

# SOUTH AFRICAN LIFE SCIENCES TEACHERS' EXPERIENCES WHEN EMPLOYING DIFFERENTIATED INSTRUCTION TO FOSTER INCLUSIVITY

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## Abstract

In South Africa, addressing historical inequalities in education and embracing diverse learner needs remains crucial. Globally, the Salamanca Statement on Education for All has greatly influenced the adoption of inclusive education policies in various schools. This led to the inclusion of learners regardless of intellectual, physical, emotional and linguistic changes. Consequently, South Africa cemented its commitment with Education White Paper 6 (EWP6), outlining strategies that can be adapted by schools to cater to diverse learning needs, especially in heterogeneous classrooms commonly found in full-service schools. Moreover, the Curriculum and Assessment Policy Statement (CAPS) document encourages teachers to create inclusive and responsive learning environments. To meet these demands, differentiated instruction (DI) must be employed by teachers to address various learner profiles in heterogeneous classrooms. As such, this study aimed to explore Life Sciences' teachers experiences of employing DI to foster inclusivity in their classrooms within a public full-service school in Johannesburg, South Africa. Four Life Sciences teachers participated in semi-structured interviews and lesson observations to collect data for the adopted qualitative case study methodology. The Reformed Teacher Observation Protocol (RTO) tool was used to evaluate the extent to which the lessons aligned with DI principles. Findings reveal that although teachers have a sound conceptual understanding of DI and value its affordances in fostering learner engagement and improving academic performance, they have significant challenges. These challenges entail limited resources, time constraints, heavy administrative duties, late detection of learning barriers, learners' disinterest and inadequate support from the School-Based Support Team (SBST) and School Management Team (SMT). Also, while helpful, teachers find the Secondary School Improvement Program (SSIP) workshops overly theoretical and CAPS guidelines offering limited practical support on how to create inclusive classrooms through DI. The findings contribute to the ongoing studies on inclusive education in South Africa by uncovering the lived experiences of Life Sciences teachers. Furthermore, they highlight the need for clear and practical DI guidelines in CAPS, enhanced teacher training programs and improved resource allocation to support teachers in fostering inclusivity through DI practices.

**Keywords:** *Differentiated instruction, full-service school, inclusive education, life sciences teachers' experiences.*

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## 1. Introduction

South African classrooms are characterized by being diverse, thus challenging teachers to effectively cater to every learner's needs (Onyishi & Sefotho, 2020). Learners' diversity entails differences in gender, ethnicity, race, socio-economic backgrounds, languages, and learning styles, amongst other factors (Majoko & Phasha, 2018; Possi & Milinga, 2018). As a result, when teachers employ traditional teaching methods, they often fall short in addressing the wider range of learning needs existing in a classroom (Mkhalemele & Jama, 2023). To address this issue, differentiated instruction (DI) has become a viable approach for teachers to create inclusive learning environments (Onyishi & Sefotho, 2020; Gheysens et al., 2023). Defined as an instructional approach that considers the employment of various ways of teaching to accommodate individual learner needs (Tomlinson, 2017), DI permits teachers to strategically plan lessons that cater to varied learner profiles in their classrooms (Mulder, 2014).

The South African policy was heavily influenced by the Salamanca Statement and Framework for Action on Special Needs Education (UNESCO, 1994; Department of Education [DoE], 2001). It is the document that served as a foundational basis for South African inclusive education (Tebele & Chaka, 2024).

Since then, the Education White Paper 6 (Special Needs Education: Building on Inclusive Education and Training System, 2001) was introduced, advocating for an inclusive education approach (Department of Basic Education [DBE], 2011). This Education White Paper 6 (EWP6) entails adapting education structures, systems, and pedagogies to meet the needs of all learners while acknowledging their unique identities and experiences (Maphalala & Ngubane, 2023). Concurrently, the South African Curriculum and Assessment Policy Statement (CAPS) document for Life Sciences underscores the seriousness of inclusivity, emphasizing that it should be a central aspect of school organization, planning, and teaching (Department of Basic Education [DBE], 2011). Masunungure and Maguvhe (2023) emphasize that to achieve this, teachers should be educated about inclusion to support the vast needs of learners.

This research, therefore, aims to uncover teachers' experiences of employing DI as a means of promoting inclusive classrooms when teaching Life Sciences. To achieve this, four teachers were interviewed and observed in a full-service school in Johannesburg.

## 2. Review of literature

DI is an approach that allows teachers to strategically plan to meet the needs of all learners (Tomlinson, 2010; Tomlinson, 2017; Onyishi & Sefotho, 2020). Ismail (2019) posits that DI aims to address learners' needs according to their interests, readiness level and learning profiles by adjusting the curriculum. In a study conducted by Aftab (2015), it was revealed that teachers have a positive attitude towards DI. Teachers expressed that employing DI does not only address diverse learning styles but also accommodates learners with special needs (Aftab, 2015; Talain & Mercado, 2023). Moreover, Ginja and Chen (2020), and Sibanda (2021) revealed that more teachers believe that DI can positively impact their pedagogy in their diverse classrooms. However, Santos and Miguel (2019) argue that it is possible for teachers' beliefs to be incongruent to what they practice in class.

Life Sciences classrooms have learners from diverse cultural backgrounds, genders, learning preferences and languages (Motloug, 2019). Thus, it becomes necessary to employ DI to attend to all learners' needs. Differentiated learning activities are mostly learner-centered, contrary to traditional instructional strategies (de Jager, 2019). Learners become actively involved in constructing knowledge (Tomlinson & Imbeau, 2010). As opposed to banking by Freire (2000).

Despite the affordances of DI, its implementation is not without shortcomings. Bondie et al. (2019) and Suprayogi et al. (2017) discovered that various challenges prevent teachers from successfully incorporating DI into their instructional practices, including a lack of resources and time, personal beliefs, and insufficient training, competence, and collaboration. de Jager (2017) highlighted similar issues prevalent in South African schools. Also, Maphumulo (2016) uncovered that pre- and in-service teachers receive less quality training. As result, teachers require constant support and professional development to effectively enact DI practices (Gheysens & Engels, 2020).

## 3. Research methodology

To uncover Life Sciences teachers' experiences when employing DI, a qualitative case study approach was used. This entailed semi-structured interviews and lesson observations (Creswell, 2017). Ethical considerations involved consent forms, acquisition of ethical clearance and maintaining the anonymity of the participants through using pseudonyms. Also, ethical clearance to conduct the study was issued (*S E M 1-2 0 2 4 -1 1 4 /5 June 2024*).

### 3.1. Sampling

Four teachers from a school in Johannesburg North, D10 district, Gauteng, participated in this study. These teachers are registered with the South African Council for Educators (SACE) and employed by the DBE in a Johannesburg public school, and they specialize in Life Sciences teaching, from Grade 10-12. The method of sampling that was selected was a purposeful sampling. In purposive sampling, samples are selected to create an in-depth view of the investigated factor (Shaheen et al., 2016). This implies that, in the first step of this sample, the researcher had selected participants who have more knowledge or expertise on DI.

### 3.2. Data collection process

Four semi-structured interviews were conducted, recorded and transcribed online through Microsoft Teams. Ruslin et al. (2022) argues that semi-structured interviews are mostly effective in a qualitative study since they enable the researcher to get in-depth information from the participants including their perceptions, challenges and affordances of DI implementation. To corroborate the findings, participants were observed and recorded on two occasions, making a total of eight lesson observations.

### 3.3. Data analysis

Using transcribed data from MS teams, codes were generated and categorized into seven themes. However, this paper only focused on three themes. Also, video recordings of the lesson observations were coded and categorized as per the themes from the Reformed Teaching Observation Protocol (RTOP) instrument (Sawada et al., 2002; Ndiokubwayo et al., 2020).

## 4. Findings

The findings of the study unpacked Life Sciences teachers' experiences when employing DI in their classrooms from the semi-structured interviews and lesson observations. Data from interviews were categorized into three themes namely teachers' understanding of DI, perceived affordances and challenges of employing DI to foster inclusivity. To corroborate these findings, lesson observations were analyzed against RTOP criteria. For ethical reasons, pseudonyms were used instead of teachers' real names.

### 4.1. Theme 1: Teachers' understanding of DI in life sciences classrooms

In this theme, teachers showed a great conceptual understanding of DI in teaching Life Sciences. This was noted in teacher Naledi's response:

*Naledi: ...My understanding of differentiated instruction is being able to tailor a lesson and instructions to better accommodate learners with different learning abilities.*

Teacher Naledi's conceptualization of DI suggest a sound understanding and what it entails such as tailoring and lesson and instruction for catering to differently abled learners.

### 4.2. Theme 2: Perceived affordances of DI in Grade 11 Life Sciences classrooms

The second theme was generated based on the affordances of DI in the context of Life Sciences teaching based on the responses provided by teacher Naledi and Rofhiwa:

*Naledi: ...it becomes a game changer. Learners become more confident, enjoy the subject and want to learn the subject.*

*Rofhiwa: ...Using differentiated instruction enables learners to have a deeper understanding of the content.*

Similar to Theme 1, Teachers' responses suggested that DI is an innovative strategy in enhancing Life Sciences learning promotes learners' confidence and enjoyment of the subject. Also, it facilitates the comprehension of the content.

### 4.3. Theme 3: Challenges of employing DI in grade 11 life sciences classrooms

The third theme captured numerous challenges faced by teachers when implementing DI to foster inclusivity in their classrooms. These challenges encompass time constraints, limited resources which fostered teachers to self-fund themselves. Also, teachers experienced time constraints as teachers have heavy administrative responsibilities to fulfil and late identification of learning barriers. The following responses came from teachers:

*Margaret: ...Sometimes you must buy something. ...that money comes out of your pocket.*

*Oludara: ...Sometimes the non-teaching activities are more than the teaching activities. There are many admin duties.*

*Rofhiwa: ...Some learners have a challenge with handwriting and it's things that are that are not even picked up early.*

These findings elucidate that due to limited resources, teachers are forced to buy them. Also, due to pressures of syllabus completion and heavy administrative duties, barriers learning are not identified earlier. Moreover, teachers heighthted that, although supportive, SBST and SMT does not provide adequate support for employing DI. Evident to this was teacher Oludara's response stating "From time to time they support... but some of the resources you need are beyond the SMT or SBST."

Furthermore, teachers claimed that SSIP workshops and the CAPS are overly theoretical. This was noted as Oludara stated that, "Workshops are organized from time to time, but they are mostly theoretical... the practical aspects are not addressed."

Naledi also shared similar sentiments saying, “CAPS and the policies help us, but more training is needed to fully address learner diversity in the classroom.”

## 5. Discussions

Teachers’ understanding emphasizes that DI is not just about adapting instructional methods but also involves tailoring tasks to individual learners’ abilities, as supported by Tomlinson (2017). The researchers identified similar patterns in teachers’ responses, in that, they all value the affordances of DI. Similarly, the studies conducted by Ginja and Chen (2020) and Sibanda (2021) identified that teachers have positive perceptions towards DI. While the findings show that teachers value DI, its implementation is not without problems. The major obstacles identified were a lack of resources, insufficient time and pressure for syllabus completion, low learners’ interest, inadequate support from the school structure, lack of training in DI techniques. These challenges mirror those identified by Bondie et al. (2019) and de Jager (2019), who found that South African teachers struggle to employ DI due to inadequate support systems and heavy workloads. According to Gheysens and Engels (2020), effective DI relies on clear and actionable policy support, yet current CAPS guidelines lack the depth needed to support practical differentiation in classrooms. Without explicit guidance, teachers face uncertainty in adapting lessons to meet diverse learner needs, which impedes the full implementation of DI.

## 6. Conclusions and recommendations

This study explored Life Sciences teachers’ experiences of employing differentiated instruction for fostering inclusivity in their classrooms. The findings revealed that teachers understand DI and value its role in Life Sciences. However, there were various challenges encountered by teachers, hindering DI employment. These challenges included lack of resources, time constraints, poor learner interest, minimal support from SBST and SMT, unclear and over theoretical workshops and CAPS. Therefore, this study recommends that teachers should receive continuous training on DI strategies particularly integrating technology in resource-constrained environments. Schools should reconsider curriculum pacing guides and reduce administrative workload to provide more flexibility for teachers to employ DI, reducing reliance on traditional teaching due to time pressures. Education departments should invest in providing schools with sufficient technological resources and multimedia tools to enable teachers to employ DI more effectively in fostering inclusivity. Also, the government needs to provide teachers with necessary guidance on safely disposing of expired chemicals, to foster a safe and supportive learning environment. Moreover, Teachers should receive training in effective classroom management techniques that support learner-centered approaches, minimizing disruptions while promoting active participation. Lastly, there should be follow ups from the SSIP training programs to ensure that teachers effectively employ differentiated instruction in their classrooms.

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