded to generate themes for presentation and discussion of findings (Braun & Clarke, 2006), equipping the interviewer to infer a verbatim transcript of the interview.

All the interviews took place in the natural school environment of teachers, where they were relaxed and comfortable to respond. The trustworthiness of the instrument was ensured. All ethical considerations were strictly adhered to by the authors (McMillan & Schumacher, 2011).

### Presentation and discussion of findings

Table 1: The participants' biographical information N= (6)

Participant	Gender	Age	Years of Experience
1	Female	24	02
2	Female	32	12
3	Female	40	20
4	Male	22	02
5	Male	30	09
6	Male	42	22
Total= 6			

As shown in Table 1, the balance in gender representation was purposive to avoid biases. The spread in ages was purposively selected to represent different age groups' views of the participants. The participants were engaged in a 30-40 minutes individual interview to share their lived experience on teaching and learning scarce skills subjects in the selected South African high schools. The analysis, presentation, interpretation and discussion elicited are carefully and interpretively presented. Pseudonyms have been used for some excerpts from the participants to confidentiality.

### Theme 1: Causes of poor performance in scarce skill subjects

The poor performance of learners in scarce skill subjects is usually observed after the matric examinations of the grade 12 learners. This may be because the education system seems to focus on the results of the final years of learning in high school. According to the teachers teaching these subjects, the good and the bad of teaching and learning in these subjects occur much earlier than the last grade in high school.

When teachers were asked the question that, 'to what success are learning intentions and criteria for success are made known to learners?' T1 said:

*"My learners do not even understand what is it that I am trying to say. They would say it could be better if I was saying that in vernacular".*

While another said:

*“It is difficult for my learners to understand in English, maybe because of their backgrounds in learning with their mother language” (T6).*

This largely suggests that the medium of instruction was not well understood by most learners. The learners will find it challenging to ask questions for clarity or answer questions, as they fail to express themselves clearly in English. The language of instruction in scarce skill subjects is English. These subjects often lack terminology in vernacular. Although switching from one language to another for the benefit of better understanding is not prohibited, but slow down the pace of teaching or consume most of the instructional time. This suggests why the medium of instruction with the English language create gaps in teaching and learning in earlier grades (Woodfield et al, 2017). Similarly, the question papers for the final examinations are written in the English language. Hence, learners who have challenges in interpreting the question papers within the period of examination will end up performing poorly. Also, some learners may lose interest in the subject because they could not express themselves in the accepted medium of instruction, and so feel less important in the class (Reddy, 2015).

While another teacher identified too many teaching loads as another cause of learners’ poor academic performance in scarce skill subjects.

*“Most of the teachers teaching science subjects have unreasonably teaching loads. There are too many learners in one classroom. We are in class teaching from the first period to the last and the only time to refresh is break time” (T3).*

*“Lack of learning support materials is another cause of poor performance in scarce skills-subjects for us as teachers. Learners’ lack of books makes it difficult for effective learning. For example, in the class of 70 learners there were only about 20 books. Most of the learners would not do homework sighting that they did not have books. In some cases, only the teacher has a copy and teachers could not make copies available for all learners” (T5).*

*“Most learners don’t have books and their parents cannot afford to buy those books because parents are not working” (T2).*

This suggests the absence of needed materials will affect meaningful learning in schools and will affect also the coverage of the syllabus or the content by the teachers. The final examination is based on the whole curriculum for each subject, so schools or learners who cannot cover all the subject-contents will be disadvantaged (Ojimba, 2012).

## **Theme 2: Challenges Faced by Teachers in scarce skill subjects.**

Overcrowding in classrooms is one of the most significant challenges that teachers face when teaching practical subjects, making it difficult for the teacher to attend to every learner’s

challenges during lessons. Others include parental neglect or inadequate support for learners' education at home. Another issue that may arise is a learner's lack of subject knowledge:

*“Inadequate classrooms are giving us tough times as teachers. We need a smaller number of learners to deal with at a time; if we must make these learners achieve learning. When you have many learners to teach, effective learning cannot be attained at all” (T1).*

*“Some learners exhibit poor background of a basic concept in a subject. They are unable to apply basic skills which should have been learned from earlier grades” (T2).*

Teachers frequently blame learners for having a poor background from their earlier grades. Basic concepts that should have been learned in earlier grades are frequently missing when learners reach high school. According to the study, when such gaps are discovered, learners frequently find it difficult to learn new things because they do not understand or know where they started. The teacher frequently blames the learners' poor academic performance on the environment at home. The environment at home can either help or hinder academic success. Domestic squabbles between parents, particularly those who are poor and unemployed, result in child neglect. Learners who perform poorly may have other issues such as death or divorces which are highly emotional issues to cope with. The situation might become worse because schools have no mandate to interfere with family matters. Such homes do not encourage learners to study at home or attend to homework.

*“Most learners come to school the next day having not done the homework” (T5).*

Learners whose parents do not encourage or assist will find it difficult to attend to their homework at homes. This may be due to their parents' illiteracy or inability to understand their children's homework. While in some cases, some parents are working far away from home, and so they get back home late to assist their children with homework. Lack of assistance or support to teachers is another challenge.

*“I did not receive any assistance from the school SMT. I had to find my way through trial and error which was mostly errors. We also go to the subject workshop here at school” (T3).*

Muremela, Kutame, Kapueja and Lawrence (2020) agree that the success of learners in academic is influenced by the number of support stakeholders give to both learners and teachers toward teaching and learning. Both the teachers and the learners need to be adequately provided with all the necessary teaching and learning materials (Reardon, 2011). This support averts avoidable challenges that can hinder smooth operations of the school system. Makgato and Mji (2006) highlights overcrowding, unqualified teachers, lack of necessary support to teachers as some of the various challenges that are influencing learners' performance in South African schools. Teachers need to be provided with regular and appropriate workshops to enhance their

classroom practices (Govender & Ajani, 2021). The workshops and training will help teachers to inculcate the right culture of learning in learners (Khathi, Govender & Ajani, 2021).

### **Theme 3: The Role of Stakeholders towards improving learner performance in scarce skill subjects**

This includes government officials, members of school boards, and teachers. In education, a stakeholder is anyone who has a vested interest in the well-being and success of the school and its learners, including teachers, staff members, parents, families, school administrators, community members, local business leaders, and elected officials such as school board members. Teachers agree that these stakeholders are to blame for the majority of the flaws that contribute to learners' poor academic performance.

*“We do not have enough classrooms here at school. Those classrooms that we have are old and poorly maintained. Some have broken windows and sometimes there are no doors” (T1).*

*“It is difficult to teach science-related subjects without well-equipped laboratories. There is a need for learners to have both theories and practical knowledge of the curriculum. So, for us in such schools without these infrastructures, we cannot do that” (T5).*

*“We lack qualified teachers to teach these subjects. It is a big problem in most rural schools. It is difficult to get adequate qualified teachers to teach these subjects in rural schools” (T3).*

Most of the rural schools have access to limited numbers of quality teachers and they also lack the necessary resources to promote efficient teaching and learning in these rural-based schools. Thus, infrastructure significantly affects learners' performance in scarce skills subjects. Inadequate or absence of laboratories for STEM-related subjects will affect learners' in-depth knowledge and skills in the STEM subjects (Akoojee & Nkomo, 2008).

This implies why inadequate or absence of necessary teaching and learning materials affects the learning capabilities of learners in scarce skills subjects such as mathematics, science and technology in such schools.

Finance and Politics have a big role in the success of school education. Teachers believed that politics around the school affects teaching and learning in the school.

*“Yes. If for example, one political group is dominant around the school, they often do not allow learners from the neighbouring village to attend that particular school” (T2).*

Education and politics exist in a symbiotic relationship. This agrees with Wales, Magee and Nicholai (2016), that the application of political differences can influence the progress in education access and quality. The education system, therefore, needs to be understood in the

light of the political context, rather than in isolation from it. Groups or individuals such as trade unions, traditional chiefs, criminal gangs or even civil societies could impact learners' performance. Learners' academic performance is said to be influenced by trade unions. Teachers unions are politically motivated and can call for meetings during school hours, leaving learners in schools with no teachers to teach them during their meeting hours (Reardon, 2011). Occasionally, different trade unions will use different days for their activities, leaving the school with 'skeleton' staff to handle school-related matters. They frequently wield authority over who is appointed to a vacant position at the school, and the best candidate is frequently overlooked (Nader, 2008). Differences in learners' abilities, according to Engelbrecht (1996), represent social realities such as poverty, political and socio-economic backgrounds of learners as they affect the school system. The learners need to be encouraged and monitored as some of them are struggling to learn or be serious academically as a result of substance abuse (Nzama & Ajani, 2021).

#### **Theme 4: Inadequate parental support**

Parents and learners both identify parents as very important participants that affected or could play a vital role in improving learners' performance at school. Teachers indicated the problem of learners in taking scarce skills subjects is compounded with the lackadaisical attitude of their parents to their study.

*"Most parents do not care about learners' performance in school subjects. They fail to provide the necessary support to assist the learners" (T4).*

Another teacher believed that parents who are not educated do not understand the importance of any subject.

*"Most times I invite parents to inform them of their wards' poor performance in the subject, and the need to provide the learners with necessary materials. These parents do not understand the importance of education, not to talk of the need for good performance in any subject" (T5).*

Parents have the responsibilities to support and provide necessary materials that can influence learners' readiness to learn in the school system (Ojimba, 2012). Ramrathan (2017) opines that parents must support teachers if learners must excel in academic activities. Similarly, Du Plessis and Mestry (2019) affirm that support from parents enhances continuous and positive influence to enhance and complement school's effort on their children. Thus, adequate parental involvement critical to the education system. Parents can regularly participate in various school functions, provision necessary school equipment. However, the socio-economic status of parents, as well as the work-related demands of the parents, will influence their level of involvement in supporting the school activities of their children (Ramrathan, 2017). Mncube, Mkhasibe and Ajani (2021) assert that parental support is critical to learners' academic success.

The parents need to show concern to these learners' academic activities, and in these way, learners can improve their learning activities.

### **Theme 5: Lack of regular and adequate professional training for teachers**

Teachers revealed that they lack appropriate workshops or training to enhance their classroom practices. The education system is dynamic and requires constant training for teachers to be relevant.

*“We do receive in-service training, but they are not regular”* (T6).

Another teacher said:

*“I think as teachers, we need more support in form of regular and appropriate workshops on our teaching approaches. We need to update our classroom practices to accommodate approaches that will make learning attractive to these learners”* (T5).

The teacher agreed that outdated teaching practices and lack of basic content knowledge have resulted in poor teaching standards.

*“Many of us have been employed when ICT was not in vogue, but these days, ICT has taken over every area of our lives. So, we need to inculcate this into teaching. But, as teachers, many of us do not have the knowledge or skills for this”* (T3).

To maintain teachers' efficiency in classroom delivery of their subject content, there is a need for them to be regularly capacitated through appropriate and regular in-service training (Padwad & Dixit, 2011; Ajani, 2019). Teaching and learning become impaired when teachers teach in overcrowded and non-equipped classrooms (DoE, 2001a). Lack of regular professional development activities for a teacher is a critical challenge to their effective classroom performance (Ajani, 2020). Hence, regular capacity building is necessary for teachers to drive a quality education system. Tsotetsi and Mahlomaholo (2015) affirm that most developed countries have invested heavily in the training of their teachers as a means of enhancing their classroom practices, which also improve learners' academic performance. According to Ravhuhali, Kutame and Kutame (2015), denial of teachers regular access to appropriate in-service professional development programmes, will affect teaching and learning. Ajani (2021) asserts that teachers of same subject can use WhatsApp groups to share information as well as professional development of their classroom practices.

### **Conclusion**

The study explored the challenges of teachers who are teaching some scarce skills subjects in selected high schools in South Africa. The participants expressed diverse views on their lived

experiences on teaching and learning of these critical subjects in schools. Extant literature affirms that learners perform poorly in these subjects, and this poor academic performance of the learners is a serious concern to the stakeholders in the education system. The shortage of critical skills in the South African economy continues to linger, due to the low number of learners who pursue further careers in STEM-based subjects in higher education. Teaching and learning scarce skills subjects require adequate and prompt attention to improve learners' performance and interest in the subjects. The Fourth Industrial Revolution is a global wind that is driven by knowledge and skills from these scarce skills subjects. Hence, teachers of these subjects need to be supported to improve their classroom practices. The study identifies gaps in the provision of support to these teachers in enhancing learners' performance in the subjects.

### **Recommendations**

Based on the findings of this study, the authors recommend the following strategies to improve learners' performance in scarce skills subjects:

- The Department of Basic Education should employ more scarce skills subject teachers to reduce the teaching load of the available teachers and for the provision of adequate teachers in many struggling schools in disadvantaged areas.
- The Department should also address the issues of poor and inadequate infrastructure like classrooms, laboratories, running water, ICT, and furniture.
- The Department should provide regular and adequate in-service professional development support to teachers to improve their classroom practices.
- The Department of Education and all other stakeholders should provide necessary learning materials for learners.
- Learners should be encouraged and provided with socio-economic support to pursue careers in scarce skills subjects in teacher education.

### **Limitations of the Study**

This study was limited to teachers teaching scarce skill subjects (STEM) in high schools (FET) from six high schools in the uMhlathuze Circuit under King Cetshwayo District. The study, therefore, represented the data from one circuit and could not be generalised for the whole circuit, district, province or country at large (Mack (2010)). The study has succeeded in gaining some insight into teachers' perspective about the poor academic performance of learners in scarce skill subjects in South Africa. The authors, therefore, recommend a large scale study on the phenomenon to generate larger results.



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